Enhancing Estimation with Neuro-Semantic NLP[1]

By Pascal Gambardella, PhD, ACMC

"What gets us into trouble is not what we don't know; it's what we know for sure that just ain't so[2]."

Summary

This article is about calibrating your confidence to become a well-calibrated estimator. It provides a step-by-step estimating approach, enhanced by Neuro-Semantic NLP, that can be applied to estimating risk, probabilities, costs, or even how many people will come to a workshop or training. This approach counters the natural tendency for many people to be over-confident in their estimates, and can even help you be a better estimator when estimating things outside your own field. A calibrated estimator has just the right amount of confidence for estimating, with a clear understanding of how much he or she does and doesn't know.

A Client with a Problem

You are a Business Consultant listening to your client tell you about her problem. She wants you to find a way to help her staff better estimate risk, especially when estimating the expected return on a candidate innovation or estimating costs when bidding on government contracts. It seems many people on her staff were overconfident in estimating risk, and her company lost money when marketing a supposed innovation. If her staff could more accurately associate best case

and worst case numbers with certain aspects of an innovation (e.g., base cost, potential users, and advertising budget) they could do some quick calculations and decide whether to take a chance on funding the innovation or spending more money to better estimate their likely success. To better estimate costs they may also need to decide if there are things they could measure (e.g., potential users) that will help them. The measurement process itself costs money. The entire estimation process, including the costs of measurement, will cost much less if rather than seeking information that gives them 100% certainty (if at all possible), it allows them to be, for example, 90% confident.

While listening to her you realized that some trainers you know have a similar, but less complicated, problem. They need to decide whether to give their Neuro-linguistic Programming (NLP) training in Washington DC and want to have a certain degree of confidence that a given number will attend. They would even like to make money. If, for example, they were 90% confident that between 20 and 50 people would attend and they needed 25 people to break even, then they could calculate their expected gain or loss and decide if the risk was worth taking. Of course, the actual calculation is more complicated. More people might attend if the price was less, and they might reach more people if they spent more on advertising. How do they decide what to do?

There are four basic steps to this approach[3] (1) estimate business quantities with some level of confidence, (2) decide if you need to identify things to measure that will enhance your estimates (and you have the money to accomplish this), (3) calculate how much you will gain or lose if you move ahead with your endeavor, and (4) decide whether the risk is worth it. Her team could already do the last three steps well, doing the calculations with something called Monte Carlo

techniques, which evokes the magic of statistics and spreadsheets! She wants you to help with the more difficult first step, which in her words is to "help calibrate people to be better estimators of probability." Her need is urgent and you don't have much time.

Being the premier consulting agency you would ideally take a multi-pronged approach:

a. Research the skill of estimating and create a straw man model of "how to effectively estimate" based on what you learn. This helps immerse yourself in the field and identify things you want to investigate.
b. Find people who have the skill and model them, taking care not to be anchored to your initial model.
c. Integrate the results of steps (a) and (b).
d. Test and enhance the model until it is good enough for your purposes.

Neuro-Semantic NLP – An Ace in the Hole

You hit your first obstacle: "How do you find people who estimate probabilities well? Do you advertise? Given the time crunch you decide just to research the skill of estimating and create a straw man model of how to effectively estimate for the client. Your ace in the hole is the use of Neuro-Semantics (Hall, 2011), which includes NLP. Some people refer to Neuro-Semantics as Neuro-Semantic NLP. Neuro-Semantics provides a framework to help you integrate the research you encounter. It also provides behavioral distinctions to help you model the skill. You can use the subsequent model when creating a training to teach the skill to others.

According to Hall "NLP focuses on the how of human behavior" and Neuro-Semantics adds another distinction to NLP by focusing on "the why of behavior (its meaning)." Why is

"meaning" important in learning a new skill? You realize that to learn a new skill effectively (especially one that is not in the comfort zone of many people) requires more than just going through a series of external behavioral stages or steps. It requires being "in the zone" like an Olympic athlete needs to be before and during their event (Cooper and Goodenough, 2007). How often have you heard someone say?

> "I have to be in the right frame of mind before I can give a presentation before a new client (or compete in a swim meet, or play a round of golf, or meet an old flame)?"

Neuro-Semantics generalizes "frame of mind" to "frame of reference." This frame of reference (or "frame" for short) could include the beliefs, mind-body states (or "states" for short), and perceptual filters, etc., needed to support the stages and steps. **Frames govern how we make meaning.** Many people who hear the word "probability" groan and think of "arduous mathematics classes and tedium" (i.e., a frame). However, Pierre Simon De Laplace said

> "The most important questions of life are, for the most part, really only problems of probability."

What a shift in meaning from "tedium" to "the most important questions in life!" Neuro-Semantics helps align your inner frames of reference (i.e., frames of meaning) and the external stages and steps to the performance you want to achieve. Uncovering these frames and employing them can facilitate learning how to be a "calibrated estimator", and how to teach others to be one.

One way to discover these frames and associated behavior is to model people who are successful at this skill. Since you don't have time to model "calibrated estimators", what can you do to find

the behavior and inner frames that support having this skill? One option is to do research to find someone who describes insight into this skill because they have modeled people who have it.

Researching and Modeling

You did research and discovered that many years ago Daniel Kahneman and Amos Tversky (Kahneman, Slovic, Tversky, 1982) conducted research into how people estimate probabilities. You also discovered that estimating probabilities was more recently discussed by two authors: Douglas Hubbard, author of "How to Measure Anything" (3rd edition, 2014) and "The Failure of Risk Management" (2009), and Dylan Evans, author of "Risk Intelligence" (2011). Evans does not reference Hubbard's work. This gives us two recent, independent perspectives on the same problem, even though some of their references are the same (e.g., Kahneman and Tversky). What follows interweaves what was learned from Hubbard and Evans and indicates how Neuro-Semantics is relevant.

In his books, Hubbard discusses techniques for training people to accurately estimate important "business quantities." For example, suppose you wanted to estimate how many people will attend your next training. Although you might tend to give just a one number answer like 25, an answer that also tells how confident you are is better. You might express your confidence by saying; "I am 60% confident that 25 people will attend" or "I am 90% confident that between 5 and 40 people will attend." The later example is called a 90% confidence interval. It means: if we ask a person to estimate 100 times, his estimate will be within the interval (i.e., 5 and 40) 90 times.

Hubbard discovered that most people are overconfident in their estimates[4]. To be a successful estimator you need just the right amount of confidence with a clear understanding of how much you know and don't know. Hubbard trained people in how to estimate and calls his successfully trained people "calibrated estimators." They have developed a new ability. Dylan Evans speaks of a more general ability, which he calls "Risk Intelligence." In his book, Evans said:

> "At the heart of risk intelligence lies the ability to gauge the limits of our own knowledge – to be cautious when you don't know much, and to be confident when, by contrast you know a lot."

What is interesting is that once calibrated, Hubbard's calibrated estimators can provide accurate estimates outside their field of expertise. Hubbard has a simple technique (i.e., Equivalent Bets), which we will discuss shortly, that can suggest whether someone is underconfident or overconfident when making an estimate.

Evans studied expert gamblers and compared them with ordinary (or problem) gamblers. An "expert gambler" is a type of calibrated estimator. Identifying the mental map of expert gamblers can help create frames for calibrated estimators. In a New Scientist article (May 2012) Evans said (I **highlighted** some passages and added the brackets) in response to the question "What's the difference between an expert gambler and an ordinary gambler?"

> "The expert gambler makes money and the problem[5] [ordinary] gambler loses it. But there are emotional differences. Although they both gamble a lot and it appears to be compulsive, expert gamblers know when not to bet, **they evaluate their opportunity each time.**

> There is also a big asymmetry in feelings about winning and losing. Problem [ordinary] gamblers get a buzz from winning, it's like an adrenalin rush, but they don't mind losing that much. With experts, it's the opposite: they don't get a huge kick out of winning, the pleasure is more cognitive. **But they hate losing so much that they are constantly re-evaluating their decisions and finding out how to do better.**"

How does knowing this help? The ordinary gambler seems to filter out any obstacles or problems and just thinks of the outcome of winning; whereas, the expert gambler doesn't get a "huge kick out of winning" instead pays a lot of attention to what can go wrong. I wonder if active investors who are successful in the stock market fit the profile of an expert gambler. If so, mastering estimation skills could prove useful in today's turbulent market environment.

Let's explore the tendency of some people to just pay attention to the outcome, and others to pay attention to what can go wrong. The NLP Meta-Program model is about the perceptual filters we place on the lens through which we experience the world (Hall and Bodenhamer 2005, Hall 2011, Charvet 1997). According to Hall (2008) "A meta-program is a cognitive-emotional program for perceiving, noticing, and orienting yourself in life…A meta-program is your lens for seeing." The meta-program in the gambler's situation is called Motivation Direction. Operating within this meta-program, a person's motivation can lie anywhere on a spectrum with "towards" on one end, and "away from" on the other end; where we distinguish between those motivated "toward" outcomes or goals, and those motivated toward solving a problem that gets them "away from" a threat or issue. In a particular context, people can change their position on the spectrum between "towards" and "away from" to encompass more of the distinction they need in that context.

We associate frames with the Motivation Direction meta-program and can say the expert gambler follows the Problem Frame. He is motivated not to lose and will address any potential problem, issue or obstacle he thinks will prevent him from winning. The ordinary gambler follows the Outcome Frame. He is motivated to win and may not focus on potential problems. As mentioned earlier, having just the right amount of confidence is important in estimating with a 90% confidence interval. Within the Problem Frame, the expert gambler could be in a "cautiously confident" state. This state is called a meta-state in Neuro-Semantics since it a state of a state. We can associate a frame (e.g., beliefs, attitudes) around being cautious and one around being confident. "Cautiously confident" is a higher level frame of reference about "confidence." The process of bringing a higher state to bear on a lower one is called meta-stating[6] and it is a form of framing. Let's assume being "cautiously confident" is an overarching state that can support estimation. The usefulness of identifying supporting states, meta-programs, and associated frames is that accessing them can help a person learn and perform the skill. Hubbard found that 15% of the people that went through his calibration training did not have any significant improvement in their calibration skills. He said that none of these people were the "relevant expert or decision makers for a particular problem" and may have been less motivated, or they "may lack the aptitude for such problems…" These may be valid reasons, or perhaps these people did not have the appropriate associated frames of reference.

Evans describes many ways (including biases) that diminish a person's risk intelligence. Some distinctions within a particular meta-program enhance risk intelligence and others diminish it. Here are two key perceptual filters mentioned by Evan (2011), which I labeled by their associated meta-programs (Hall and Bodenhamer, 2005). These meta-programs may be at play

when people consistently give extreme values of probability (i.e., 0% for knowing nothing, 100% for knowing with extreme certainty):

- **Completion Meta-Program** (Closure and Non-closure are ends of a spectrum within this meta-program). Completion" is about how we handle closure. One measure of this meta-program is about the length of time a person can tolerate ambiguity and uncertainty. Some people can't tolerate ambiguity and uncertainty long and want immediate closure, so they make decisions quickly; while others, near the non-closure end of the spectrum, can deal with ambiguity and uncertainty much longer. Evans labels the closure end of the spectrum as "wanting an answer now." Estimators need to take the time to work through and improve their estimates. They also need to come to decisions and not analyze forever. So a balance between one extreme and the other is needed. People with a high need for closure may quickly choose extreme values of 0% or 100% when asked for a probability. Or, people might just quickly select a probability in between these values without much thought just to achieve closure quickly. These are choices that can illustrate an overconfident estimate, relying on the person's intuition and not on any deep analysis. People with a high need for non-closure may likely chose 50% (i.e., not sure).
- **Classification Scale Meta-Program** (Either-or or Continuum distinctions). Evans labels the "either-or" distinction the "All or Nothing Fantasy." If you ask a person with an "either-or" filter to give a probability estimate, there is no in-between stance, they either know or don't know. They may even believe you can only know for certain, or not at all. It's either a 0% or 100% probability. To be a good estimator a person needs to be able to work in the gray area and give probability estimates between 0% and 100%, or associate a confidence interval for a range of values.

While Evans provides us with a lot of insight, Hubbard provides us with more detailed techniques for estimating probability. How does Hubbard calibrate people to be better estimators within a 90% confidence interval? He uses a multi-technique approach to get the right amount of confidence and to handle various biases. Four of his key techniques are discussed below. Since you need to go through several techniques, experiencing uncertainty for a while and not coming to closure too quickly is important. While reading the descriptions of the techniques it might be useful to work through an example of your own or use this one: For what interval (in years) would you be 90% confident that it included the release date of Charlie Chaplin's "The Great Dictator" movie, or (to make sure I include another generation of readers) the release date of the first Harry Potter movie? Here are Hubbard's techniques:

Technique 1 - Reverse the anchoring effect. An anchoring bias[7] can occur when your subsequent estimates are close to an initial estimate. For example, an expert fisherman brings his boat to the area in a large lake where he last caught many fish, and sets his anchor there. After many hours he hasn't caught one fish. Rather than moving his boat very far across the lake, he moves it a very short distance away because he believes the fish could not have wandered very far (an anchoring bias). As another example, suppose a used car dealer arbitrarily sets the price of a car and convinces you that it is a plausible price. Then, you may likely start your bargaining from that arbitrary price. The dealer has set the anchor for you (see Sugden, Zheng and Zizzo, 2013).

As you may have suspected, the term "anchoring" discussed in this section has a different meaning from same term commonly used in NLP, where an (internal or external) stimulus (e.g.,

a Tai Chi move) in any representation (e.g., kinesthetic) gets connected to and stimulates a response (e.g., calm).

To avoid the anchoring bias when estimating, select extreme values for your estimates and gradually narrow the range by eliminating "absurd" values.

> **Example:** How many people will come to my karate classes on Saturday morning? I might say between 0 and 30 people will come. Since there are at most 20 people who could attend, "30 people" is absurdly high; and 0 is too low since there are always some people who come. I could always say between 0 and 20 and be 100% confident; however what will be my 90% confidence interval? I am 90% confident that at least 4 people will attend since I have rarely seen less than 3. Similarly, I never saw more than 13, so I can go a bit lower. So my final estimate in this step is that I am 90% confident that between 4 and 11 people will come to next week's Saturday morning class.

Technique 2 - Consider two pros and two cons. List two reasons why you think your assessment is correct and two reasons where it could be wrong. Evans mentions a similar technique where people are asked to give reasons for and against a choice they made when they answered a multiple choice question. Giving reasons counters the "confirmation bias", which Evans says is the "tendency to pay more attention to information that confirms to what we already believe and to ignore contradictory data." In research cited by Evans people gave more reasons for their choice than against it indicating a confirmation bias. The research also indicated that giving the "cons" is more important in countering confirmation bias than giving the "pros." Here is another place where an "away from" stance is important, especially since you need to say: "What is the problem with my estimate?"

Example: My 90% confidence interval estimates before using this technique are 4 to 11 people will come to my class. Here are the results of applying this technique:

Cons: (1) the upper bound might not be correct because we could get new students. I recall that a few weeks ago five people took class to see if they liked it; Also, (2) it is summer and I have not accounted for people taking vacation. We don't get new students often, however I could think of a few people who might be on vacation so I drop my upper estimate by 1 and assume at most 10 will be present Saturday.

Pros: (1) I correctly accounted for the student preferences to attend Saturday; and, (2) I have always had at least one person attend class. So the pros don't change my estimates.

After applying this technique my revised estimate is that I am 90% confident that between 4 and 10 people will come to next week's Saturday morning class.

Technique 3 - Equivalent Bets. In this technique you evaluate your estimates by choosing between the following two alternatives. Notice that only the first alternative refers to your estimates:

(1) Win $10,000 if the actual value is between your two estimates.

(2) Imagine you have a bowl with 10 jelly beans, with 9 green and one red. Without looking at the jelly beans someone picks one from the bowl. If it is green you win $10,000.

People who chose (1) were typically underconfident when they made their estimates since they feel that the range of their estimates was very wide (i.e., with confidence interval greater that 90%, perhaps close to 100%). According to Hubbard, about 80% of people choose (2). Perhaps because they have second thoughts about their original estimate and feel it was too narrow. If so, their confidence interval was less than 90%, meaning they would typically get their estimates correct less than 9 out of 10 times. In this case, they were initially overconfident.

Adjust your ranges so that you can't easily decide whether to pick (1) or (2).

> **Example:** My 90% confidence interval estimates before using this technique are 4 to 10 people will come to my class. Using this technique, my choice was alternative (2). Now $10,000 is a lot of money and I felt that I may have been a bit overconfident in thinking people will make coming to my class a top priority during the summer. There have been many times that people who I thought would come do not. I thought of several past instances and realized that it represented a significant percent. I decided to tighten my minimum estimate a bit to a minimum of 2. My final estimate is between 2 and 10 people will come. When I look at the two estimates again using this new estimate, I can't really decide which alternative to take. After applying this technique, my revised estimate is that I am 90% confident that between 2 and 10 people will come to next week's Saturday morning class.

Technique 4 - Repetition and Feedback. How would you know if you were within a 90% confidence interval unless you practice and responded to feedback (e.g., about what actually happened)? Practice the first three techniques with many examples and keep track of how well you do. Fine tune your approach with the first three techniques until you achieve your 90%

confidence interval, i.e., gets 9 out of 10 right. In this case getting 10 out of 10 correct is not your goal. It just indicates your ranges are too wide because you were underconfident. And consistently getting less than 9 out of 10 correct means you are overconfident. The goal is to calibrate your confidence. I made this calculation during one week. The following week 9 people came to my classes and one person told me he could no longer come on Saturdays because of his job. I need to re-estimate for the subsequent week.

In an article (Kahneman, 2011a) on the hazards of confidence, Kahneman states: "True intuitive expertise is learned from prolonged experience with good feedback on mistakes." When people actually use this estimation approach in their work they will need to continually compare their estimates with the actual results to see how well they do.

Report to the Client

You did your research into the problem and prepared your report to the client. In the report you summarized the results, and then outlined some next steps. Here is how you began your report: For the people you want to train to be calibrated estimators set the proper frames. To temper a tendency for over or under confidence have them access a state like cautiously confident. This helps balance the tendency "to feel confident in thinking they know more than they do" with the tendency "to feel confident thinking they don't know enough." Furthermore, have them adjust their perceptual filters accordingly (if needed):

- **Motivation Direction.** Go to the "away from" end of the spectrum so they can see and deal with obstacles.

- **Completion.** Find a balance between "non-closure" perceiving so they can handle uncertainty and ambiguity, and "closure" perceiving so they don't analyze forever and are able to zero in on an estimate.
- **Classification Scale.** Use the "continuum" distinction rather than the "either-or" one so they can deal in the gray area between "complete certainty" and "having no idea at all."

Given these frames, have them do the first three of Hubbard's techniques in order, and use the fourth technique (Repetition and Feedback) to calibrate themselves to the 90% confidence interval, going back to the first three techniques with what they learn. Hubbard did not mention which order to perform the techniques, except to do the third technique after the first two.

While talking to the client you thought of a way to illustrate the frames in the approach and drew the following diagram, which is the list of frames summarizing what is needed to support the ability to estimate probabilities.

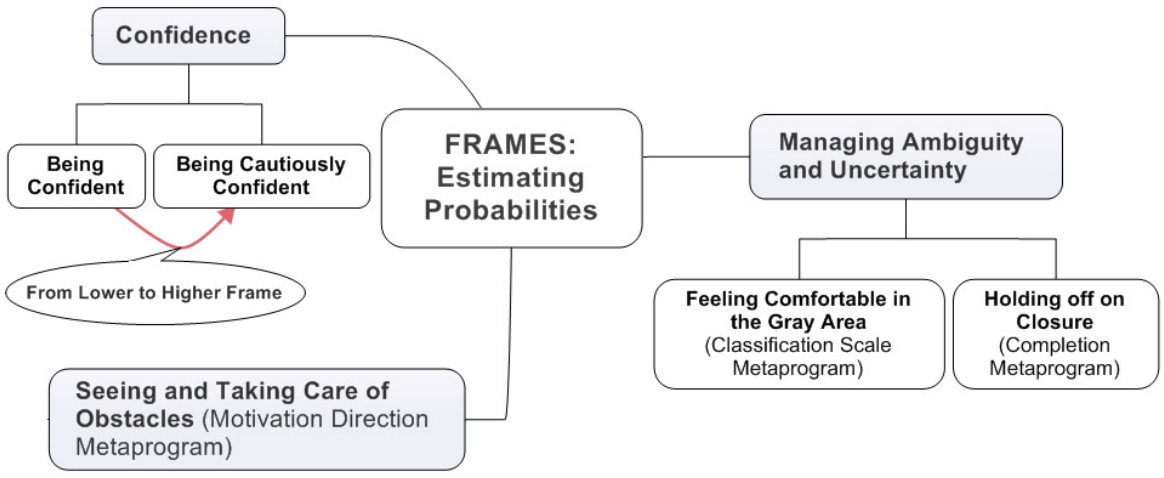

Figure 1. Frames for Estimating Probability

How can you incorporate these frames into mentoring or teaching people to be well-calibrated estimators?" Neuro-semantic NLP has several techniques (called "patterns") to assist accessing a meta-state like "cautiously confident" (Hall, 2008), to help identify meta-programs (Hall and Bodenhamer, 2005; also see Charvet, 1997), and to support expanding meta-programs (Hall, 2011) to include the distinctions that would help achieve this skill. The latter pattern can contextualize the meta-program change to this situation and allow a person to test the expanded meta-program. This ensures that any proposed (and optional) change in his or her perceptual filter is ecological with other aspects of his or her life.

Finally, estimators don't need to estimate from what is currently in their mind at the moment, they can measure things, do research, or even do back of the envelope calculations. One excellent reference for doing these quick calculations is the book by "Guesstimation: Solving the World's Problems on the Back of a Cocktail Napkin (Weinstein and Adam, 2008; see also Weinstein, 2012)."

Suppose people become "calibrated estimators" and begin estimating important business quantities. This unlocks the door to making better business decisions. Hubbard (2014) goes into much further detail on how "calibrated estimators" can do this.

Clients often want more! Your next step would be to test, experiment with, and improve the estimating approach with several people. Your client also wanted you to create a training program on how to calibrate estimators. You told her that Hubbard already has a pretty effective training. His book also shows how to do the four steps mentioned in the first section of this paper. But you piqued her interest and curiosity and now she wants a training program with a Neuro-Semantic NLP flavor. She may also need some new corporate estimation processes and

procedures, and maybe an ongoing estimation certification program (with periodic recertification). However, addressing these needs and requests is another story.

Afterward

Will the approach described in this paper work for everyone? Recall that Hubbard found that 15% of the people that went through his calibration training did not have any significant improvement in their calibration skills. It is hoped that having a training that addresses the frames in Figure 1 will reduce that number.

There may be a deeper problem you may need to address. Some people may do very well during the training program, but go back to their old way of estimating when they leave the training. These people may feel overconfident in their estimates, and even **evidence to the contrary** may not shake their overconfidence. They believe their estimation process is valid, even when feedback indicates the opposite. You might hear them say "Today was just a bad day, usually I do much better." Kahneman use the term "illusion of validity[8]" to refer to situations like this. How do you proceed? How do you motivate people to change, especially when they don't feel the pain or need to change? Kahneman[9] says that: "Organizations are better than individuals when it comes to avoiding errors [biases], because they naturally think more slowly and have the power to impose orderly procedures." How do we address the "illusion of validity" on an individual level? This is a very real issue in any training and deserves a paper of its own.

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Author's Note

In accordance with full disclosure, while in the Army in 1970, I used probability to win the football pool. I did not have any prior knowledge of football. My fellow soldiers knew this. My mistake was letting them watch me do extensive calculations. They banned me from the pool! Later probability and statistics had prominent roles in my career in physics, and when working on the spacecraft attitude (orientation) support team for several NASA satellites.

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Notes

[1] This article was published in NLP Acuity, Volume 5, pages 70-84 (April 2016)

[2] Although usually attributed to Mark Twain, Ralph Keyes attributes an earlier version of this quote to Henry Wheeler Shaw (aka Josh Billings).

[3] This approach is a high-level, informal summary of Applied Information Economics. See Hubbard (2014, Chapter 14: A Universal Measurement Method: Applied Information Economics) for a more complete description of the approach.

[4] This is consistent with Kahneman's view. He devotes six chapters to "overconfidence" in his book "Thinking, Fast and Slow" (2011b, Part III. Overconfidence).

[5] The question asked about "ordinary" gamblers. Evans used the word "problem" gamblers instead of "ordinary" in the response.

[6] See Hall (2008, Chapter 13 – The Meta-Stating Process).

[7] In this article, I discuss anchoring and confirmation biases. They are both cognitive biases. It is good to beware of our biases because that awareness enriches our ability to be critical thinkers. However, having a bias can be useful. In their paper on the Evolution of Cognitive Biases, Haselton, Nettle, and Andrew (2005) state: "Where biases exist,

individuals draw inferences or adopt beliefs where the evidence for doing so in a logically sound manner is either insufficient or absent", "...biases ... often reveal the design of the mind", and "Our perspective suggests that biases often are not design flaws, but design features." Also see: Haselton and Nettle (2006), and Wilke and Mata (2012).

[8] Also see Kahneman (2011b, Chapter 20 – The Illusion of Validity) and Lawley (2011).

[9] Kahneman (2011b, pages 417-418).

