

# The Neuroscience of Debtors

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# The Neuroscience of Debtors

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## Introduction

Life is chaotic during our earliest moments. For example, a growing baby will begin to differentiate her boundaries while still in the womb by using tiny kicks to help her distinguish “baby” from “not baby.” Later in life she will test her psychological dimensions to further separate out herself from others. The process will continue throughout her lifespan, though injury can disrupt her self-orienting networks and cause significant problems with the planning and management of everyday living.<sup>1</sup>

Most of us cannot recall those earliest periods of growth. We were just too busy: a toddler’s brain receives upwards of 60% of the energy available to the child when building out these early brain networks.<sup>2</sup> These same networks are built upon and refined throughout our lives. Science informs us that they profoundly impact who we are and also define why we do what we do.

With that in mind: do you do debt? If you possess a mortgage or make car payments then you are a debtor since you are someone who owes a sum of money. Yet, the majority of debtors manage their debts just fine, and well enough to keep away from bankruptcy court. This leaves the important question, what is it about the minority of debtors that can produce such significant credit woes?<sup>3</sup>

This article focuses on the neuroscience of those debtors who find themselves crossways with creditors. To simplify things, I separate out people who have suffered from a bout of bad financial luck from those individuals who possess a chronic approach to poor money management. What is it about the brains of chronic debtors that leads them to their poor debt practices? This is the burning question

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<sup>1</sup> For one person’s journey following stroke and struggle to regain her sense of self, listen to neuroscientist Jill Bolte Taylor’s talk at Ted.com; search for her name there to find it. You can also read her excellent memoir, *My Stroke of Insight*. Taylor, Jill Bolte. *My stroke of insight: A brain scientist’s personal journey*. Penguin, 2008. One researcher speculates that Jill’s loss of self-awareness resulted from her loss of inner speech. Morin, Alain. "Self-awareness deficits following loss of inner speech: Dr. Jill Bolte Taylor’s case study." *Consciousness and cognition* 18.2 (2009): 524-529.

<sup>2</sup> Leonard, William R., et al. "Metabolic correlates of hominid brain evolution." *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology* 136.1 (2003): 5-15.

<sup>3</sup> You may be acutely aware of the size of consumer debt in America. While credit card spending appears to have peaked since 2009, student loans and associated defaults are on the rise. See, [www.newyorkfed.org](http://www.newyorkfed.org). In an August 7 article published on line in the NY Times, student and car loans reached record-breaking levels compared with the prior three years, with delinquencies on the rise as well. See, [www.nytimes.com](http://www.nytimes.com).

this paper explores. First, the paper reviews science relevant to this topic, it then explores some common patterns associated with chronic debtors, and finally, it concludes by offering several ways in which we can impact a debtor's neuronal networks to help them positively impact their financial status.

## **Lottery anyone?**

Do you play the lottery? Likely you do not if you are risk-averse and understand the probabilities. On the other hand if you do, take a moment and ask yourself: why? What compels the long shot gamble? Famous psychologist Edmund Bergler speaks to the qualities of the debtor's mind in this passage from his book on gambling:

The gambler is apparently the last optimist; he is a creature totally unmoved by experience. His belief in ultimate success cannot be shattered by financial loss, however great. He did not win today? So what? Tomorrow will be lucky. He's lost again? It doesn't prove a thing; someday he's bound to win.

- Edmund Bergler, *Psychology of Gambling*, (1957)

No surprise that chronic debtors can suffer from, among other things, "gambler's fallacy," which is a belief that two independent events are interrelated. This type of thinking leads to error. For example, mistakes result when we conclude that after an event occurs the probability of it occurring again will lower. It's also an error to assume that after a string of losses the probability of winning will increase.<sup>4</sup> These errors are the tip of the iceberg of the ways that chronic debtors' minds can get in the way of successfully managing their debt well enough to avoid bankruptcy.

## **Introduction to the science**

The brains of debtors, like all human brains, are complex adaptive systems.<sup>5</sup> This means that while brains are never 100% predictable, they are subject to patterns that repeat themselves over time. Those patterns unfold based on the brain's anatomical structure and functional abilities, which energize one set of brain cell networks more than others based on the conditions present in a given moment. Brain networks that receive more energy and resources become dominant, and their increased cellular activity drives our behaviors and defines how well we will handle, among other things, our debt obligations.

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<sup>4</sup> Rogers, P., *The cognitive psychology of lottery gambling: A theoretical review*, Journal of Gambling Studies, 14, 111-134 (1998).

<sup>5</sup> For a review of the development of the human brain as a complex adaptive system, see Lewis, M. D., *Self-organizing individual differences in brain development*, Developmental Review, 25(3), 252-277 (2005). These types of systems avoid chaos through self-emerging properties. They are bounded, follow consistent rules, and are driven by underlying organizing forces. Within their boundaries, areas called strange attractors become hubs for patterns that we notice consciously as habits, behaviors, and traits.

The manner in which energy travels throughout the brain can be compared to the ways in which weather patterns present themselves throughout the United States. Predicting either the brain's use of energy or the weather's trajectory over time is difficult since both systems are inherently chaotic.<sup>6</sup> As with the weather, the brain's activity becomes much easier to predict as the moment of action approaches, but brain activity is much harder to discern several minutes or hours in advance.

Over time the weather exhibits repeatable patterns. This is why with the analysis from trained professionals it is subject to modest predictions. Each of our brains also demonstrates repeatable patterns over time. Like with the weather, with enough information we can also predict the brain's use of energy with a varying degree of success.<sup>7</sup>

You may have attempted at times, for instance, to predict the neuronal energy shifts of friends, family or coworkers. When you get it right, you may exclaim, "I really know you well, don't I?" Bonding and successful relationships depend on our ability to predict from past experience the behaviors, traits, and personality tendencies of others. All of those qualities are dependent on how the brains of those people energize their cellular networks prior to taking action.

For instance, if someone suddenly becomes unhappy, we know his or her brain's "weather," meaning the energy freely available to the brain at that moment, pours into the network associated with unhappiness. The resulting energy shift brings about the behavior set we recognize as unhappiness, including a pouty face and glum commentary. If the person suddenly receives great news, then a bifurcation of the energy might happen that sends "the weather," his or her mental energy, towards networks responsible for happier feelings such as excitement or joy. Each brain uniquely energizes its networks based on genetic and conditioning factors.

Here's some bad news that you might already know: the patterns associated with human decision-making are not always rational. When it comes to investment decisions, scientists like Nobel Laureate Daniel Kahneman have demonstrated that people hoard their wins and unreasonably fight to get losses back, and will engage in highly risky behaviors to do so.<sup>8</sup> The debtor's descent into debt, in other words, can be attributable in part as a byproduct of humanity's irrational distaste for losses.

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<sup>6</sup> Famous meteorologist Edward Lorenz computed mathematical formulas in the 1960s that helped better predict the weather. His preliminary work combined with the precursor work of others to help develop the mathematical disciplines of complexity science and chaos theory.

<sup>7</sup> Relying on sophisticated software and brain imaging technology, researchers have been able to recreate scenes watched by individuals using only the brain's cellular activity. Nishimoto, Shinji, et al. "Reconstructing visual experiences from brain activity evoked by natural movies." *Current Biology* 21.19 (2011): 1641-1646. Similarly, another lab reliably predict words that subjects intend to use based on "reading" the patterns of their thought. Mitchell, Tom M., et al. "Predicting human brain activity associated with the meanings of nouns." *science* 320.5880 (2008): 1191-1195.

<sup>8</sup> Kahneman, D., & Tversky, A., *Prospect theory: An analysis of decision under risk*, *Econometrica*, 47, 263-291 (1979).

The following sections describe some brain regions known to play critical roles in how we judge information and act based on our past learning.

### *The Insula*

By way of a quick overview of the anatomy and function of the debtor's brain, each of our brains possesses a cluster of cells called the insula and there are two of these inward-facing portions of cortex on each side of the brain. The insula gets involved in many diverse functions. For example, it serves a checks and balances roles when we need to know whom we can trust and whom we must stay clear from to ensure our safety or success.

In keeping with this feature of the insula, our species' ancient networks of avoidance and disgust reside in this area as well.<sup>9</sup> Spiders, snakes and snot, for instance, are examples of things that satisfy the insula's visceral meter of what to stay away from by instinct. By contrast, money issues rarely raise a visceral warning flag unless for some reason an impactful personal history of money fears or problems arose during the insula's development stages.<sup>10</sup>

Given the insula's role as a risk-aversion and avoidance regulator, there is an implication that in the brain of a debtor, risky behaviors associated with bad financial decisions are not registered negatively and therefore do not activate the insula's regulatory control over them. In other words, the research indicates that the insula's normal cautionary concern for things it actively avoids does not naturally encompass money concerns or poor investing behaviors like those that reside in the chronic debtor's brain.<sup>11</sup>

Age and youth present additional complications. With respect to older debtors, studies show that activity in the insula becomes "more noisy" as we age and that can confuse normal risk assessing processes and lead to more errors with financial

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<sup>9</sup> There are many disputes as to the exact function of brain regions like the insula. With this in mind, the references here are offered as generalizations that are subject to refinement as neuroscience becomes more precise. For our purposes, it is convenient to rely on the distinctions made in the literature so far to help clarify what is going on in the debtor's brain. Interestingly, science confirms this area can also be responsible for certain habits like smoking. We know this because injury to the insula from stroke or cancer can result in the complete cessation of the need for another cigarette. Naqvi, N.H., Rudrauf, D., Damasio H., Bechara, A., *Damage to the insula disrupts addiction to cigarette smoking*, *Science*, 315:531-4 (2007).

<sup>10</sup> One theory poses that the main difference between debtors and tight wads is their pain tolerance for spending money. Rick, S. I., Cryder, C. E., & Loewenstein, G., *Tightwads and spendthrifts*, *Journal of Consumer Research*, 34(6), 767-782 (2008) ("Indeed, people likely differ in their tendency to experience the pain of paying, and these individual differences likely have important behavioral implications." The article goes on to say that as retailers make paying by credit less painful, the conversion from tight wad to spend thrift becomes easier to make).

<sup>11</sup> Kuhnen, C. M., & Knutson, B., *The neural basis of financial risk taking*, *Neuron*, 47(5), 763-770 (2005) (demonstrating that insula activation increases with a predicted loss in the future and deactivates during investing mistakes).

choices.<sup>12</sup> There is also compelling evidence that the developing minds of children are bad at assessing risky investments by default and benefit from proper education about the pros and cons of gaming outcomes.<sup>13</sup>

The science suggests that life lessons ought to include teaching children the basic elements of successful money management at an early stage of development so that they can build a healthy respect for investment risks and can better appreciate the value of money. To properly impact the child's insula and related regions, the educational process can clarify the difference between monetary loss as a punishment and monetary gain as a reward to encourage the brain of the child to pay attention to financial decisions and record them with the relevant importance they deserve for future financial health.<sup>14</sup>

### *The Anterior Cingulate Cortex*

Another cluster of cells, called the anterior cingulate cortex, or ACC, shows up in each hemisphere as well and plays a role in smart debtor practices. The ACC helps control reward processing, performance monitoring, and the distribution of energy within the brain. It distributes energy based on the variety of factors, both internal and external, which compel it to resource and favor certain brain areas over others.<sup>15</sup>

Specifically, the ACC governs error processing as it distributes energy from one brain area to another. It keeps track of its decisions to energize one region in the brain over another. After distributing the energy the ACC monitors the activity that follows for success or failure. When errors occur, the ACC will quickly remedy the situation by remembering to reroute the energy through alternative pathways next time. At this level of brain function, what we call reward and punishment is, from the ACC's perspective, an error assessment of how well those brain networks that received extra energy used it to the overall success of the person.

The ACC's focus on error detection can, if not functioning properly, give rise to the stop and redo of error signals that are associated with Obsessive Compulsive

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<sup>12</sup> Samanez-Larkin, G. R., Kuhnen, C. M., Yoo, D. J., & Knutson, B., *Variability in nucleus accumbens activity mediates age-related suboptimal financial risk taking*, *The Journal of Neuroscience*, 30(4), 1426-1434 (2010).

<sup>13</sup> Carlson, S. M., Zayas, V., & Guthormsen, A., *Neural correlates of decision making on a gambling task*, *Child Development*, 80(4), 1076-1096 (2009).

<sup>14</sup> Gianaros, Peter J., et al. "Parental education predicts corticostriatal functionality in adulthood." *Cerebral Cortex* (2010): bhq160 (exploring educational level of parents and its impact on adult handling of financial decision making). I surmise, without proof from the literature, that first jobs at an early age such as babysitting, lawn mowing, or paper routes aid in giving the children that take on those jobs a keener sense of the value of money than other children who do not experience the pain or reward of an incoming and outgoing flow of money.

<sup>15</sup> Shenhav, A., Botvinick, M.M., Cohen, J.D., *The expected value of control: an integrative theory of anterior cingulate cortex function*, *Neuron*, 79:217-240 (2013).

Disorder or the terrifying outcomes of Post-Traumatic Stress Disorder.<sup>16</sup> With these conditions, energy bottlenecks in specific regions and therefore cannot flow freely. That increases the strain of built up energy on the brain, which a person feels as, among other things, anxiety and despair.

Conversely, in a debtor's brain if the red light of error detection doesn't turn on or doesn't work well, then the brain is free to increase the risks it will take without regard for the regulatory control associated with potential losses, a role normally held by the insula in conjunction with a few other regions like the ACC. This potential flaw in the brain's traffic signals, when present in a chronic debtor's brain, can place his or her already weak financial position into significant further peril.

### *The Nucleus Accumbens*

Things get even more complicated in the brain when neurotransmitters like dopamine get involved. There are several networks of cells that unite together, including the nucleus accumbens, to produce dopamine, a chemical associated with our notion of anticipation. While serotonin may be the neurotransmitter of satisfaction with a completed goal, dopamine is the neurotransmitter that epitomizes the excitement of the effort. The nucleus accumbens is a critical region for dopamine because it is thought to be responsible for increasing the demand for dopamine when conditions are right; it is also highly correlated with financial risk-taking.<sup>17</sup>

Instructions from the nucleus accumbens will increase dopamine production, which in turn turbo charges the brain. One of dopamine's main functions is to entice the brain into action based on anticipated, rather than realized, gains. Extra dopamine compels an already fast moving brain into warp speed as it locks on to its reward.

Therefore, it is the thrill of the chase and not necessarily the success of the race that gets the nucleus accumbens' attention.<sup>18</sup> This is why happiness is so fleeting and also why what seems like a good idea at first can cascade into a fiasco of epic proportions later. This is precisely what can happen to a debtor whose brain transmits dopamine without the restraint of proper error recognition.

### *The Prefrontal Cortex*

The clusters mentioned above are the workhorses of the brain since they supply the preliminary information the brain relies on to make significant decisions. It is the

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<sup>16</sup> Shin, L. M., Davis, F. C., VanElzakker, M. B., Dahlgren, M. K., & Dubois, S. J., *Neuroimaging predictors of treatment response in anxiety disorders*, *Biology of Mood & Anxiety Disorders*, 3(1), 15 (2013).

<sup>17</sup> Sugam, J. A., Saddoris, M. P., & Carelli, R. M., *Nucleus accumbens neurons track behavioral preferences and reward outcomes during risky decision making*, *Biological Psychiatry* (2013).

<sup>18</sup> Berridge, K. C., *The debate over dopamine's role in reward: the case for incentive salience*, *Psychopharmacology*, 191(3), 391-431 (2007).

front-most parts of the brain, called the prefrontal cortex, where the big decisions to invest in or stay out of deals will ideally take place. This region of the brain is the one thought to be most capable of assessing the risks involved in any venture given the right information. This region can project out in time beyond short-term gains or losses to better understand what will happen in the longer term. Unfortunately, when the prefrontal cortex lacks access to critical information it depends upon from those brain regions discussed above, it is far less likely to make a substantial impact on what happens next in the brain.

### *Section summary*

Think of the brain regions mentioned as individuals working for a key decision maker. The decision maker's success, whether a CEO, partner, parent or friend, depends on individuals who rally all the necessary information required to make the right decisions. The weaker or more flawed those efforts, the more compromised and less informed the decision maker becomes.

It turns out the front-most parts of the brain are responsible for sophisticated planning and deliberations. Key components include the dorsolateral prefrontal cortex and the orbitofrontal cortex.<sup>19</sup> If these areas are compromised, for example by wiring patterns like those formed in the brains of pathological gamblers, then bad decisions can spiral out of control without any deterrence and result in a level of debt that leaves the debtor with no recourse but to file for bankruptcy.<sup>20</sup>

## **Patterns**

The following sections review common patterns associated with chronic debtors.

### *High rewards justify high risks*

This pattern may be the number one anthem of the risk-seeking chronic debtor. It is the sign of a nucleus accumbens unencumbered by any regulation from the insula or anterior cingulate cortex. The extra dopamine produced in anticipation of the huge reward will effectively knock out the reasoning elements of the prefrontal cortex and the debtor's brain will go into heavy reward-seeking autopilot.

### *Maximize gains at any cost*

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<sup>19</sup> Brand, M., Kalbe, E., Labudda, K., Fujiwara, E., Kessler, J., & Markowitsch, H. J., *Decision-making impairments in patients with pathological gambling*, *Psychiatry Research*, 133(1), 91-99 (2005)(pathological gambling patients likely have dysfunction in the dorsolateral and orbitofrontal regions of the prefrontal cortex).

<sup>20</sup> Roca, M., Torralva, T., López, P., Cetkovich, M., Clark, L., & Manes, F., *Executive functions in pathologic gamblers selected in an ecologic setting*, *Cognitive and Behavioral Neurology*, 21, 1-4 (2008).

This pattern appears when the nonconscious brain, including regions deep within the brain such as the amygdala and the ACC, end run the prefrontal cortex and encourage instant reactions without forethought. When that happens, irrational behaviors can set in, including the formation of lies and confabulations that are then followed by after-the-fact rationalizations and self-deceptions.

*I will recoup my losses soon*

This is a classic pattern also called magical thinking in some circles. Think about it, how often would a chronic debtor continue to find his or her way into their financial situation without it? Once the debtor passes the reasonable chance for a work out, magical thinking can kick in and may result in devastating losses.

*Persistence pays off*

An unusual outcome of the neuroscience of the debtor's brain is that it can be relentless in the face of unreasonable odds. The chronic debtor is steeped in plausible stories of success and reward and therefore does not calculate the probabilities of loss and futility. This deference for hopes over statistics can wreak significant havoc on the debtor's financial wellbeing.

*Past success predicts future success*

Gamblers speak more of their wins than of their losses. On the way to Vegas, everyone in the plane is a winner. The joviality, particularly on a Southwest flight with lots of free drink tickets flashing, is palpable. By weekend's conclusion you often find the same crowd on your plane on the way home, invariably with a bunch of losers. The house has strong odds in its favor. Yet for the chronic debtor's brain, those odds fail to deter the at one time successful person from holding out hope based on his or her past success, since those wins can become embedded in the ACC and nucleus accumbens. When that happens, past success can sponsor irrational decisions for the financially troubled.

*My gut instincts are right*

Chronic debtors have proven by their record of losses that they have a hard time comparing and analyzing their debt loads. There is no surer sign of emotionally driven decisions than a debtor who openly relies on gut instinct, which comes from ancient regions of the brain, rather than using his or her rational and logical components, found up in the prefrontal cortex. Gut instincts, when it comes to financial decisions, can quickly and for some repetitively, turn sour.

*Section summary*

This is just a sampling of the patterns you can look for to help understand the substrate of the chronic debtor's brain. To be forewarned is to be forearmed. You

can prepare your own list, or add to this one, to enhance how you can aid those in financial trouble. What follows in the next section are some precautions you can take to assess and handle the neuronal patterns of the chronic debtor's brain.

## **Solutions**

### *Initial meeting*

During first interactions with the debtor, prepare questions that can help ferret out magical thinking, grandiosity, and an unrealistic and anticipatory fervor for success. Examples include: what is the probability of a successful conclusion here; can you describe the downsides of your position; what argument would you raise if you were your creditor; describe the emotions you felt as this debt was mounting?

You can also take any one of the patterns mentioned above and put it in the form of a question, for instance, do you think it's reasonable to maximize your gains despite the potential losses; or, can you see the high risks of having this argument or position go up in smoke?

What you are looking for is a realistic grounding on the issues and an acceptance of alternative perspectives. When the debtor's brain gets compromised, those alternative perspectives are hard for the brain to summons. When that happens, financial decisions can get bogged down with inaccuracies and fantasy.

### *Test the debtor's decision-making abilities*

People are generally not internally consistent decision-makers, and chronic debtors can tend to land even further in that direction. Early and often, test the decision-making capacity and abilities of the debtor. If you are concerned, have the person consider professional help to determine if their cognitive abilities are compromised in some way. A neuropsychologist will generally possess the type of tests that can rapidly determine if there is a problem with the debtor's decision-making ability.

### *Explore internal conflicts*

Explore in detail the debtor's internal conflicts. Ask probing questions and confront the debtor about ambiguous and inconsistent thought processes. A hallmark of all brains, and in particular chronic debtor brains, is internal conflict. Conflict arises from pre-set biases and notions held in the deep recesses of the brain, which can block the planning and reasoning components found in the prefrontal cortex.

### *Rely on small behavior changes for big impact*

The chronic debtor often arrives before you in a mound of hurt. He or she has likely engaged in a series of bad decisions. That set of circumstances is mostly due to a set

of life patterns and habits that have built up over time. To reroute those all at once takes Herculean efforts.

Instead, focus in on one small behavior the debtor can handle and champion it. With success on that small venture, the brain of the debtor will see that more success can follow. That approach can result in what psychologists call the virtuous cycle and can turn around bad habits one by one until the picture turns much more rosy than when you first intervened.

#### *Demand delayed rewards*

Because of the influence of dopamine on many chronic debtors' brains, it can be very hard for them to wait. Explore measures with the debtor that will encourage delayed gratification. By delaying an instant reward, you can help the debtor summons more energy up to the front of his or her brain, where good decision-making has a better chance of taking place.

#### *Reset default behaviors and routines*

You can aid a debtor's brain simply by helping him or her set up alternative routines. It can be as simple as encouraging visits to the gym twice a week, or review of bank statements on a more regular basis. Change in one area of life can bring about positive new opportunities in other areas as well.

#### *Introduce the debtor to his or her future self*

There is fascinating research that demonstrates that when people connect more clearly to their future selves, through writing or some visual method, they improve their saving behavior. One way to accomplish this is with computer programs that ages the debtor's face. Here is a free site on line that does just that; warning, it's not always the most flattering future image: <http://faceretirement.merrilledge.com/>.

#### *Make good behaviors easier to accomplish*

Many debtors deserve to increase their good behaviors. A simple way to do this is to add positive behaviors into their day. For example, encourage them to place healthy snacks in their office environment, or take walking breaks, set their bed in the morning, or drink ten glasses of water daily. Good behaviors bring about more good behaviors.

#### *Encourage the debtor to pre-commit and decide things in advance*

The chronic debtor's brain can fall prey to accepting financial patterns automatically. You can help the debtor get in the way of those sub-optimal, pre-programmed decisions by encouraging him or her to commit or decide things in advance. Putting a to do list together and holding the debtor accountable to it will do

just fine. Then, the prefrontal cortex will have more authority when the actual trigger event arrives later in the day, week, or month, at which time the commitment or decision might otherwise have been shirked or neglected.

## **Conclusion**

This article presents an overview of the growing and fascinating neuroscience of the chronic debtor's brain. The more we learn about the brain, the more important our efforts can be with those debtors straddled with difficult brain wiring and habitual patterns that do not serve them well. The brains of chronic debtors are uniquely wired to take unreasonable risk and rack up what they perceive as pain free debt. Getting in the way of the brain networks that bring those events about takes the fortitude of a careful, deliberate, and highly conscious friend and advisor.

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