



Tom Connor's Thinking Forward:

A DesCartes Lunch (But, I am, therefore I think, and I'm a Red Sox fan too!)

Work colleagues introduced me to a sandwich shop in Harvard Square, Cambridge, MA a number of years ago. "Wow", I thought as I stood observing the menu board behind the counter that must have had over 80 items and their prices. I was concentrating and only somewhat aware of the clerk asking, "What would you like?" This board had a lot of information and a rational decision meant it had to be absorbed. Although it was just one more decision in the day, decisions take thought and reasoning, or so I thought.

The initial process was quick as I eliminated certain sandwiches and the pizzas; I wasn't in the mood that day. Finally, it came down to assessing the expected utility contribution of an Italian or a meatball sub (also know as Hoagies, Grinders, and Heros as well as by other terms among regions of the country¹). The Italian was about \$.75 less, and I hadn't had a good meatball sub in a while, but I like Italian subs a lot.

The clerk was getting impatient and apparently had no appreciation for the time that it takes to optimize when I heard disgruntled customers behind me. Making decisions takes time but I succumbed to the pressure. What the heck, I'll have an Italian with hot peppers. But, I really would have liked more time to evaluate the meatball option and its potential contribution to my utility. Know what I mean?

Duck or Run?

For about 400 years there has been a perception, dominant in Western philosophy that the mind and body function best when independent, each functioning without interaction with the other. René Descartes², (1596-1650) was among the first to set out this belief. His famous quote "Cogito, ergo sum" (In English: "I think, therefore I am.") summarizes the view and that of many who followed him that the acquisition of knowledge and the decision-making process are best when devoid of emotion, following reason and logic only. This established a tradition of 'rationalism' that has been the foundation of much thought since and continues today.

We see it in Adam Smith's "The Wealth of Nations", published in 1776. There, Smith assumes that the decisions of the actors in his exposition of a market economy are rational, behave according to their own interests and have the knowledge and capacity to do so. Herbert A. Simon, the 1978 Nobel laureate economist, reflected concern with Smith's view and the requirements put on the human mind as the amount and complexity of information in modern economies expands, and as technology changes the nature of firms.

¹ - Submarine sandwich; http://en.wikipedia.org/wiki/Submarine_sandwich

² - Descartes, Rene (1596-1650); <http://www.meta-library.net/gengloss/descart-body.html>

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According to Simon, people in the institutions he studied developed methods (short cuts)³ to simplify decision-making due to the limits, or bounds^{4,5} put on rational decision-making. It's doubtful the trend today of rapid economic changes and complex information flows will reduce these bounds.

Aided by advances in medical technology⁶ that reveal the location of brain activity under different exercises, the assumption that emotion and feelings have no role in the brain/mind process is being challenged, and with that, our understanding of knowledge and decision-making processes is evolving. Antonio Damasio, one of the leaders looking into what has been the 'black box' of the human brain, documents some of his research in his book "Descartes' Error"⁷, where he hypothesizes that emotions have a central role in effective decision making.

Damasio relates the story of Phineas Gage⁸, a railroad construction supervisor who suffered brain damage in 1848 when an explosion thrust a metal rod through his skull damaging the prefrontal cortex⁹. According to reports from the time, Gage had been well regarded and dealt well with people prior to the accident. Although he survived the accident 11½ years with no observed decline in intellectual capacity, medical doctors and associates noticed and documented Gage's difficulty making decisions and relating to people after the injury.

Another patient of Damasio's suffered damage to the same area of the brain after surgery to remove a tumor, and he reports this patient had similar decision-making problems. Despite a very high level of intellectual ability the patient found difficulty even choosing a day for his next medical appointment.

Damasio concludes that the emotions, the intellect and the entire neurological system are integrated into the decision making process.

"The terms reasoning and deciding also usually imply that the decider possesses some logical strategy for producing valid inferences on the basis of which an appropriate response option is selected, and that the support processes required for reasoning are in place. Among the latter, attention and working memory are usually mentioned, but not a whisper is ever heard about emotion or feeling, and next to nothing is ever heard about the mechanism by which a diverse repertoire of options is generated for selection."¹⁰

To describe interactions in the decision-making process, Damasio presents three examples of brain/mind activity. First is a lack of conscious awareness when the body perceives the nutritional consequences of dropping blood sugar levels. Although many physical processes

³ - CMU's Simon reflects on how computers will continue to shape the world; <http://www.post-gazette.com/regionstate/20001016simon2.asp>

⁴ - Bounded rationality; http://en.wikipedia.org/wiki/Bounded_rationality

⁵ - Bounded Rationality: A Response to Rational Analysis; <http://ai.eecs.umich.edu/cogarch0/common/theory/boundrat.html>

⁶ - The biology of behavior; http://www.wi.mit.edu/news/archives/2004/cpa_0609.html

⁷ - Damasio, Antonio R. Descartes' Error, Emotion, Reason, and the Human Brain. New York, New York: Avon Books, 1994; p166

⁸ - Phineas Gage's Story; <http://www.deakin.edu.au/hbs/GAGEPAGE/Pgstory.htm>

⁹ - Prefrontal Cortex; http://www.brainexplorer.org/glossary/prefrontal_cortex.shtml

¹⁰ - Damasio, Antonio R. Descartes' Error, Emotion, Reason, and the Human Brain. New York, New York: Avon Books, 1994; p166

are active the brain/mind process is not aware of them, one is only aware of a sense of hunger. Second, is what is probably a response learned from previous experience, what many might describe as a reflex action such as the decision to quickly move away from a falling object or avoid some other danger.

Finally, are more deliberative processes, those that would appear to benefit from a purely rational, or Cartesian approach, one devoid of emotion. These could include choosing a career, choosing social relationships, making travel arrangements, or deciding the constitutionality of legislation. About these Damasio says, "All the examples in the third illustration rely on the supposedly clear process of deriving logical consequences from assumed premises, the business of making reliable inferences which, unencumbered by passion, allows us to choose the best possible option, leading to the best possible outcome, given the worst possible problem."¹¹

However, these are complex and intricate processes where the range of alternatives are unknown and the outcomes of each uncertain. According to Damasio, the consequences of a 'purely' rational approach are severe and overwhelming. "Now, let me submit that if this strategy is the *only* one you have available, rationality, as described above, is not going to work. At best, your decision will take an inordinately long time, far more than acceptable if you are to get anything else done that day. At worst, you may not even end up with a decision at all because you will get lost in the byways of your calculation."¹²

Damasio concludes that a common thread exists within these processes in the form of "a shared neurobiological core"¹³ that is key to the process of choice. This is a 'gut' feeling, or a "somatic marker", that takes place before any deliberative processes and biases them, helping narrow the range of options for deliberation. (Soma is Greek for body and marker because a physical sensation is recognized, or marked.)

"What does the somatic marker achieve? It forces attention on the negative outcome to which a given action may lead, and functions as an automated alarm signal which says: Beware of danger ahead if you choose the option which leads to this outcome. The signal may lead you to reject, immediately, the negative course of action and thus make you choose among other alternatives. The automated signal protects you against future losses, without further ado, and then allows you to choose from among fewer alternatives. There is still room for a cost/benefit analysis and proper deductive competence, but only after the automated step drastically reduced the number of options. Somatic markers may not be sufficient for normal human decision-making since a subsequent process of reasoning and final selection will still take place in many though not all instances. Somatic markers probably increase the accuracy and efficiency of the decision process. Their absence reduces them. This distinction is important and can easily be missed. The hypothesis does not concern the reasoning steps which follow the action of the somatic marker. In short, *somatic markers are a special instance of feelings generated from secondary emotions.* Those emotions and feelings *have been connected, by learning, to predicted future outcomes of certain scenarios.* When a negative somatic marker is juxtaposed to a particular future outcome the combination functions as an alarm bell. When a posi-

¹¹ - Ibid, p167
¹² - Ibid, p 172
¹³ - Ibid, p168

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tive somatic marker is juxtaposed instead, it becomes a beacon of incentive."¹⁴
(Italics Damasio)

A study of choices at Princeton University has provided further evidence that emotion has a role in decision-making. Subjects were given 10 \$1.00 bills and allowed to keep part of the money if a second subject was offered and accepted some part of the original \$10.00. According to a 'rational' process the 2nd subject would accept \$1.00 if offered since that would be a net benefit, and the subject setting the terms would recognize that and offer the \$1.00, keeping the greatest benefit to themselves - \$9.00.

"In their study, the Princeton researchers asked people to play the ultimatum game while the receiver's brain was scanned using functional magnetic resonance imaging (fMRI), a technology that allows researchers to see what brain areas are active at all moments during the study. They found that the more unfair the offer, the more activity they saw in an area called the anterior insula, which is associated with disgust and other negative emotions.

"Another brain area, the dorsolateral prefrontal cortex, which is associated with working memory and deliberative thought, also responded to unfair offers. When the researchers averaged the results from 19 subjects, who each played 10 rounds of the game with different proposers, they found that the activity of the emotion area exceeded that of the deliberative area in cases when the subjects rejected the offers. The reverse was true when they accepted offers.

"It is not only telling us that there is an emotional response but that there seems to be a competition between these different considerations or ways of processing the situation," said Jonathan Cohen, who directs Princeton's Center for the Study of Brain, Mind and Behavior and is a co-author of the study."¹⁵

In a private test the author asked his mother-in-law if she would accept an offer of \$1.00. She thought a few moments and said "Sure". Then, after presenting the two people scenario above, she was asked if she would accept \$1.00 under those conditions. The response was immediate, "Oh no Tom, 50 - 50, fair is fair."

¹⁴ - Ibid, p173

¹⁵ - Take it or leave it? Brain imaging study reveals interplay of thought and emotion in economic decisions; <http://www.princeton.edu/pr/pwb/03/1208/7a.shtml>

A Red Sox 'Not a Hat', and Economic Theory

A man who wore hats to keep the sun out of his eyes and off his head had many hats. He got them as gifts and from product promotions and other ways he doesn't remember. He didn't need more hats. Then, in December 2004 he was happy when his wife gave him another hat. But this one was different. He was a Boston Red Sox fan, and the Boston Red Sox had just won the World Series of baseball.¹⁶

Results from studies such as the 'ultimatum' game demonstrate that both affective and deliberative areas of the brain are active in decisions; the anterior insula, a region that processes negative emotions such as disgust, insult, and pain; and the dorsolateral prefrontal cortex, an area where deliberative thought and working memory processes are active. While both areas were active during offers, the anterior insula was more active during rejected offers, and the dorsolateral prefrontal cortex more when offers were accepted.

It is important to recognize that activities in different areas are dependent; there is interplay or collaboration between affective and cognitive areas. When the collaboration works well it can either reinforce or correct affective responses, when it does not work well unsatisfactory decisions will continue.

Recognition of the role of affective processes in decision-making is an important development in knowledge of the decision-making process. (Some professions however, appear well aware of the role of affective processes in decision-making.¹⁷) While the rational, neo-classical model has been extraordinarily successful providing useful information on consumer choices, they are macroeconomic and built on large collections of aggregated data, and individual differences are lost in the abstraction. Methodologies developed with affective processes included have the potential to provide more insight into individual differences and responses to similar decisions.

While neo-classical models of choice have made extraordinary contributions, they are built on aggregated data and have been useful in a macroeconomic context where homogenized consumer behavior has not been identified as very important. However, methodologies that include affective responses and provide for individual differences and their affect on consumer choice are being developed.

A neo-classical model would have difficulty forecasting who wants a Boston Red Sox hat while a model that includes affective responses would not. Neither did my wife.



My Red Sox hat

We hope you enjoyed Tom Connors **Thinking Forward** article. To be notified when Tom or our other author's enter an article, please go to <http://www.hungrypeasant.com/remindme.cfm>. You can contact Tom with questions or thoughts about what you've read at tomc@ridma.com.

¹⁶ - Yes!!! Red Sox complete sweep, win first Series since 1918;

<http://www.boston.com/sports/baseball/redsox/articles/2004/10/28/yes/>

¹⁷ - In Summation, Power to Win Jury's Favor;

<http://www.nytimes.com/2006/01/23/nyregion/23closing.html?8hpib&oref=login>