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Embarking On the Mind Tour

One of the authors heard this story during a scientific conference on ecology in Montpellier in 2010:

Two little dinosaurs are running as fast as they can, chased by a large T. Rex. They are both exhausted and one says to the other:
“Why bother running fast? We are stupid, it’s hopeless, there’s no way we can outrun a T. Rex.”
The other answers: “I’m not trying to run faster than the T. Rex, I’m trying to run faster than you!”

Sometime later, the same author heard a similar joke on the radio, telling the story of two travellers sitting quietly in a forest having lunch, when they see a bear coming. They quickly try to put their shoes on. One traveler says to the other: “Why bother?” You can guess what the other replied!¹

This is how evolution shaped our strategies for avoiding danger.

The corollary, in both cases, is that the faster of the two runners had a small advantage over the other one, and survived. This running advantage was transmitted to his or her descendants as a specific “predator avoidance module”. Darwin named this process “*descent with modification*”. We now use the more appealing term “*evolution*”, as coined by his contemporary Herbert Spencer.

The theory of evolution has filled thousands of serious books and scientific papers; this is it in a nutshell. A full discussion goes beyond the scope of *The Biased Mind*².

On our journey in search of the adaptive biases, we shall encounter Ulysses and the Sirens and other long-suffering heroes, along with Dr Jekyll and Mr Hyde and the experience of multiple selves, not to mention the seven dwarves and other instances of the magical number seven. We shall eventually step ashore with a host of inherited problem-solving devices that can be put to

¹ You may not believe it, but three years later, he heard the same joke, but this time with a lion instead of a bear, during a conference on mathematics in Rio de Janeiro!

² Darwin, R., 1859; Dawkins, R., 1976; Barkow, J.H., Cosmides, L. and Tooby, J., 1992; Pinker, S. 1997.

work like a Swiss army knife to cope with the plethora of choices that face us on a daily basis.

Throughout our journey into the biased mind, two ideas in particular—that the brain is a partly outdated survival tool kit and that there are limitations on its capacity—will prove to be major recurring themes.

Who's the Boss?

*Who is sovereign, who is in charge; the self who sets the alarm clock to rise early, or the self who shuts it down the next morning and goes back to sleep?*³

This question, raised by economists George Loewenstein, Professor of Economics at Carnegie Mellon University, and Richard Thaler, Professor of Behavioral Science and Economics at the University at Chicago's Booth School of Business, will be the starting point in our quest to unmask the biased mind. At different times in our lives, we have all experienced the feeling that there may be, not just two, but several selves within us. We need only recall our dietary commitments on New Year's day and the manner in which they were gloriously ignored as the year got underway.

One brain—two minds?...asks Michael Gazzaniga, Professor of Psychology at the University of California, Santa Barbara, in his 1972 paper in *American Scientist*... So let's explore this possibility of multiple selves.

Making Virtuous Choices

Future. That period of time in which our affairs prosper, our friends are true and our happiness is assured.

Ambrose Bierce.

Some of the virtuous choices that people make may involve a lack of empathy for the future self who will have to live with that choice.

In an elegant demonstration of this phenomenon, Daniel Read, George Loewenstein, and Shobana Kalyanaraman⁴ provided experimental participants with coupons that allowed them to rent several films for free. There were two types of film: those that were edifying or "highbrow" (such as *Schindler's List*) while others were lowbrow and fun (such as *Sleepless in Seattle*). The films were available either for the same evening or for the next day. Subjects

³ Loewenstein, G. F. and Thaler, R. H., 1989

⁴ Read, D., Loewenstein, G. H. and Kalyanaraman, S., 1999

tended to select lowbrow movies for viewing tonight and highbrow movies for tomorrow.

The desire to improve one's mind is apparently more pressing when choosing a movie for later, whereas the desire to relax is more urgent when choosing for the very near future.

The Dumbledore Pact



Picture: Ulysses and the Siren- 1891, John William Waterhouse

On his journey home to Ithaca, Ulysses had to skirt the perilous land of the Sirens. Advised by the witch-goddess Circe to avoid them and their charming songs, Ulysses told his men⁵:

Take me and bind me to the crosspiece half way up the mast; bind me as I stand upright, with a bond so fast that I cannot possibly break away, and lash the rope's ends to the mast itself. If I beg and pray you to set me free, then bind me more tightly still.

The decision to bind oneself is referred to as a “*Ulysses pact*”, a pact between two selves. Real-life examples of this abound, from the US Congress trying to find a way to commit itself to reducing State spending, or the decision when opening a new savings account to include predetermined monthly cash-in or to tie it up for a decade. Another example is Dumbledore begging Harry Potter to let him drink a poisonous liquid.

In *Harry Potter and the Half Blood Prince*, Voldemort and his allies are rebuilding their power while Dumbledore is trying to turn the tide, with Harry's

⁵ Homer, *The Odyssey*, circa 800 B.C.

help. Dumbledore and Harry find the cave where Voldemort has hidden one of the seven parts of his soul. Dumbledore slices his hand with a knife and wipes his blood on a stone to enter the cavern. On an island in the middle of a subterranean lake stands a bowl, at the bottom of which is a necklace containing one seventh of Voldemort's soul. This necklace is protected by a poisonous liquid. Dumbledore knows he has to drink it. He begs Harry to oblige him to drink the liquid to the last drop, regardless of his cries of pain and his demands to stop.

Many authors suggest that human behavior, as illustrated by Dumbledore and Ulysses, results from an internal struggle between "multiple selves", selves that have accumulated as adaptive responses during the process of evolution. Which is the real Dumbledore, the one who cries for mercy, or the one who insists on drinking to the last drop?

Hero But Shy With the Ladies?

Being cautious, taking precautions, being careful with one's health even if the absolute risk of becoming ill seems small, run in direct opposition to the social vocabulary of risk that exists in the world at large. Such vocabulary includes slogans like "no risk, no reward", "just do it", "no guts, no glory", "no fear", and "no pain, no gain", and encourages us to take real risks with our lives and well-being, even as we continue to flinch every time we encounter an entirely innocuous spider or see the moving image of a snake on the Discovery Channel.

Many characters in movies or in books, and maybe some people around you, display an ambivalent attitude towards risk-taking. John would not take any risk with his savings, took years to approach and court his wife Laura, but does not hesitate to climb a peak 7000 m high in the Himalayas.

In "*Risk taking and personality*", Michael R. Levenson⁶, from the School of Public Health, in Boston, Massachusetts, notes that Hollywood scriptwriters portray the Western hero as physically fearless but interpersonally shy, like many of the characters played by John Wayne. This is exemplified when Gail Russell plays the angel (but such a strong woman) and John Wayne the bad man (yet a shy one), in *Angel and the Bad man*, a 1947 Hollywood movie.⁷

Other examples from popular culture include Spiderman, Superman, and Batman—who all struggle desperately with their interpersonal relationships—and certain heroes from children's literature such as Peter Pan and his fairy advisor Tinker Bell, or Pinocchio and his companion Jiminy Cricket. Bram Stoker introduces us to the enigmatic Dracula, whose nighttime and

⁶ Levenson, R. M., 1990

⁷ John Wayne's character in the 1969 movie *Rio Bravo* was not more confident with the ladies, when confronted with the character played by Angie Dickinson. This double self was an important factor in forging the John Wayne legend.

daytime habits contrasted so interestingly, a character that embodied many of the worries and concerns of the era in which the story was set.

In the same vein, Oscar Wilde wrote *The Picture of Dorian Gray*, the chilling tale of Dorian Gray, the handsome young man who did not wish to grow old, but found a way to keep his looks while everyone around him was beginning to fade. Dorian Gray's other self was a portrait in the attic, a portrait that showed not only how he should have looked by then, but also how he had allowed himself to become morally vile and corrupt. Similar themes are brought out in Robert Louis Stevenson's *Dr Jekyll and Mr Hyde*, which dramatizes the endless conflict between base instinct and culture in the heart of a "civilised" man. All depict multiple selves in conflict.

When Dr Jekyll Becomes Mr Hyde

Heroes from cowboys to Superman struggle to balance contrasting elements of their personalities. Human behavior is full of tensions between our "good" side (Tinker Bell) and our "bad" side, which we try to tame with Ulysses pacts. Dieters pay good money to stay on "fat farms" whose main appeal is that they promise to underfeed their guests; alcoholics take anti-abuse medication which causes nausea and vomiting if they have a drink; smokers buy cigarettes by the pack (rather than by the carton, which is cheaper) because they feel that this may help them to smoke less.⁸ We may argue that hiring a personal coach at the gym is a way to acknowledge weakness. But would we do as much exercise without the coach?

Darth Vader, a character from the *Star Wars* movie, displays the typical Machiavellian trait. Machiavellianism, narcissism, and psychopathy, the *Dark Triad Traits*, are described by Peter K. Jonason, Minna Lyons, and Emily Bethell⁹ as "entitlement, superiority, dominance (i.e., narcissism), glib social charm, manipulateness (i.e., Machiavellianism), callous social attitudes, impulsivity, and interpersonal antagonism (i.e., psychopathy)." In the *Blank State*¹⁰, Steven Pinker informs us that "psychopaths, who are definitely not "good and kind people", make up about three or four percent of the male population". Psychopaths are however quite extreme folks, not to be confused with our ordinary healthy bi-ased minds: "psychopaths, who lack all traces of a conscience, are the most extreme example, but social psychologists have documented what they call Machiavellian traits in many individuals who fall short of outright psychopathy."

Nevertheless, *Star Wars* fans discovered that the bad Darth Vader had once been the good Anakin Skywalker. Looking for explanations, some of them

⁸ Loewenstein, G. H. and Thaler, R. H., 1989

⁹ Jonason, P. K., Lyons, M. and Bethell, E., 2014

¹⁰ Pinker, S., 2012

surely concluded that “*it was the loss of his mother as depicted in Star Wars II, Attack of the Clones*” that turned Anakin Skywalker into Darth Vader. In that respect, they would agree with Jonason, Lyons, and Bethell, who claimed that “*Machiavellianism*” could be related to low quality or irregular parental care and relationships. According to the American psychologist Judith Rich Harris, it seems that the influence of parents on their children’s personality has been overestimated¹¹. Psychoanalysts from Freud onwards have striven to find other kinds of deep-rooted explanations. We shall leave those to them.

The Multi-Modular Mind Hypothesis

The Ulysses pact mentioned above illustrates what Leda Cosmides and John Tooby¹² refer to as “*the multi-modular mind hypothesis*”. Along with other scholars, they asserted that our mind is made up of a bunch of separate modules, or “mental organs”, each one adapted to a specific kind of problem, like “avoiding predators”, “food searching”, “looking for a mate”.... So is human behavior the outcome of internal struggles between multiple selves with conflicting preferences?

The philosopher Daniel C. Dennett¹³ seeks to explain consciousness with the insights from evolutionary biology, using his “*Multiple Drafts Model*”, which he contrasts with the traditional “*Cartesian Theater*”¹⁴. According to Dennett, it is hard to get rid of the idea that our brain holds a special center coordinating consciousness, like a unique internal observer. Instead, he proposes that “*at any point in time there are multiple ‘drafts’ or narrative fragments at various stages of editing in various places in the brain.*”

In the register of feelings, the idea of a single emotion system also seems engrained in us. But LeDoux claims that we employ a whole range of emotional devices which have evolved to accomplish specific functions and enable different sorts of feelings. Fear, happiness, shame, and other emotions serve different purposes and provide different solutions to different problems, from avoiding danger to developing fair social relations.

Now, with so many mental modules, we have to choose which things to worry about, because we have only a finite amount of time and brainpower to devote to problem-solving. Life’s problems range from finding a spouse to getting a raise from the boss, choosing a tooth brush, or finding our way in a crowd or a forest.

¹¹ Harris, J., 2009

¹² Cosmides, L. and Tooby, J., 2001

¹³ Dennett, D. C., 1991

¹⁴ “The Cartesian Theater is a metaphorical picture of how conscious experience must sit in the brain.” “According to the Multiple Drafts Model, all varieties of perception—indeed, all varieties of thought or mental activity—are accomplished in the brain by parallel, multitrack processes of interpretation and elaboration of sensory inputs.”

Please Alleviate My Cognitive Burden

As Sir Joshua Reynolds noted:

There is no expedient to which a man will not resort to avoid the real labour of thinking.

The Magical Number 7

In folk tales, a hero has to perform three tasks before he can marry the princess, or travel seven seas in order to complete his quest, or the inquisitive maiden learns that she may open six of the doors in her new home, but that the seventh is forbidden.

In real life, as in folk tales, it is often easier when options are limited!

George A. Miller, a psychologist from Harvard University, gave a famous lecture in 1955 demonstrating our cognitive limitations. In his 1956 follow-up paper¹⁵, “*The magical number seven, plus or minus two: some limits on our capacity for processing information*”, Miller claimed that our senses and cognitive capacities allow us to distinguish between more or less seven alternatives. As the span of our immediate memory is limited, so is our capacity to memorize and process information. Miller adds that he has been persecuted by an integer, the magical number seven:

the seven wonders of the world, the seven seas, the seven deadly sins, the seven daughters of Atlas in the Pleiades, the seven ages of man, the seven levels of hell, the seven primary colors, the seven notes of the musical scale, and the 7 days of the week?

...not forgetting *The Magnificent Seven*, the famous 1960 Western movie by John Sturges, featuring the seven actors Yul Brynner, Eli Wallach, Steve McQueen, Charles Bronson, Robert Vaughn, Horst Buchholz, James Coburn, and Brad Dexter.

When our mind has to grasp anything more than seven items, it tends to package them in easy-to-handle “*chunks*” of information. According to Herbert A. Simon¹⁶, recipient of the Nobel Prize in economics, the psychological reality of the “*chunk*” has been fairly well demonstrated, and the chunk capacity of short-term memory has been shown to lie in the range from five to seven. He states that it takes between 5 to 10 s to record an item of information, a chunk, in the long-term memory. Some other “magical numbers”

¹⁵ Miller, G. A., 1955

¹⁶ Simon, H. A., 1982

have been estimated, such as visual scanning speeds and the time required for simple grammatical transformations. Simon believed that short-term memory capacity and the rate at which items can be fixed in the long-term memory are keys to the organization and systematization of both simple tasks and more complex cognitive performances, and explain a wide range of findings.



An Amusing Test of Short Term Memory

In *The Emotional Brain*, Joseph LeDoux exposes the following experience.¹⁷ Remember this number: 783445. Now close your eyes and repeat it, and then count backward from 99 to 91 by 2 s and try repeating the number again. LeDoux claims that you are unlikely to be able to perform the task.

In fact, once the six figures 7, 8, 3, 4, 4, and 5 are stored in the mental workspace, you have no room left for the operations $99 - 2 = 97$, $97 - 2 = 95$, etc.

So to find more space, and to complete the subtractions, you have to kick the number 783445 out of the working memory. But then once that number has been removed from the mental workspace, you cannot say it out loud again.

The mental workspace in which we temporarily store pieces of information, the so-called “working memory”, is limited, and so is the number of items we can hold together, manipulate, and compare in our mind.

“*The memory is full!*” message is not limited to personal computers, smartphones, and digital cameras.

Happiness Is a Matter of (Not Too Much) Choice

Barry Schwartz, Andrew Ward, John Monterosso, Sonja Lyubomirsky, Katherine White, and Darrin R. Lehman¹⁸ suggest in “*Happiness is a matter of choice*” that so-called “*maximizers*” or “*optimizers*” can feel worse as their opportunities increase. One possible explanation is the avoidance of potential regret; the more choices there are, the more likely one is to make a non-optimal choice. A second explanation is that, as the number of choices increases, each seems less attractive, relatively speaking, since there is so much information to deal

¹⁷ LeDoux, J., 1998

¹⁸ Schwartz, B. et al., 2002

with. The authors suggest that people may be better off with a limited set of options when they have to choose.

Let's look at a trivial example. You are on a journey in a city. You fancy Italian cuisine and look for a restaurant. Were you a "*satisficer*", you would pick the first Italian restaurant that pleases you enough in the main street. Now, a "*maximizer*" (optimizer) would try one way or another to gather information to make the "best choice". She could do that by asking around for recommendations, comparing prices and quality, surfing on specialized web pages on the Internet, or buying the *Michelin Guide*.



A Small Dose of Theory On Satisficing

Herbert A. Simon¹⁹ is well known, among other things, for questioning humans' supposed aptitude for behaving as economic optimizers. Simon coined the term "*satisficing*" to refer to when people make a decision on the basis of what is useful enough, and not necessarily what is most useful. As opposed to the optimizers, who tend to look for the most useful choice or the maximal interest.

The Social Number 150?

People are not just individuals. One could even describe the human species as "*hyper social*". When we interact with others, there is a cost to the brain to live in groups, and to maintain and monitor social relationships on a daily basis. Robin Ian MacDonald Dunbar, a renowned British anthropologist and evolutionary psychologist—head of the Social and Evolutionary Neuroscience Research Group in the Department of Experimental Psychology at the University of Oxford—asked if there was a "*cognitive limit to the number of individuals with whom any one person can maintain stable relationships*."²⁰

We owe Dunbar the fruitful discovery that 150, the now famous *Dunbar number*, is more or less an upper bound for the number of social relationships that any given individual can monitor simultaneously.

¹⁹ Simon, H. A., 1982

²⁰ Dunbar, R. I. M., 1993



A Small Dose of Theory On the Size of Human Social Groups

Robin Dunbar used different approaches to get to the figure of 150. Relating the size of the neocortex in primates with their group size, he predicted from the size of the human neocortex “*that humans should live in social groups of approximately 150 individuals.*”²¹

Dunbar also looked for typical group sizes in communities, academic disciplines, the army, etc., and observed that figures in the region of 150 to 200 are common in human societies, both old and modern²². For instance, in the army, where coordination is essential for survival and success, it is striking to observe such figures for military companies. It seems that, by a process of trial and error, splitting and merging, coordinated human groups have converged to a common range.

Together with Russell Hill of the Department of Anthropology at Durham University, Dunbar examined various social network dimensions in the modern West based on the exchange of Christmas cards. They found that “*Maximum network size averaged 153.5*”, surprisingly close to the 150 deduced from the size of the human neocortex.²³

So here we stand, with our mind full of “*mental organs*”. Each enjoys its domain of validity, having been tailored for specific tasks. And each displays capacity limitations.

²¹ Hill, R. A. and Dunbar, R. I. M., 2003

²² Dunbar, R. I. M., 1993

²³ Hill, R. A. and Dunbar, R. I. M., 2003



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