The Red Paper...

Toilet roll syndrome: A tale of two amygdala! Part 1.

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Thinking in colour...

The COVID-19 outbreak had an almost immediate effect on toilet paper all over the world.

To some, the stockpiling of toilet paper will seem bizarre. To others, it was essential.

This difference highlights how each of us is individually hardwired, how we all perceive things differently, and why we don't all respond in the same way.

The truth is that 'toilet paper syndrome' is just an *emotional* response to an environmental *trigger*.

LIFE IS AN EMOTION

We are all inherently emotional beings, and whether we acknowledge it or not, much of our behaviour is emotionally motivated.

Despite our level of sophistication in many aspects of our lives, understanding our emotions, and how to manage them, lags well behind our practical and intellectual skills.

So why do we have emotions? After all, being 'emotional' is often seen as a negative!

The word 'emotion' comes from the Latin word *motere*, meaning 'to move'. Emotions have the power to 'move people'.

A great way to describe emotion is 'energy in motion'.

Our 'negative' emotions have been blamed for a plethora of ills, when in fact, it is not the emotion that has caused the problem, but rather how we have chosen to react to it.

> If you can't **understand** it, you can't **control** it. If you can't control it, you can't **improve** it.
>
> *James Harrington*

When it comes to emotions, there's no such thing as 'bad' - they're there for a reason, and all emotions serve a useful purpose.

When emotions are sufficiently expressed, they are healthy and appropriate. Anger, fear, and sadness are as healthy as peace, courage and joy. It's what we decide to do with them - how we manage them - that's key.

Take anger for example. It's perfectly fine to feel anger - it often helps us identify our boundaries, what we will and won't accept in relationships, and acts as a red flag in situations we don't like. These can all be seen as benefits.

In itself, anger is therefore neither good nor bad. It's how we react, or what we do, when we become angry that can be considered as 'good' or 'bad'.

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For example, if someone says something negative about your work, you could become defensive, start yelling at the person, get frustrated with everyone in your workplace, and possibly make the situation worse.

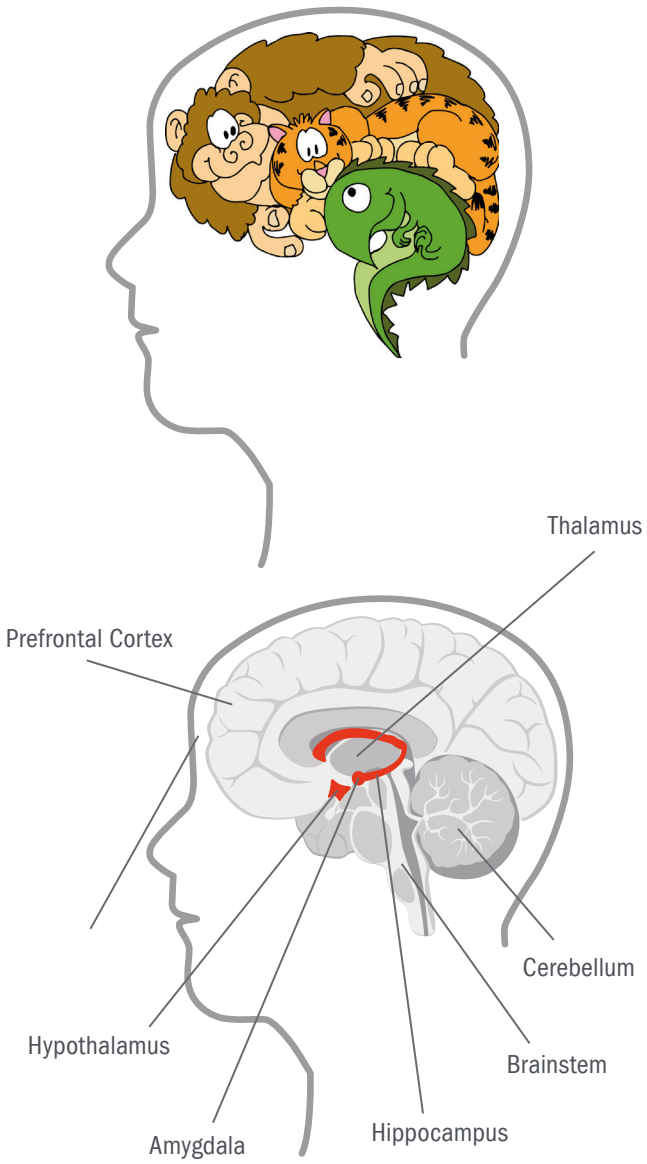
Or you can process what was said and the anger you feel, identify whether there was any truth to the comment, and if not, ignore it. If it was true, use it to motivate change.

To understand *how* we are feeling, and what we can do to *manage* that feeling, we need to understand the source of all our emotions: the brain.

The study of the human brain is one of the least explored areas in science, and even experts agree that there is more we don't know about the brain than what we currently do know.

In recent years, our knowledge of the brain has exploded - most of what we know about the brain has only been discovered in the last 20 years or so. In fact, by the time you've finished reading this paper, some of the info may already be outdated!

But, from what we know, we can take a huge step forward in bringing the best of ourselves to everything we do. So, lets start at the beginning!



HOW THE BRAIN GREW

The concept of the 'triune brain' - three in one - was developed by the American physician and neuroscientist, Paul D. MacLean.[1]

While some aspects of the theory have been controversial, and neuroscience has developed a greater understanding of how the brain develops, it's an excellent way to begin to understand how the brain has 'grown from the bottom up'.

The 'oldest' layer of the brain is referred to as the *reptilian brain*, which includes the brainstem that surrounds the top of the spinal cord, and the cerebellum.

This part of the brain doesn't learn very well from experience - it's there to repeat instinctual behaviours in a fixed way: survival activities like breathing, body temperature, heart rate, balance, and reproduction.

Layered over the top of the reptilian brain is the *mammalian brain,* a set of structures called the *limbic system* - the centre of our emotions, learning, and memory.

We'll mostly be looking at the *amygdala*, an almond-shaped mass of grey matter inside each cerebral hemisphere - the brain's radar for threat and our prehistoric 'smoke detector'. We'll also be talking about the amygdala's partner in crime, the *hippocampus*.

The largest part of the human brain is the *primate brain*, the home of our complex cognitive, linguistic, motor, sensory, and social abilities.

The area that we're interested in here is the *prefrontal cortex* - located just behind the forehead. It's the bit we 'bang against the wall'!

This is our 'executive centre', where decisions are made, where we plan, where we think things through, where we learn.

Think of it as the brain's 'boss'... well, most of the time!

SURVIVAL COUNTS

Evolution created what we are today, but some of our more primitive functions haven't evolved to keep up with our current way of life.

One of the areas that hasn't been upgraded to a newer OS is how we react to '*stressors*' - a demand or threat - that pulls our body out of it's natural balance.

Whatever the stressor - whether a threat to our life, or just to our self-esteem - our body reacts with the same primitive response: the *fight-flight-or-freeze* response.

Let's take a look at the neuroscience:

When sensory inputs enter our brain - from our 5 senses - they're first processed in the *thalamus*, which acts a 'relay station', or hub.

Information is then sent to the sensory processing areas of the neocortex, which processes the information, compares it with our 'world model' to identify what we are experiencing, assess its meaning, and then decide on the appropriate response.

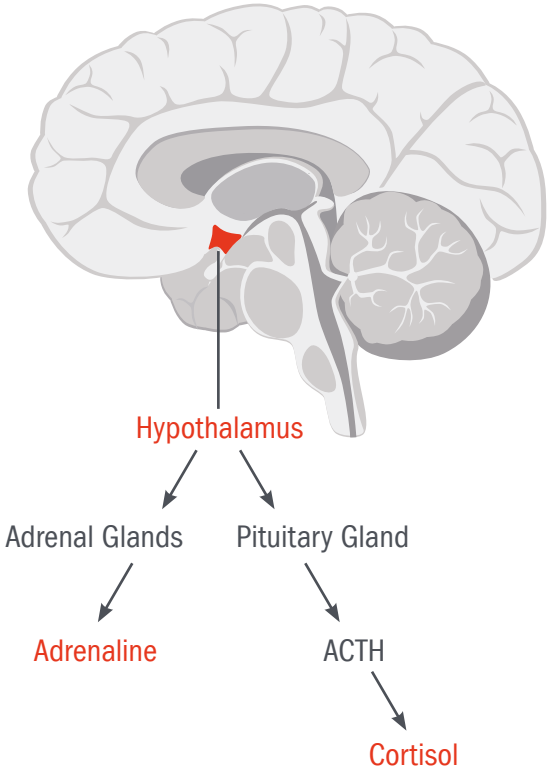
If that response is emotional, a signal is then sent to the amygdala to activate the emotional centres.

So far, so good!

However, there is also a smaller bundle of neurons that connects the thalamus *directly* to the amygdala. This allows the amygdala to receive direct input from the senses - even if a little 'blurry' in detail.

If the amygdala perceives the stimulus as a threat, it sends a distress signal to the hypothalamus - a small region at the base of the brain.

When the hypothalamus receives the distress message, it sends a signal to the adrenal glands via the sympathetic nervous system - our *gas pedal* - causing *adrenaline* to be pumped into the bloodstream.



Adrenaline increases heart rate and respiration, primes muscle tissue for action, stimulates the production of glucose and the breakdown of fat stores, and changes the priority of blood flow by dilating some vessels and constricting others.

As the initial surge of adrenaline starts to subside, the hypothalamus quickly activates the second part of the stress response system - the HPA axis - signalling the pituitary gland to release ACTH (adrenocorticotrophic hormone).

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ACTH stimulates the adrenal glands to produce steroid hormones (glucocorticoids), including the stress hormone *cortisol*, which mobilise the body's defence mechanisms, keeping us revved-up and on high alert.

This primitive response starts within a fraction of a second, springing us into action before the slightly slower neocortex receives the warning, and can prepare a more refined plan of action.[2]

We react without rational control.

From an evolutionary perspective, this had great advantages. Who wants to wait until the 'thinking' brain has shouted 'LION... RUN!' when our 'emotional brain' can trigger the fight-flight-or-freeze response as soon as we sense danger?

To deal with the threat of a lion, that's great. But we don't meet lions - real ones that is - in our daily lives today.

STRESSORS EVERYDAY

The stress response isn't all-or-nothing; it's proportional to the perceived degree of threat. It's also cumulative: the more stressors we have, the more the hypothalamus responds.

So, even with a non-life threatening stressor like being late for a meeting, or a colleague not greeting you first thing in the morning, the same physiological response is triggered to a greater or lesser degree.

But, a little stress is good for us. It gives us the push we need to meet a challenge, along with an unmatched feeling of exhilaration.

It's only when stress becomes chronic, or makes us feel out of control, that it becomes a problem.

The cascade of physiological reactions that are designed to save us from the hungry lion, are therefore responsible for shutting down our power of logical thought.

Extra oxygen is sent to the brain to increase alertness and sharpens our senses.

A good thing!

But, activity is suppressed in the areas responsible for short-term memory, concentration, rational thought and inhibition - we think less and react more instinctively.

The amygdala can also take things to the extreme.

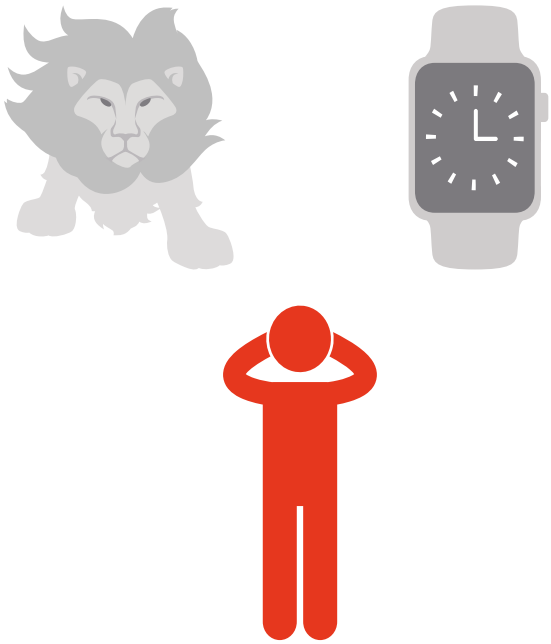
The term *amygdala hijack* was coined by Daniel Goleman to describe emotional responses that are immediate, overwhelming, and out of measure with the actual stimulus.[3]

Here, the amygdala triggers a much more significant emotional response to the perceived threat.[3] The amygdala completely takes over from our rational, emotional self-control.

Amygdala hijacks are not always as obvious as a four-letter tirade. That's the *fight*.

Someone may feel powerless in situations with the same person - flooded by stress hormones that do more than cause agitation. They can *freeze*.

Or, *retreat* could be the ultimate response.

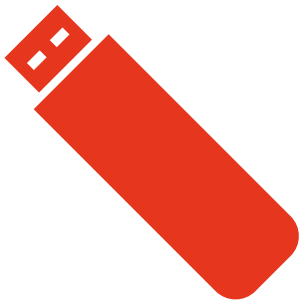


MORE THAN JUST FEAR

The amygdala is best known for its role in processing fear, although the more we understand its function, the more we learn that this is a hugely oversimplified view of how the amygdala impacts our daily lives... and the supply of toilet paper on the shelf!

The amygdala is in fact the centre of a variety of functions, including our emotions and emotional behaviour, decision-making, and motivation.

The amygdala also plays a key role in memory.



I REMEMBER THAT!

Storing and retreivinig information may seem like a simple process, but managing the memories of our life experiences is an incredibly complex function of the brain!

In addition to collectively shaping who we are, our memory function helps us interact with the world around us. Similar situations evoke certain responses, familiar faces evoke specific reactions, and repeated stimuli help us learn.

Information goes through different stages as it is stored, ultimately leading to its permanent home in our long-term memory - if it's deemed important enough, that is.

First, we have temporary storage, which is generally accepted to comprise short-term and working memory.

Short-term memory holds sensory events, movements and cognitive information like numbers, words, names and other bits of information for a *brief* period of time.[4]

Short-term memory is like a flash drive with very little space - it may help you get immediate tasks done, but you're not likely to rely on it to hold weeks, months or years of your work.

For the average adult, the most commonly quoted capacity for short-term memory is *The Magical Number Seven, Plus or Minus Two* - known as Miller's Law.[5]

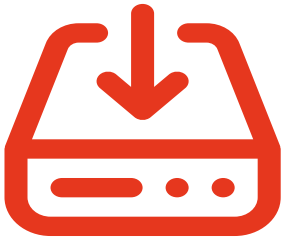
That's +/- 5 bits of information, thought to be retained for around 15 to 30 seconds.[6]

We can keep information in our short-term memory for longer through *rehearsal*:

Maintenance rehearsal involves repeating information without thinking about its meaning, or connecting it to other data, keeping information in our short-term memory, and/or working memory, for longer.[7]

Elaborate rehearsal is more effective in converting information into long-term memory. It involves *thinking* about the meaning of the information, and *connecting* it to other information that is already stored.[8]

Working memory is a little more complex, and involves the manipulation of stored information, whereas short-term memory only refers to the short-term storage of information. It has a *cognitive* function as opposed to a *storage* function.[9,10]



Long-term memory - as the name suggests - is anything you remember that happened more than a few minutes ago.

Long-term memories can last for days or even years, and are divided into two different groups: *procedural* and *declarative*.[11]

Procedural memory is about 'knowing how', and it involves the things we learn by practice or repetition, like playing the piano or driving a car.

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Declarative memories are about 'knowing that', and can be recalled consciously. To take it even further, declarative memories are split into two more groups:

1. *Semantic* memories, which are facts like dates, word definitions, and learned concepts - our 'general knowledge'.

2. *Episodic* memories are related to our personal experiences, within their specific context - our 'personal recollection'.

Long-term memory is formed from short-term memory - primarily in the hippocampus - and is stored throughout the cerebral cortex.[11]

These interconnected structures help us interpret stimuli and figure out the appropriate response, either by retrieving old memories to help us move forward, or by storing them so that we can begin to learn more.[12-16]

So, what is the role of the amygdala?

The amygdala plays a pivotal role in the memory of emotional stimuli, in partnership with its 'mate', the hippocampus.

The amygdala prioritises the most important information (*salence*), such as emotion, motivation and how 'good' or 'bad' you have deemed the situation or object in question (*valence*).[17-19]

The hippocampus then provides the *context* - which no clear picture is complete without - by considering fear, emotional judgement and emotional memory, which are all critical for remembering motivationally important stimuli.[20-22]

The amygdala attaches the emotional *significance* to memories, by both strengthening the emotional content of memories, *and* helping the embedding of new memories.

Everything that presents a meaningful social or biological incentive for us, plays an important role in shaping our interpersonal behaviour.[23]

When we interact with each other, emotionally salient stimuli like fearful facial expressions, or an ear-to-ear smile, are important cues for helping us focus on the relevant or important information.

> The amygdala in the emotional centre sees and hears **everything** that occurs to us **instantaneously**.
>
> *Daniel Goleman*

Positive and negative emotional connections are both the work of the amygdala, with the strongest connections remembered more vividly.[24-26]

Finally, the hippocampus contextualises the memory - as in *what* happened, and *where* - to complete the process of episodic memory encoding.[27]

It's important to remember - no pun intended! - that the amygdala plays its part in *all* emotions, those happy moments that we experience, as well as those that are not so happy.

But, as we'll see shortly, the amygdala has a predisposition to encode the negative.

CAN'T QUITE SHAKE IT OFF?

Do you tend to dwell on a negative comment, or fixate on a small mistake for days?

If we look at the world around us right now, it's clear that criticism often has a greater impact than compliments, and bad news usually draws more attention than good news.

This is because negative events have a greater impact on our brains than positive events do - it's called *negative bias* - the tendency to attend to, learn from, and use negative information far more than positive information.[28]

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As humans, we tend to:

- Remember traumatic experiences better than positive ones
- Recall insults better than praise
- React more strongly to negative stimuli
- Think about negative things more frequently than positive ones
- Respond more strongly to negative events than to equally positive ones

Even when we experience many good events in one day, negative bias can cause us to focus on the single 'bad' event that happened. We feel the frown more than the smile.

It leads us to ruminate on the little things, worry excessively over having 'made a bad impression', and linger on negative comments that may not have been intended that way.[29-31]

To add to that, negative emotions also last longer than positive ones. We tend to spend much more time thinking about them, and therefore, reason about them more too.[32]

Negative bias is likely related to learning and memory processes - the more attention we focus on a stimulus or experience, the more likely we are to remember it.[33]

On the bright side, the negatives help us make sense of the world, as we learn far more from negative outcomes and experiences. We even tend to make decisions based on negative information more than positive data.[28,34,35]

Negative bias also helps us to get things done - or at least to think with that intention - by firing up our motivation. Research has also shown that we're more motivated by *preventing* the loss of something, than we are by an incentive of *gaining* something![35]

In other words, we take a 'better safe than sorry' approach to what we do, and are more inclined to avoid risk.[35] For our ancestors of course, paying attention to bad, dangerous, and negative threats was literally a matter of life and death.

Those who paid more attention to the bad things around them were more likely to survive, and hand down the genes that made them more attentive to threat.

This is what we call *adaptive* evolution.

At the heart of negative bias is - yes, you've guessed it - the amygdala!

Studies have identified 'positive' neurons located at the back of the amygdala, and 'negative' neurons at the front.[36]

Most interestingly, these opposing positive and negative neurons were found to be both physically separated and genetically distinct - differing in shape, size, and electrical properties.[36]

These sets of cells also inhibit each other, leading us to believe that the brain is constantly balancing activity between the two.[37]

Remember that there are two amygdala? One in each cerebral hemisphere?

To make things even more exciting, differences have also been identified between the two.

The right amygdala responds to negative emotions, especially fear and sadness. In contrast, the left amygdala responds to pleasant emotions like happiness, as well as unpleasant emotions.[38]

This *asymmetry* is the way we process negative and positive events to understand the world around us - the negative receives far more 'air time', and promotes more rapid and prominent responses.[39,40]

Research has also shown that this *antagonistic* control of our emotional behaviours and memories is genetically defined.[36, 37, 41]

So are some people wired to 'look on the bright side'? Studies say yes. Happier people show greater amygdala responses to positive stimuli.[42]

The ability to stay positive when times get tough - and conversely, of being a bit of a pessimist - is hardwired into the brain.[41]

Happiness, however, isn't at the expense of feeling affected by negative stimuli. We can feel happy about some things, but unhappy about other things at the same time.

Individual difference in regulating emotions is referred to as our *affective style* - basically the mood that we're typically in - which originates from genetic and/or early environmental influences. It manifests in our different expectations about the world, and critically, the most adaptive ways for us to interact with it.[37,43]

Our 'love of the negative' influences everything we do, in one way or another. Take the media we consume, for example. Negative news articles consistently dominate world news - is that negative bias in action?

Research says yes! And it's a cross-national phenomenon. Globally, we're more attuned and attentive when it comes to negative news.[44]

Studies have also shown that negative news is more likely to be perceived as truthful. Since negative information draws greater attention, it also may be seen as having greater validity.[45]

IS THAT NEW?

The amygdala also has high stakes in novelty - the experience of something 'new', that shiny new stimulus.

We can think can think of novelty in two ways:

1. *Novel-common* - stimuli that we've experienced before, but are new in the current context.

2. *Novel-unusual* - stimuli that have not been encountered before. Anywhere.

Novel-common stimuli increase activity significantly in *both* the amygdala and hippocampus.

However, for novel-unusual stimuli, only the amygdala shows an increased response.[46]

It's important to note that the interpretation of novel information is also dependent on our emotional state.

If you're already anxious, for example, it may lead to a more negative, threatening interpretation of the new information.[47]

But more on anxiety shortly.

AM I WORRIED?

Worry, stress and anxiety are all related - but they each come with their own signature characteristics. They're 'same same, but different'.

Worry is when your mind dwells on negative thoughts, uncertain outcomes, and anything that could possibly go wrong.

Worry tends to be repetitive, obsessive thoughts. But, believe it or not, worry has an important function in our lives.

Our brains become stimulated when we think about uncertain or unpleasant circumstances, like possibly failing an exam, or being unable to pay the bills.

So worry should be a catalyst for problem-solving and action - both of which are positive.

It's only when we get stuck thinking about a problem that worry stops being functional.

Again, even when we've had a great day, negative bias can lead us to ruminate on the small things that haven't been great. The amygda drives worry.[29-31]

Worry is that 'thing' that sits on your shoulder, rabbiting in your ear. That persistent nag that doesn't seem to pipe down.

It's the constant fault-finding, criticism, and 'doom and gloom' ending to the stories in our head.

And, as we all know, some people are more prone to worrying than others.

Stress on the other hand is a response to a *stressor*. It's present, either real or perceived.

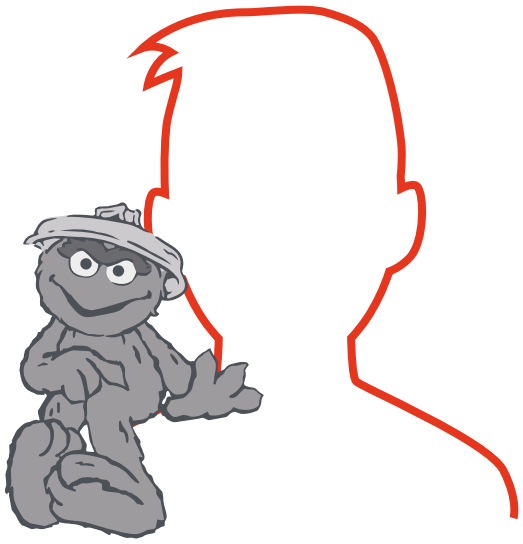
If stress and worry are the *symptoms*, anxiety is the *result*. Worry is the cognitive element of anxiety, and stress is the physiological response.

This means that we experience anxiety both in the mind, and the body.

Anxiety can be defined as 'an emotional response to potential unidentified threats and is characterised by sustained arousal, vigilance, worry, and apprehension that results in specific patterns of defensive behaviours and concomitant autonomic responses'.[48]

Anxiety is not the same as fear. Fear is a response to an *immediate* threat, whereas anxiety is the expectation of a *future* threat.[49]

Anxiety includes situations that threaten our state of emotional balance, like when we're anxious about that first date, being asked into the boss's office but have no idea what the meeting is about, or expecting something to happen, but we don't quite know whether it's going to be good or bad.[50]



We can think of anxiety as 'fear of the future', so it should be no surprise that the amygdala is is very much at the heart of it.

In fact, the brain circuitry involved in anxiety and fear are so similar that many areas of the brain involved have been identified.

It's the interactions between these areas - through a large number of different neurotransmitters and neuropeptides - that *amplify*, or *soothe*, the anxiety that we're feeling.[51].[49,51]

As with its role in the regulation of the amygdala stimulated stress response, the hippocampus is also central to the regulation of anxiety.[49,52]

Specific 'anxiety cells' have even been identified in the hippocampus.[53]

As in the stress response, the hippocampus moderates the effect of stimulation by dampening the hypothalamic-pituitary-adrenal (HPA) axis that modulates glucocorticoid production.[54-57]

The more it gets involved, the less anxious we feel.

Research also indicates that there is a direct, rapid pathway in the brain that enables us to respond to anxiety-provoking stimuli without needing to go through higher-order brain regions to be processed.[53]

That's why we can feel anxious without even knowing *what* we feel anxious about - before we then interrogate ourselves to figure out *why*. Sound familiar?

Anxiety is part of our primitive survival mechanism, and even though we're not likely to be anxious about bumping into a sabre-toothed tiger on the way to the shops, these brain functions are still hardwired into our behaviour.

Like worry and stress, anxiety is simply a physiological response to everyday life. But, it can become a problem when the response outweighs the threat - like when talking to a crowd of people invokes the same response as running into a snake.

Chronic stress has also been shown to predispose people to anxiety, with several studies reporting both functional and physical changes in the amygdala.[49]

These changes may lead to increased anxiety, and even aggression.

Other brain areas involved in processing anxiety have also been reported to suffer changes - and even damage - as a result of chronic stress.

The hippocampus and prefrontal cortex, for example, show atrophy, which could lead to impaired memory.[49]

And, as the amygdala is at work, those with a more pronounced negative bias are also more likely to feel anxious more often.

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IS IT CONTAGIOUS?

Worry, stress, and anxiety - as well as other emotions that we express - are catching.

It's called *emotional contagion:* the tendency to mimic, feel, and be influenced by, the emotional displays and experiences of others.

It's also our tendency to be influenced by the *mood* of those we engage with - and if we're stressed, worried or anxious, we're even more prone to be influenced by the emotions of others.[58]

Our ability to consciously or unconsciously mirror the emotions of others is further influenced by genetic heritage, gender, personality, affective style, and early experiences.

Emotional contagion is relatively automatic, unintentional, and mostly unconscious.[59] Studies suggest that it automatically prepares the brain - and therefore, the body - for action.[60]

Think of a herd of antelopes grazing the sunny African savanna. Suddenly, one senses a stalking lion. The antelope momentarily freezes, then quickly runs to escape the predator. In the blink of an eye, other antelopes follow.

This explains the mass panic that occurs at music concerts, sports events, or other public gatherings.

Once fear is triggered in the crowd - say someone exclaimed that a that loud noise was in fact a gunshot - there is no time or opportunity to verify the source of terror.

The fear travels from one to the next, affecting each individual as it sweeps across the crowd.

Everyone starts running for their lives. People must rely on each other, just like antelopes do.

Once again, it's the amygdala at work, and it stems from our ancestors, where working *together* against threat was essential for survival.

As we have discussed, there is a connection between our general bias towards the negative, and the perceived importance of stimuli.

So, we can take emotional contagion further, and look at the theory of *negative bias, dominance and contagion*, split up into four key areas:[61]

1. Negative *potency*: even if positive and negative events, things, experiences, have the same *importance* to us, the negative will have the stronger emotional *impact*.

2. Steeper negative *gradients*: the negativity of 'bad' events increases faster as they grow closer to us.

3. Negativity *dominance*: how combining 'negative and positive entities yields evaluations that are more negative than the algebraic sum of individual subjective valences would predict'. Phew!

   In other words 'one plus one equals two' when positives combine. However, 'one plus one is *greater* than two' when negative things combine.

4. Negative differentiation: the concepts - our thoughts - that we create around negative things are more well-defined, and also more complex.

   They also elicit a far broader range of responses from us than positive entities do.

The end result?

Negative stimuli are more contagious than positive ones - and bad news really does travel fast!

A TALE OF TWO AMYGDALA!

David Goleman coined the term amygdala hijack to explain the power of emotion to overwhelm rationality.

I'd like to christen toilet paper syndrome an 'amygdala storm' - a perfect storm.

From negative bias to novelty, from stress, worry and anxiety, to emotional contagion... external stimuli as a result of the invisible global threat had our amygdala triggering on overtime - whether we were consciously aware of it or not.

And, unlike the antelopes on the savanna who could stop running once they were a safe distance from the predator, our threat to life was ever present.

Emotion doesn't have to be face-to-face to be contagious. Emotional contagion - especially fear contagion - can spread person to person faster than any virus, across our ever present, 'always on' media.

Wherever we turned, pre-lockdown coffee conversations at a table (relatively) nearby were quickly Covid-ised.

And not just on 'home turf', either.

Because of the speed and power of the media we consume, it felt as though China was suddenly around the corner, and Italy on our border.

In other the parts of the world we experienced by the virtuality of identification with our new neighbours.

We stared in awe at their empty streets.

We shared their distress of empty shelves... even toilet paper was disappearing faster than being flushed down the toilet itself.

If something as basic as an everyday consumable is going to run out, what about food?

What about *my* family?

Terrifying images and information are incredibly effective at spreading fear.[62] And photographs of empty shelves make good news.

Even though we are reassured by those in charge that there will be no disruptions to supplies of goods, our negative bias will prompt a 'yes, but what if?'.

Research from the University of Edinburgh Business School and the University of Southampton in March 2020, found that photographs of empty shelves in news stories increased the likelihood of panic buying by 86%.[63]

Plus, actions speak louder than words. Photos of shoppers in Hong Kong wearing face masks and leaving the supermarket with trolleys full of goods, trolleys in Los Angeles brimming over with bottled water and toilet roll, walking into my local Woolies - Kloof Street - on 14 March at 16.04 to no meat of any description.

Even the usually well-stocked vegetarian range had been depleted more than it had been since launch.

Was the need to panic buy even enough to prompt the conversion to vegetarian?

Or vegan?

IT'S THERAPY

When the going gets tough, the tough go shopping![64]

It's not called 'retail therapy' for nothing. Shopping actually does make us feel better.

The human body is designed to maintain balance - homeostasis. Our brains actively monitor and assess our affective state - how positive or negative a space we're in - and aims to maintain or improve the way that we're feeling.[65]

So when we're feeling down, we're 'prompted' into *mood-regulating activities*.[66]

More specifically, bad moods are improved by engaging in potentially uplifting activities, or distracting ourselves from the negative.

And similarly, a good mood is sustained by avoiding risky activities that might potentially dampen our positive feeling.[65, 67-72]

In general, however, most mood regulation is motivated by the goal of repairing a bad mood.[69,70,73-75]

Unfortunately, the goal of mood repair may result in a decrease in the pursuit of other goals.

Self-regulation theory describes how emotional stress, like anger, fear and anxiety, can cause us to fail at consciously managing our thoughts, behaviour, and feelings.

We become more impulsive, focusing our energy on reducing negative emotions. Our main aim, when in distress, is to find immediate pleasure, and relief.[64,71]

Different types of negative feelings can also result in different forms of retail therapy. In other words, retail therapy can be *strategically motivated* as well.[64,76,77]

That's right. Strategic shopping!

Whereas the purchase and consumption of 'therapeutic treats' arises from mildly negative, temporary situations, when we feel high levels of *existential* anxiety, our purchasing patterns change.

There are those 'meaning of life' or 'make or break' moments, when we want to make important (and sensible) decisions in an irrational environment.

In these situations, we want to be in control - or at least, regain it.[64,78]

Shopping helps us feel in control, particularly during out-of-control, unpredictable times.[64,79]

An existential crisis also influences *what* we buy.

Although we naturally use products that are full of symbolic properties - the power of the brand - the symbolism we crave intensifies under threat.

Whatever the threat - that's fear, stress, and anxiety again - consumers have been shown to acquire, consume, and display products that boost a desired trait or identity.[80,81]

We call this *compensatory consumption.* Our purchasing behaviour for psycho-social benefit: the *signalling* of value, not just function.[82-84]

Self-signaling motivates the purchase of anything that makes us feel better, or buids our 'self-esteem'.

In contrast, *social-signaling* motivates purchases to impress others. This could be a certain type of product, like hand sanitiser proudly on display at home... well before lockdown. Or a trolley full of toilet roll to signal that we're a 'savvy shopper'.

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On top of compensation consumption, we can layer the theories of psychological needs.

The most well known model, Maslow's hierarchy of needs, comprises five tiers and motivations - a theory of psychological health based on fulfilling our needs in order of their priority, that culminates in self-actualisation.[85]

Even though there is no definitive evidence for Maslow's pyramid of deprivation/domination proposition, except for self-actualisation, it provides a great framework to discuss our basic human needs.[86]

Food, shelter, and protection are the foundation of Maslow's model. Shopping helps us take control of our psychological and safety needs.

An alternative, more scientifically published model is the *self-determination theory* by Edward Deci and Richard Ryan.[87,88]

Unlike Maslow's hierarchy, this model doesn't have a strict, 'tiered' approach, it simply describes three basic psychological needs: *autonomy*, *competence*, and *relatedness*.

1. Autonomy: people need to perceive that they have choices, and that they can self-determine what to do.

2. Relatedness: people need to care about, and be cared about by others. We need to feel connected without suspecting alterior motives.

3. Competence: people need to feel challenged, and as though they're being effective and contributing to the cause.

Deci and Ryan identified three psychological needs that need to be satisfied in everything that we do: at the specific task level (a given job task), at the domain level (work or family) and at the global level (self).[89]

Across cultures, research has proven that the satisfaction of these needs is necessary for any individual's healthy development, engagement, motivation and general well-being.[90]

Maslow's Hierchy of needs.[85]

At its basic level, panic buying - even of toilet paper - fulfils all three of these fundamental psychological needs:

1. Autonomy: we feel as though we are actively taking control of the situation.

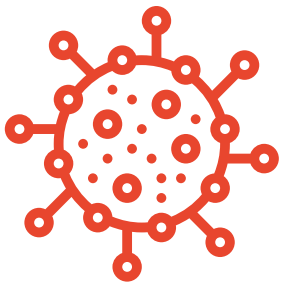
2. Relatedness: we feel as though we're part of the crowd - it's 'we shopping' rather than 'me shopping'.

3. Competence: when a purchase results in a level of personal accomplishment... "I'm doing something right!"

THE NEW NOW

It's not called the Novel Coronavirus for nothing. We have never experienced a global threat of the same magnitude - we have nothing that tells us how we need to prepare for what's coming.

Do we have any *frame of reference* that's anywhere close to what we are faced with?



For those of us in Cape Town and other drought-stricken areas, we could reference our last threat to life experienced not too long ago.

The responsible citizens among us still only flush when necessary - another toilet-related metaphor!

Asia, however, had a point of reference with SARS.

Ebola had quite an impact.

But we suddenly has something - a very small, unknown something - that was halting life *across the world*.

Journalists started citing examples from history, such as The Plague and the Spanish Flu, adding more panic and fervour to the negative messages surrounding us.

And my personal peeve - apart from toilet roll of course - was the emergence of the phrase 'new normal', compounded with 'life won't be the same again', and talk about 'emerging on the other side'.

This doom and gloom journalism promotes an even bigger slap-in-the-face-with-a-wet-fish for the two almond-shaped areas of our brain.

What's was going to happen to *us*?

The 'the new now' or the 'new today' is less threatening. We don't know what tomorrow will be.

Will it be the end of buildings made up of multi-story pods of people with their heads down in front of their computer?

Or will it be working from home with a cat on our jogging pants clad laps, with a work-shirt strategically visible on camera from the perceived safety of our own homes?

One thing I can be sure of is that as of today, at 11.05am on day-I've-lost-count of lockdown, there is meat on the shelves at my local Woolies, a packed to the brim corner display of toilet roll - whatever ply you need - and vegetarian mince for dinner.

Is my amygdala at now peace? Of course not. Face masks, visors, hand sanitiser, and red lines in the checkout queue are there to remind me to keep away from people... a constant alert to our 'smoke detectors' that there's a lion in our midst.

But I've learnt that through the power of 'how' and the knowledge of 'why', that even though it's not possible to switch off the trigger, it is possible to manage life's impact on us.

You've already started the journey with Step 1: Emotional Self-Awareness, simply by reading this paper.

Step 2 is Emotional Self-Management, where 'perception-taking cognitive strategies' come into their own.

Together with Step 1, these form two of the pillars of our Emotional and Social Intelligence methodology, a highly personalised approach to self-development that uses Insights Discovery to unlock self-awareness.

Through a greater understanding of our inherent human nature - and the brain processes that captain our daily decision-making - we can begin to make more informed choices in our lives...

... and how much toilet paper we really do need to pile into the trolley!

About the author: Steve is the founder and owner of ST-AND Brand & People Development - a boutique, SETA accredited people development consultancy.

He's a member of COMENSA (the professional body for coaching and mentoring in SA), an Insights Discovery Licensed Practitioner, registered assessor and moderator, accredited in the Goleman/Boyartzis Emotional & Social Competency Index (ESCI), LEGO® SERIOUS PLAY® facilitator, and creator of the brand-based leadership development framework, YourBrand™.

REFERENCES

1. MacLean, P.D. (1990). *The triune brain in evolution: Role in paleocerebral functions*. New York: Plenum Press.
2. Bach, D.R., Hoffmann, M., Finke,C., Hurlemann, R., Ploner, C.J. (2019). *Disentangling hippocampal and amygdala contribution to human anxietyj-like behavior*. Journal of Neuroscience, 39(43).
3. Goleman, D. (1995). *Emotional intelligence: Why it can matter more than IQ*. New York: Bantam Books.
4. Kolb, B., Wishaw, I.Q. (2009). *Fundamentals of Human Neuropsychology*. New York: Worth Publishers.
5. Miller, G.A. (1956). *The magical number seven plus or minus two: some limits on our capacity for processing information*. Psychological Review, 63.
6. Atkinson, R.C., Shiffrin, R.M. (1971). *The control of short-term memory*. Scientific America, 225(2).
7. Bergmann, H.C., Daselaar, S.M., Beul, S.F., Rijpkema, M., Fernández, G., Kessels, R.P. (2015). *Brain activation during associative short-term memory maintenance is not predictive for subsequent retrieval*. Frontiers in human neuroscience, 9.
8. Goldstein, B. (2011). *Cognitive psychology: Connecting mind, research, and everyday experience*. Belmont, California: Wadsworth.
9. Cowan, N. (2008). *What are the differences between long-term, short-term, and working memory?*. Progress in Brain Research. 169
10. Diamond, A. (2013). Executive functions. Annual Review of Psychology, 64.
11. Almaraz-Espinoza, A., Grider, M.H. (2020). *Physiology, long term memory*. In: StatPearls [Internet]. Treasure Island, Florida: StatPearls Publishing.
12. Cowan, N. (2008). *What are the differences between long-term, short-term, and working memory?*. Progressive Brain Research, 169.
13. Norris, D. (2017). *Short-term memory and long-term memory are still different*. Psychological Bulletin. 143(9).
14. Jeneson, A., Squire, L.R. (2012). *Working memory, long-term memory, and medial temporal lobe function*. Learning & Memory, 19(1).
15. Lum, J.A., Conti-Ramsden, G., Page, D., Ullman, M.T. (2012). *Working, declarative and procedural memory in specific language impairment*. Cortex, 48(9).
16. Müller, N.C., Genzel, L., Konrad, B.N., Pawlowski, M., Neville, D., Fernández, G., Steiger, A., Dresler, M. (2016). *Motor skills enhance procedural memory formation and protect against age-related decline*. PLoS ONE, 11(6).
17. Janak, P.H., Tye, K.M. (2015). *From circuits to behaviour in the amygdala*. Nature, 517.
18. Jin, J., Zelano, C., Gottfried, J.A., Mohanty, A. (2015). *Human amygdala represents the complete spectrum of subjective valence*. Journal of Neuroscience, 35.
19. Jennings, J.H., Sparta, D., Stamatakis, A., Ung, R.,l Pleil, K., Kash, T., Stuber, G. (2013). *Distinct extended amygdala circuits for divergent motivational states*. Nature, 496).
20. Ji, J., Maren, S. (2014). *Hippocampal involvement in contextual modulation of fear extinction*. Hippocampus, 17.
21. Wang, S., Tudusciuc, O., Mamelak, A.m, Ross, I., Adolphs, R., Rutishauser, U. (2014). *Neurons in the human amygdala selective for perceived emotion*. Proceedings of the National Academy of Sciences of the United States of America.
22. Holland, A.C., Kensinger, E.A. (210). *Emotion and autobiographical memory*. Physics of Life Reviews, 7.
23. Adolphs, R. (2003). *Cognitive neuroscience of human social behaviour*. Nature Reviews Neuroscience, 4.
24. Dolcos, F., LaBar, K.S., Cabeza, R. (2004). *Interaction between the amygdala and the medial temporal lobe memory system predicts better memory for emotional events*. Neuron, 42(5).
25. LeDoux J.E., editor. (1996). *The emotional brain*. New York: Simon & Schuster.
26. Weymar, M., Schwabe, L. (2016). *Amygdala and emotion: The bright side of it*. Frontiers in Neuroscience, 10.
27. Hamann, S.B., Ely, T.D., Grafton, S.T., Kilts, C.D. (1999). *Amygdala activity related to enhanced memory for pleasant and aversive stimuli*. Nature Neuroscience, 2(3).
28. Vaish, A., Grossmann, T., Woodward, A. (2008). *Not all emotions are created equal: The negativity bias in social-emotional development*. Psychological Bulletin, 134.
29. Lupfer, M.B., Weeks, K.P., Doan, K.A., Houston, D.A. (2000). *Folk conceptions of fairness and unfairness*. European Journal of Social Psychology, 30.
30. Chen, Z., Lurie, N. (2013). *Temporal contiguity and negativity bias in the impact of online word of mouth*. Journal of Marketing Research, 50.
31. Wisco, B., Marx, B., Wolf, E., Miller, M., Southwick, S., Pietrzak, R. (2014). *Post-traumatic Stress Disorder in the US veteran population: Results from the national health and Rresilience in veterans study*. The Journal of cClinical Psychiatry, 75.
32. Larsen, R. (2009). *The contributions of positive and negative affect to emotional well-being*. Psihologijske Teme, 18(2).
33. Midori, I., Michio, N., Hideki, O. (2005). Neural evidence of effects of emotional valence on word recognition. International Journal of Psychophysiology, 57(3).
34. Cacioppo, J.T., Gardner, W., Berntson, G. (1999). *The affect system has parallel and integrative processing components*. Journal of Personality and Social Psychology. 76.
35. Cacioppo, J.T., Cacioppo, S., Gollan, J.K. (2014). *The negativity bias: Conceptualization, quantification, and individual differences*. Behavioral and Brain Sciences, 37(3).
36. Kim, J., Pignatelli, M., Xu, S., Itohara, S., Tonegawa, S. (2016). *Antagonistic negative and positive neurons of the basolateral amygdala*. Nature Neuroscience, 19(12).

37. Redondo, R.L., Kim, J., Arons, A.L., Xu, L., Susumu, T. (2014). *Bidirectional switch of the valence associated with a hippocampal contextual memory engram*. Nature, 513.
38. Lanteaume, L., Khalfa, S., Régis, J., Marquis, P., Chauvel, P., Bartolomei, F. (2007). *Emotion induction after direct intracerebral stimulations of human amygdala*. Cerebral Cortex, 17(6).
39. Carretié, L., Mercado., F., Tapia, M., Hinojosa, J.A. (2001). *Emotion, attention, and the 'negativity bias', studied through event-related potentials*. International Journal of Psychophysiology, 41.
40. Ito, T.A., Larsen, J.T., Smith, N.K., Cacioppo, JT. (1998). *Negative information weighs more heavily on the brain: the negativity bias in evaluative categorizations*. Journal of Personality and Social Psychology, 75(4).
41. Jason, S., Moser, R., Hartwig, T.P., Moran, A.A., Jendrusina, E.K. (2014). *Neural markers of positive reappraisal and their associations with trait reappraisal and worry*. Journal of Abnormal Psychology, 123 (1)
42. Cunningham, W.A, Kirkland, T. (2014). *The joyful, yet balanced, amygdala: moderated responses to positive but not negative stimuli in trait happiness*. Social cognitive and affective neuroscience, 9(6).
43. Davidson, R.J. (2004). *Affective style: Causes and consequences*. In: J.T. Cacioppo, G.G. Berntson (Eds.), Essays in Social Neuroscience. Cambridge, Massachusetts: MIT Press.
44. Soroka, S., Fournier, P., Nir, L. (2019). *Cross-national evidence of a negativity bias in psychophysiological reactions to news*. Proceedings of the National Academy of Sciences, 116(38).
45. Hilbig, B.E. (2009). *Sad, thus true: Negativity bias in judgments of truth*. Journal of Experimental Social Psychology, 45(4).
46. Blackford, J.U., Buckholtz, J.W., Avery, S.N., Zald, D.H. (2010). *A unique role for the human amygdala in novelty detection*. Neuroimage, 50(3).
47. Donley, M., Jeffrey, B. (2017). *Novelty and fear conditioning induced gene expression in high and low states of anxiety*. Learning & Memory, 24.
48. Tovote, P., Fadok, J.P., Luthi, A. (2015). *Neuronal circuits for fear and anxiety*. Nature Reviews Neuroscience, 16(6).
49. American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders, Fifth Edition. Arlington, Virginia: American Psychiatric Association.
50. Linsambarth, S., Moraga-Amaro, R., Quintana- Donoso, D., Rojas, S., Stehberg, J. (2016). *The amygdala and anxiety.* In: B. Ferry (Ed.), The Amygdala. London, United Kingdom: IntechOpen.
51. Williams, L., Gatt, J., Schofield, P., Olivieri, G., Peduto, A., Gordon, E. (2009). *'Negativity bias' in risk for depression and anxiety: Brain–body fear circuitry correlates, 5-HTT-LPR and early life stress*. NeuroImage, 47.
52. Bach, D.R., Hoffmann, M., Finke, C., Hurlemann, R., Ploner, C.J. (2019). *Disentangling hippocampal and amygdala contribution to human anxiety like behavior*. Journal of Neuroscience, 39(43).
53. Columbia University Medical Center. (2018). *'Anxiety cells' identified in the brain's hippocampus*. ScienceDaily. (sciencedaily.com).
54. Jacobson, L., Sapolsky, R. (1991). *The role of the hippocampus in feedback regulation of the hypothalamic pituitary adrenocortical axis*. Endocrine Reviews, 12(2).
55. Herman, J., Figueiredo, H., Mueller, N., Ulrich-Lai, Y., Ostrander, M., Choi, D., Cullinan, WW. (2003). *Central mechanisms of stress integration: hierarchical circuitry controlling hypothalamo-pituitary-adrenocortical responsiveness*. Frontiers in neuroendocrinology, 24.
56. Dunn, J.D., Orr, S.E. (1984). *Differential plasma corticosterone responses to hippocampal stimulation*. Experimental Brain Research, 54(1).
57. Rubin, R.T., Mandell, A.J., Crandall, P.H. (1966). *Corticosteroid responses to limbic stimulation in man: Localization of stimulus sites*. Science, 153(3737).
58. Hatfield, E., Cacioppo, J.T., Rapson, R.L. (1992). *Primitive emotional contagion*. In: M.S. Clark (Ed.), Emotion and Social Behavior. Review of Personality and Social Psychology, 14.
59. Hatfield, E., Cacioppo, J., Rapson, R. (1992). *Primitive emotional contagion*. Review of Personality and Social Psychology. 14.
60. Gelder, B., Snyder, J., Greve, D., Gerard, G., Hadjikhani, N. (2004). *Fear fosters flight: A mechanism for fear contagion when perceiving emotion expressed by a whole body*. Proceedings of the National Academy of Sciences of the United States of America, 101.
61. Rozin, P., Royzman, E. (2001). *Negativity bias, negativity dominance, and contagion*. Personality and Social Psychology Review, 5(10).
62. Towers, S., Afzal, S., Bernal, G., Bliss, N., Brown, S., Espinoza, B., Jackson, J., Judson-Garcia, J., Khan, M., Lin, M., Mamada, R., Moreno, V., Nazari, F., Okuneye, K., Ross, M., Rodriguez, C., Medlock, J., Ebert, D., Castillo-Chávez, C. (2015). *Mass media and the contagion of fear: The case of Ebola in America*. PLOS ONE, 10
63. University of Edinburgh Business School and the University of Southampton. (southampton.ac.uk).
64. Atalay, S., Meloy, M. (2006). *When the going gets tough, the tough go shopping: An examination of self-gifting behavior*. Advances in Consumer Research, 33.
65. Larsen, R. J., & Prizmic, Z. (2004). *Affect regulation*. In R.F. Baumeister, K.D. Vohs (Eds.), Handbook of self-regulation: Research, theory and applications. New York, New York: Guilford Press.
66. Carver, C.S., Scheier, M.F. (2003). *Self-regulatory perspectives on personality*. In T. Millon, M.J. Lerner (Eds.), Handbook of psychology, Volume 5. Hoboken, New Jersey: Wiley and Sons, Inc.
67. Isen, A.M. (2000). *Some perspectives on positive affect and self-regulation*. Psychological Inquiry, 11.
68. Morris, W.N., Reilly, N.P. (1987). *Toward the self-regulation of mood: Theory and research*. Motivation and Emotion, 11
69. Tice, D.M., Bratslavsky, E. (2000). *Giving in to feel good: The place of emotion regulation in the context of general self-control*. Psychological Inquiry, 11.

70. Tice, D.M., Wallace, H. (2000). *Mood and emotion control: Some thoughts on the state of the field*. Psychological Inquiry, 11
71. Tice, D.M., Bratslavsky, E., Baumeister, R.F. (2001). *Emotional distress regulation takes precedence over impulse control: If you feel bad, do it!*. Journal of Personality and Social Psychology, 80.
72. Wegener, D., Petty, R.E., Smith, S.M. (1995). *Positive mood can increase or decrease message scrutiny: The hedonic contingency view of mood and message processing*. Journal of Personality and Social Psychology, 69.
73. Baumeister, R.F. (2002). *Yielding to temptation: Self-control failure, impulsive pur-chasing, and consumer behavior*. Journal of Consumer Research, 28.
74. Mayer, J.D., & Gaschke, Y.N. (1988). *The experience and meta-experience of mood*. Journal of Personality and Social Psychology, 55.
75. Thayer, R. E., Newman, J. R., McClain, T.M. (1994). *Self-regulation of mood: Strategies for changing a bad mood, raising energy, and reducing tension*. Journal of Personality and Social Psychology, 67.
76. Luomala, H.T., Laaksonen, M. (2000). C*ontributions from mood research*. Psychology & Marketing, 17.
77. Zemack-Rugar, Y., Bettman, J.R., Fitzsimons, G.J. (2007). *The effects of non-consciously priming emotion concepts on behavior*. Journal of Personality and Social Psychology, 93.
78. Greenberg, J., Pyszczynski, T., Solomon, S. (1986). *The causes and consequences of a need for self-esteem: A terror management theory*. In: R. F. Baumeister (Ed.), Public self and private self. New York, New York: Springer-Verlag.
79. Rick, S., Pereira, B., Burson, K. (2014). *The benefits of retail therapy: Making purchase decisions reduces residual sadness*. Journal of Consumer Psychology. 10.
80. Lee, S., Shrum, L.J. (2012). Conspicuous consumption versus charitable behavior in response to social exclusion: A differential needs explanation. Journal of Consumer Research, 39(3).
81. Rucker, D.D., Galinsky, A.D. (2008). Desire to acquire: powerlessness and compensatory consumption. Journal of Consumer Research, 35(2).
82. Woodruffe, H.R. (1997). *Compensatory consumption: why women go shopping when they're fed up and other stories*. Marketing Intelligence & Planning, 15(7).
83. Yurchisin, J., Yan, R., Watchravesringkan, K., Chen, C. (2008). *Investigating the role of life status changes and negative emotions in compensatory consumption among college students*. College Student Journal, 42(3).
84. Rucker, D.D., LevavJ., Lisjak, M. (2014). *Compensatory consumption as self- and social-signaling*. In: Cotte, J., Wood, S. (Eds.), NA - Advances in consumer research, Volume 42. Duluth, Minnesota: Association for Consumer Research.
85. Maslow, A.H. (1943). *A theory of human motivation*. Psychological Review, 50(4).
86. Wahba, M.A, Bridwell, L.G. (1996). *Maslow reconsidered: A review of research on the need hierarchy theory*. Organizational Behavior and Human Performance, 15(2).
87. Deci, E.L., Ryan, R.M. (2000). *The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior*. Psychological Inquiry, 11.
88. Ryan, R.M., Deci, E.L. (2000). *Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being*. American Psychologist.
89. Deci, E.L., Ryan, R.M. (2014). *The importance of universal psychological needs for understanding motivation in the workplace*. In: M. Gagné (Ed.), Oxford library of psychology. The Oxford handbook of work engagement, motivation, and self-determination theory. Oxford: United Kingdom, Oxford University Press.
90. Gagné, M., Forest, J., Vansteenkiste, M., Crevier-Braud, L., Van den Broeck, A., Aspeli, A., Bellerose, J., Benabou, C., Chemolli, E., Güntert, S., Halvari, H., Indiyastuti, D., Johnson, P., Molstad, M., Naudin, M., Ndao, A., Olafsen, A., Roussel, P.,m Wang, Z., Westbye, C. (2015). The multidimensional work motivation scale: Validation evidence in seven languages and nine countries. European Journal of Work and Organizational Psychology, 24(2).