Mental footnotes: knowledge constructivism from logical thinking to personal beliefs and therapy

Jose L. Vilchez[1,2]

[1]Department for Management of Science and Technology Development, Ton Duc Thang University, Ho Chi Minh City;
[2]Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam

ABSTRACT

The cognitive system has to carry out tasks that require mental activity, which is tiresome. Therefore, daily life demands that the system saves energy in order to be able to solve relevant problems. If we had to reason every single problem that was presented to us, our mental load and fatigue would increase immeasurably. Our minds can avoid the unnecessary waste of resources by taking a shortcut when reasoning. The output of previous reasoning turns into pieces of implicit information that constitute the meanings we give to things or circumstances, as the general framework where other reasoning occurs. These implicit meanings determine the manner we represent our environment and, therefore, our beliefs, emotions and behaviors. These *mental footnotes* set the manner in which we contemplate and conceive the world and we deal with reality. The better we understand these processes, the better we can control and restructure them, and even capitalize on their functioning for therapy.

Key words: Mental footnotes; Reasoning; Psychology of thinking; Psychopathological syndrome; Cognitive therapy.

Introduction

Thinking can be defined as a large number of specialized mechanisms – or *modules* – that process information and give solutions in a particular domain (Brase, 2014). Therefore thinking includes: i) recalling information (*e.g.*, Baddeley & Hitch, 1974); ii) representing it (*e.g.*, Johnson-Laird, 1983); iii) reaching goals by solving problems (*e.g.*, Mayer, 1992); iv) learning new concepts (*e.g.*, Rath et al., 2003); and, finally, v) making a decision (*e.g.*, Kenrick et al., 2009).

Correspondence: Jose Luis Vilchez, Department for Management of Science and Technology, Faculty of Applied Sciences, Ton Duc Thang University, Nguyen Huu Street 19, Tan Phong Ward, District 7, Ho Chi Minh City, Vietnam.
Tel: +84.934.757173.
E-mail: vilchez.tornero@tdt.edu.vn

Citation: Vilchez, J.L. (2016). Mental footnotes: knowledge constructivism from logical thinking to personal beliefs and therapy. *Research in Psychotherapy: Psychopathology, Process and Outcome*, *19*(2), 157-164. doi: 10.4081/ripppo.2016.234

Received for publication: 10 July 2016.
Revision received: 24 September 2016.
Accepted for publication: 25 September 2016.

Research in Psychotherapy:
Psychopathology, Process and Outcome 2016; 19:157-164
doi:10.4081/ripppo.2016.234

Specifically for the module of reasoning, individuals use mental models of possible alternatives of specific situations to process information (*e.g.*, Johnson-Laird, 2006). Mental models are based on the representation of the common features for a variety of entities related to a determined situation (Barwise, 1993). When dealing with propositions, humans envisage what is possible regarding the meanings that are being given. This semantic representation of information is as iconic as possible (Johnson-Laird, 1983). The products of this process of construction of mental models are images whose structure is analogous to the structure of the situation that they represent.

In the creation of mental models, a conclusion is true if it holds in every possible mental model that has been created from the understanding of an expression. On the other hand, the same expression would be catalogued as false if individuals can find, at least, one incompatible counterexample to any other generated model. In this sense, the semantic information of an expression is defined as the number of possible situations that the expression rules out. Therefore, the greater the number of incompatible situations generated by the expression, the more semantic information that expression provides (*e.g.*, Castro, Moreno-Ríos, Tornay, & Vargas, 2008).

The *conceptual truth* is an essential principle in the mental model theory (*e.g.*, Johnson-Laird & Savary, 1999). The *truth* depends on the individual's capacity to generate a mental model that represents instances of the given expression, or its negation. In this sense, individuals do not represent what is *impossible* to happen. This functioning mode minimizes the load on working memory by providing parsimonious representations. In order to understand how humans *positively* represent reality by en-

visaging what is possible instead of what is impossible, formal-logic-reasoning tasks have been used. In a series of experiments, even new assumptions were generated from given situations and were considered as true just because it was *possible* to envisage them (Goodwin & Johnson-Laird, 2010), although those conclusions were not logically valid. In the conditional:

¬ red ¬ square (*if no red, no square*)
red ¬ square (*if red, no square*)

From a formal point of view, participants failed to recognize that the concept *red* and *square* conceptually at the same time is illusory. In the first clause, it is stated that if something is *no-red*, it will be *no-square*. On the other hand, the second clause states that if something is *red*, it will be *no-square*. Individuals make the mistake of validating the illusory conclusion of something *red* and *square* at the same time just because it is possible to represent the truth of both clauses at the same time. The error comes from the fact that participants do not envisage the exclusive formal disjunction stated in the first clause. To reverse the effect, incompatible concepts such as *circular* and *square* were used to make participants unable to generate the illusory conclusion from the impossibility of envisaging something concurrently being *circular* and *square*.

Constructivism of knowledge

Humans construct their knowledge, *inter alia*, from their rationalization of the experience with their surrounding environment. Therefore, individuals use mental models for both dealing with and formatting concepts (*e.g.*, Neisser & Weene, 1962). In this sense, the fewer instances a new concept triggers, the easier it will be learned (*e.g.*, Byrne & Johnson-Laird, 2009; Vigo, 2009). This plain way to acquire new *mental schemata* (in terms of Stein & Trabasso, 1982) makes us represent and comprehend our reality. The knowledge constructivism of our reality is built on previous reasoning that can make us succumb to systematic fallacies from false premises (*e.g.*, Khemlani & Johnson-Laird, 2009); we base our information processing on erroneous sources. Therefore, it is possible that humans validly reason depending on unsuitable cognitive material. The simpler the false concepts are, the easier this wrong information guides our *conceptual truth*.

Once concepts are constructed, the context can play a role in modifying these conceptions in particular circumstances (Vilchez, 2013). The holistic understanding of meanings in specific settings determines which inferences humans can make (Thompson, 2000). The context facilitates the process of turning incomplete mental models into fully explicit models, which fleshes out the representation with implicit possibilities (Richardson & Ormerod, 1997). The presence of this implicit information can modulate the core meaning of the expression, add information to the mental model, prevent the construction of alternative models, and/or take precedence over contradictory models (Johnson-Laird & Byrne, 2002).

Mental footnotes

As the simplest example of the functioning of the implicit information, in order to represent negations, individuals do not create mental models for false clauses; they represent what is true and generate *mental footnotes* (in terms of Johnson-Laird & Byrne, 1991) to capture that the information being represented is false. In this sense, Bucciarelli and Johnson-Laird (2005) instructed participants to list the state of affairs of premises related to deontic action, such as *Workers are obligated/forbidden to go on holiday in August*. When the word *obligated* was used, individuals mentally envisaged the possibility of a worker being on holiday in August. When the word *forbidden* was used, participants envisaged a worker on holiday *not* in August (cf. Byrne, 2005); individuals represented a worker on holiday with a mental footnote denying such possibility.

Castro, Moreno-Ríos, Tornay, and Vargas (2008) followed this logic to account for faster reaction times to evaluate a *permitted* or *non-permitted* maneuver at a road junction. By using obligatory or prohibitory, directional traffic signs, a car turn was signed beforehand. Results showed that participants were faster to evaluate a maneuver as permitted when the turn was signaled with an obligatory sign and as non-permitted when the sign was prohibitory. Participants represent obligatory turns by envisaging themselves turning in the correct direction. This is the reason why it is easier for individuals to evaluate a maneuver as permitted than as non-permitted when the maneuver is actually permitted. However, participants represent prohibitory turns by envisaging themselves turning in the direction pointed by the sign plus the label *prohibitory information* (by means of an attached mental footnote denying such possibility). Therefore, with prohibitory signs, participants are faster evaluating a maneuver as non-permitted than as permitted when the turn is actually non-permitted.

Vilchez (2015) tested the effect of the implicit information provided by the mental footnotes (attached to mental models) on movement. By using obligatory and prohibitory signs in a tracking task, the obligation or prohibition of taking a route in a road junction was signalized beforehand. The results showed an initial *repulsive effect* when presenting the sign. Participants displaced themselves significantly to the opposite side of the route that they were mentally representing to take. That is to say, if participants represented that they had to take the route, for example, on the left, initially they veered significantly to the right. Conversely, when individuals represented themselves having to take the route on the right, initially they veered to the left. Vilchez used the concepts of the mental model of *Where I have to go* and the influence of

the mental footnote of *Not yet* over that particular mental model to account for the results obtained. The direction of the effect was explained based on Carpenter's (1852) concept of ideomotor phenomenon. In this sense, when individuals represent a movement, they activate the cognitive system just as if they were carrying out that movement. In this particular case, participants represented the obligation of taking one of the two routes but the mental footnote added the implicit meaning concerning that that particular representation-decision was not suitable *yet*. Consequently, this additional information – in form of an implicit mental footnote – initially made participants first imagine and then carry out a veer-away movement from the route that they had to take afterwards.

The nature of mental footnotes

It is unknown how long mental footnotes remain in the system or how wide their influence is. Mental footnotes are proposed to underlie more stable thinking modes such as attitudes. In other words, these pieces of information are set out to be the general framework where other kinds of thinking take place, as *the color of the glass we look through* (in terms of Shrauger & Schoeneman, 1979). In general terms, after every single reasoning, just mental footnotes remain active, as the conclusion or output of that information processing. These outputs accumulate and remain in the system as a joint between one thought and the next one, determining our daily life and, in turn, our essence.

In order to restructure these outputs of reasoning, it is necessary to restart the whole process, fathoming the premises represented and reasoned through the mental models that yielded those mental footnotes. However, the functioning of mental footnotes is not necessarily and continuously conscious, as it is not reasoning itself (*e.g.*, Vilchez & Tornay, 2012). Mental footnotes are present in the system in a more automatic manner, such as other cognitive processes (Hasher & Zacks, 1979). These frameworks unconsciously shape our mental schemata to give sense to the world around us. Mental footnotes become our unconscious-automatic, metacognitive beliefs (Wells, 1997), which determine even the emotional information we will recall in the future (Bower, 1981), with emotional correlatives closer to moods than just emotional reactions.

Overall, mental footnotes define our *spotlight of attention* (in terms of Posner, 1980), the manner of accommodating and assimilating new information into our knowledge (Beck, 1976), the decisions we make (Falzer, 2004), and the emotions that are triggered (Bower, 1981) – even the most automatic ones such as the *micro expressions* (in terms of Ekman, 1965).

The activation of mental footnotes means a shortcut of reasoning without unleashing the entire process, becoming heuristics that do not just solve problems but save mental resources (Simon, 1955). The conclusion of the process (in form of mental footnote) is linked to one of its very first premises, jumping to the output without completing every step in the sequence of reasoning. The function is similar to a simple arithmetic operation in which it is not necessary to break down every single mathematical sub-operation to reach the correct answer.

Occasionally, it is not even possible to remember how mental footnotes were established. Even when we do not know from where those mental footnotes came, mental footnotes can alter our daily functioning. If these disturbing footnotes are retained for a length of time, the system can collapse. That singularity seems to be behind the fact that individuals with depression disorders are likely to sleep more than usual (Watson et al., 2014), as a means to *disconnect* for a period. This necessity of disengaging the *central executive* (in terms of Baddeley & Hitch, 1974) can explain many substance abuses. In this sense, psilocin – present in most psychedelic mushrooms – has been proven to have an effect on the ego dissolution (*e.g.*, Studerus, Kometer, Hasler, & Wollenweider, 2011) and, therefore, helps to *erase* mental footnotes for a while. However, it is also possible to give the system a rest using techniques that are more personal. To this aim, mindfulness meditation has been applied in the treatment of depression (*e.g.*, Teasdale et al., 2000).

Examples of mental footnotes in common psychopathological problems

Suffering here [India] is much more physical, much more material, but in some other places [western world], where our sisters are working, suffering is much deeper and also more hidden.

Mother Teresa (Petrie & Petrie, 2004)

Nowadays, it is common to find individuals with mood or anxiety disorders. In these cases, persons who are by their side can perceive the mental footnotes that are activated in these individuals' mind. A continuous repetition of the same sentences is the behavioral expression of what is mentally being processed. The psychopathological mental processes eventually arise in form of particular manifestations. These embodiments objectify in form of either complexes-leading-to-omissions or *overcompensations* (in terms of Freud, 1954)-leading-to-commissions. Bipolar disorder [Diagnostic and Statistical Manual of Mental Disorders, 5th ed. (DSM-5)]; American Psychiatric Association, 2013) is the clearest example of both kinds of *I'm a looser* and *I'm the best* footnotes and their respective behavioral manifestations contingently present in the same syndrome (Hergueta & Weiller, 2013).

The nature of mental footnotes can be used as criterion to define and classify other common mental disorders. In obsessive disorder (Shin, Lee, Kim, & Kwon, 2013), for instance, a permanent mental footnote of *Something is going to go wrong* is present. These catastrophic footnotes are constantly active in individuals with this mode of think-

ing. The intrusion of harmful thoughts interferes with other cognitive processes and makes individuals recall states of affairs of worry or apprehension. Just the mere act of thinking become the main problem. The consequence of this ruminating thinking – in form of the interchange of noxious mental models and footnotes – is a rise of anxiety. This faulty processing of information can turn into the compulsion of carrying out particular behavioral rituals under the new mental footnote of *If I do this, I'm solving the problem* (the *problem* or thought that they cannot mentally control). These rituals permanently establish in individuals' behavior as the only clear solution for patients to reduce their anxiety.

On the other hand, in Diogenes syndrome (*e.g.*, Clark, Mankikar, & Gray, 1975), the mental footnote constantly present is one of the kind of *This could be useful later* (Carrato Vaz & Martínez Amoros, 2010). This kind of evaluation makes individuals with this syndrome employ a just-one-way criterion of *I'll hang on to it* before every decision of keeping or not keeping a particular object. This tendency to hoard is related to anxiety problems, such as panic attacks and social, specific or generalized anxiety disorders (*e.g.*, American Psychiatric Association, 2013). In this sense, the tendency to hoard in these kinds of cases is not just physical but mental as well; accumulating mental footnotes that trigger mental models of fear (*e.g.*, *Something bad is going to happen if I don't keep it*). In this sense, we can *clean* our mind of mental footnotes, likewise we can clean the physical space.

As other example, *the theory of mind* (Premack & Woodruff, 1978) postulates the ability of individuals to attribute mental states, such as beliefs, desires, intentions, or knowledge, to oneself and others. This mental processing relies on the capacity to understand that those thoughts are different from ours. The incapability of processing the information in such a way has been associated with schizophrenia (*e.g.*, Cassetta & Goghari, 2014). Persons with schizophrenia possess a malfunction in recognizing their own thoughts. This inability is the reason why schizophrenics attribute the origin of information they receive to an external source. This misled designation of the source of information sticks in an individual's mind as mental footnotes such as *If what I'm hearing inside my head are not my thoughts, it is because somebody is talking to me*.

In eating disorders, the problem has been related to the necessity of thought suppression (Collins, Fisher, Stojel, & Becker, 2014). Following an extremely stressful situation (such as rape), individuals experience *learned helplessness* (in terms of Seligman, 1975). In these cases, a necessity to increase the individuals' sense of control over their life – through controlling what they ingest – is reported (García Alba, 2003); these persons use this mode of thinking as a coping mechanism. The mental footnote in this case is *If I can control this, I can control anything*.

Finally, psychosomatic disorders are the clearest example of how the dysfunction of our thinking can provoke structural damage in our own body. Incapacity for concrete thinking or for controlling thoughts activates the involuntary nervous system and the endocrine glands inappropriately (Gil Lemus, 2008). Taking this mind-body connection into account, some treatments of these disorders have been oriented to cancel the thinking in which preverbal constructs (or, in other words, mental footnotes) embody the symptoms (YuChi & Payne, 2014).

Mental footnotes in normal mental problems

Material poverty you can always satisfy it with material (...) the unwanted, the unloved, the uncared, the forgotten, the lonely (...) this is much greater poverty (...) the loneliness of the agony, the loneliness of being rejected, the loneliness of being left alone [Chris] (...) I think today we see that loneliness being relived in many, many rich countries where people are being tortured or being unwanted, rejected (...) and I think this is the greatest, greatest suffering and the greatest poverty today.

Mother Teresa (Petrie & Petrie, 2004)

It is impossible to define what is normal and what is not. Taking a statistical criterion, all the current killing, murdering, raping, robbery, and other unfortunate human actions would become *normal behavior*. On the other hand, taking the severe interference of a mode of thinking in the individuals' daily life, it is clear that the aforementioned syndromes (American Psychiatric Association, 2013) are not normal, but serious and more widely well known. However, it is not a *sine qua non* condition to be diagnosed with a psychological pathology to be unhappy.

In any given social interaction, individuals can usually and readily modify their self-conceptions in response to interpersonal feedback (*e.g.*, Shrauger & Schoeneman, 1979). In this sense, there is an inherent tendency in humankind to know who we are from what other people think of us. This symbolic interactionism allows mental footnotes to be set up in our mind from external sources as well, and not only from our own mere experience. The danger with this open possibility of assimilating alienated mental footnotes comes from, *inter alia*, toxic relationships (Carruthers, 2011), in which one of the two element of the microsystem lives for the other and rules their world. This dynamic makes one of the members (the *victim*) to build up the representation of their reality based on unrealistic and on-the-other's-demands mental footnotes. In this kind of relationship, the toxic element runs the relationship, in the attempt to *fix* the victim element (McBride, 2011). Acting on this manner, mental footnotes (*I need to please him/her*) are generated, placed and stuck in the victim's mind. Individuals who suffer this kind of circumstance eventually forget their desires, interests or beliefs in order to accommodate themselves to the necessities of the other; they forget the mental footnotes that make them unique.

Once this dynamic is in action, in the interest of an un-

real perfection, toxic individuals continuously blame their partner to justify the manners they have or how harsh they are (Carruthers, 2011). These individuals use both passive aggression (as their normal way to communicate) and emotional blackmail, when they do not receive what they want. The more negative footnotes based on simply normal (or even unreal mistakes continuously reminded by toxic individuals) are present in the victim's mind, the more mental models of other failures will be active as well. In turn, the more negative mental models that are triggered, the more negative mental footnotes will be generated and left active in the system. This functioning forms a vicious circle or an *associative emotional semantic network* (in terms of Bower, 1981).

In the opposite extreme of interactive situations, individuals seek social contact not only for obtaining positive feedback but also for eliciting responses in others that are in line with their own previous expectation in order to confirm these beliefs (Swann & Read, 1981). As an example, in a recall test, participants significantly remembered more information that confirmed their self-conceptions than other irrelevant facts or in contrast to their line of thinking. This natural necessity of continuously self-verifying our mental footnotes can lead us to an unsatisfying life. In individuals, whose mental footnote is *I'm depressed*, a constant scrutiny of their body in search of *signs of depression* (such as lethargy, tiredness or lack of energy) is reported (Swann, Wenzlaff, & Tafarodi, 1992). In therapy, this point is one of the most complicated issues to get beyond the vicious circle that means depression. The interruption of this cyclic thinking must begin by erasing the mental footnote that constantly reminds us that *I'm not well*.

Functioning of mental footnotes in personal beliefs

The constant checking of ourselves is common to all humankind. There is a scientist in us, who is unceasingly testing our *falsifiable hypotheses* (in terms of Popper, 1959) about ourselves. The aim of this acting mode is to support our self-concept and beliefs with both data and concrete examples. In this sense, the circumstances that cause offense to individuals are meaningful. In these situations, it is obvious that a sensitive topic has been mentioned related to others' self-representation. In most cases, the comment connects to some thought [in the form of an *alternative hypothesis* (in terms of Popper, 1959) about themselves], which has been previously instilled and does not conform to the rest of their self-concept. This alternative hypothesis about oneself will have been attempted to be refuted in the past, nevertheless, its *reactivation* in the system means the necessity of collecting new data once again, in order to contrast new information to the *re-active* mental footnote. The emotion associated to this lack of consistency (between our beliefs and what other people think of us) is what makes the individual restart checking if that comment was conceptually true.

These tests lead to overcompensation in the attempt to show ourselves the falseness of that instilled idea. Take the example of the person who has been overweight and is currently fit, and shows their fitness with any opportunity. When checking our hypotheses, humans are not objective (*e.g.*, Swann & Read, 1981). In this obsessive checking to discover the *truth*, it is where cognitive restructuring (*e.g.*, Beck, 1976) must take place and the guide of a psychotherapist is most needed.

In the path of discovering oneself by recollecting data, psychoanalysis (*e.g.*, Freud, 1936) can represent a misleading means for accomplishing this task. Since memory is a non-relentless mechanism (Schacter, 2001), in flashbacks, psychoanalysts (with no particular intention) can modify memories. This influence might alter the way individuals reconstruct their knowledge of a specific situation. In this environment, it is easy to *unintentionally* introduce external mental footnotes that were not originally implanted in the mind of the individual. Those footnotes, which do not represent us, can stick in our self-representation and occupy the place of our *true* desires or identity.

Consequences of mental footnotes functioning

External mental footnotes can radically influence in our life expectations and, in turn, affect our mood. The so-called Madam Bovary syndrome (Bouchier, 2004) is the chronic life dissatisfaction state caused by the continuous comparison between the wishful thinking and the own reality that frustrates those aspirations. These unreal mental footnotes are given; they do not respond to a true necessity, nevertheless, they have an effect in our emotion. This constant, vital discontent can degenerate into a depression, since the individual lives in a continuous disappointment. In this sense, media (*e.g.*, Time: http://time.com/) are bombarding with social models *en masse*. These *I-have-to-be-like* or hero *archetypes* (in terms of Jung, 2009) condition the evaluation of our vital performance, wishing always something that we do not have or being in some other place. We can fall in a state of *I will never reach that* or *I'm not good enough for (...)* that avoids our self-development.

Independently of what is causing us emotional pain, individuals need to identify the mental footnote that make persons be themselves. The sequential, indiscriminate acquisition of external mental footnotes can make us not recognize ourselves. This incapability of differentiating our own forgotten desires is caused by the difficulty of distinguishing our identity from those mental footnotes that do not intrinsically belong to us and have been placed in our mind from external sources. If we take no action, alienated footnotes overflow and accumulate in our mind as the mental version of the Diogenes syndrome (disorder characterized by extreme self-neglect and compulsive

hoarding; Clark et al., 1975). Non-professional assistant can also be counterproductive for individual thinking. When a person tells other person *What you have to do is (...)* the dynamism is not being changed, one external footnote is being exchanged for another. We are traditional and unintentionally instructed to avoid our responsibility of taking control of our own goals and thinking. Bedtime histories have been proposed to be a significant source of concepts formation in an early age (Young & Michael, 2015). Individuals are taught with these stories (*e.g.*, Grimm, 2006) that negative mental footnotes will disappear when some kind of magic solution appears (*e.g.*, *charming prince*). Thereby, we are promised to have a perfect life (*e.g.*, *And they all live happily ever after*). Neither our fears nor the solutions can rely on an external source of information, otherwise we are slaves of the one who controls that source.

The bases for therapy based on mental footnotes

The importance of faulty reasoning is relevant for our daily life. In accordance with Beck (1976), all psychological illnesses come from either invalid reasoning or reasoning based on misconceptions or false beliefs. This principle bases an entire psychotherapeutic approach in the form of, *inter alia*, the rational emotive therapy (*e.g.*, Ellis, 1958, 1962) or just cognitive therapy (*e.g.*, Beck, 1967). Although invalid reasoning is taken in the past, it is in the present moment when this defective processing of information has to be restructured. Both rational emotive and cognitive therapy are conceptually distant from other tendencies that are more focused on the past or unconscious processes (*e.g.*, Freud, 1954). In this sense, it is established that memory is an imperfect mechanism that does not allow us to infallibly remember what has accurately happened in our personal history. Either for omission (*i.e.*, actions that memory does not take) or for commission (*i.e.*, actions that memory carries out incorrectly), memory tricks and misleads us to the wrong conclusion when committing its *sins* (in terms of Scharter, 2001).

Instead of attempting therapy, a number of individuals try to erase all those disrupting mental footnotes with alcohol or illegal drugs (Weiner, Sussman, Sun, & Dent, 2005), which are not different from medical drugs (Marinoff, 1999); in terms of the necessity of persons to obtain *extra help* to get beyond their problems. Independently of how misconceptions were originally generated, therapy represents an effective means to restart the chain of this kind of reasoning in order to reach another conclusion, and so leave active other more positive mental footnotes.

Therapy based on mental footnotes

Mental footnotes are proposed to be sequential in the track of thoughts and be the implicit joint that makes thinking a continuous activity. When one mental footnote is occupying our *central executive* (in terms of Baddeley & Hitch, 1974), another mental footnote does not assume this position until the room is released. These mental footnotes have been reformulated in therapy by using either cognitive restructuring or the addition of new footnotes. By using the lottery drum metaphor to increase understanding (Lakoff & Johnson, 1980), it is explained to patients that:

> Unconsciousness is a matter of probabilities. You have to imagine a lottery drum hidden behind a screen. Thoughts are like balls that, time to time, jump from the drum to your hands as the conscious part of your mind. There can only be just one thought or a *ball in your hands* at the time. Balls can be white (positive thoughts) or black (negative ones). You are free to change the ball in your consciousness whenever you want, if you wish so. The ball is put back into the drum and we do not know when it is going to come again to our hands, because we do not know the mechanisms that rule unconsciousness. When we get black balls, we can choose to put them back as they are, or we can choose to *paint* them of white, restructuring their valence. What it is for certain is that, if we put as many white balls as possible in the drum, we rise the probability of getting a white one next time a ball get out from there.

In the application of this metaphor to the particular case of panic attack, the therapy begins by conceptualizing that the disorder is caused by an excessive skill to be creative. Therefore, individuals are allowed to envisage whatever they pleased. The change in their thinking pattern came from adding a positive mental footnote that neutralized the *black balls*. The imaging of catastrophic situations is restructured by introducing a mental footnote (such as the one proposed by Johnson-Laird & Byrne, 1991, for negation) denying the possibility of occurring what was being envisaged. These footnotes were of the kind of *Ok, what I'm imaging is vivid but that doesn't mean that it's going to come true*.

Conclusions

> *If I help somebody (...) then my living will not be in vain.*
> Martin Luther King (1968)

In constructivism perspective (Piaget, 1950), the implicit information we store in the form of concepts determines the perspective with which we contemplate, analyze and manipulate the world that surrounds us. Mental footnotes forge our personality and personal beliefs, the social rationality we follow, and some of the mental dysfunctions we develop. Under the perspective of *It's only in our mind*, what we think of reality is only a mental representation of what we believe it is. We construct the mental schemata that guide our life based on the concepts that our environ-

ment provide. Constructivism affirms the more we know about how those concepts work, the more we can control them; the better knowledge we have, the freer we will be. How society can influence in the creation and maintenance of determined mental footnotes for controlling the mass will be the topic of future works. The pain humans unnecessarily *self-inflict* by using one mental footnote or another, the means we use to self-develop based on those mental footnotes, and how to change our inner self to abandon our miseries as humans will be analyzed. The aim of constructivism approach to psychotherapy is to burn all those mental footnotes that smother our real essence. By doing so, we change our own world, the one we can really manipulate (Steg & Vlek, 2009).

References

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders.* 5th ed. Arlington, VA: American Psychiatric Publishing.

Baddeley, A.D., & Hitch, G. (1974). Working memory. In: G.H. Bower (Ed.), *The psychology of learning and motivation: advances in research and theory* (pp. 47-89). New York, NY: Academic Press.

Barwise, J. (1993). Everyday reasoning and logical inference. *Behavioral and Brain Sciences, 16*, 337-338. doi:10.1017/S0140525X00030314

Beck, A.T. (1967). *Depression: causes and treatment*. Philadelphia, PA: University of Pennsylvania Press.

Beck, A.T. (1976). *Cognitive therapy and the emotional disorders.* New York, NY: International Universities Press.

Bouchier, D. (2004). *The accidental immigrant: American observed*. New York, NY: ASJA Press.

Bower, G.H. (1981). Mood and memory. *American Psychologist, 36*, 129-148. doi:10.1037/0003-066X.36.2.129

Brase, G.L. (2014). The nature of thinking, shallow and deep. *Frontiers in Psychology, 5*, 1-7. doi:10.3389/fpsyg.2014.00435

Bucciarelli, M., & Johnson-Laird, P.N. (2005). Naïve deontics: a theory of meaning, representation, and reasoning. *Cognitive Psychology, 50*(2), 159-193. doi:10.1016/j.cogpsych.2004.08.001

Byrne, R.M.J. (2005). *The rational imagination: how people create alternatives to reality*. Cambridge, MA: MIT Press.

Byrne, R.M.J., & Johnson-Laird, P.N. (2009). 'If' and the problems of conditional reasoning. *Trends in cognitive science, 13*, 282-286. doi:10.1016/j.tics.2009.04.003

Carpenter, W.B. (1852). On the influence of suggestion in modifying and directing muscular movement, independently of volition. *Proceedings of The Royal Institution of Great Britain*, 147-153. Available from: http://www.sgipt.org/medppp/psymot/carp1852.htm

Carrato Vaz, E., & Martínez Amoros, R. (2010). Síndrome de Diógenes: a propósito de un caso [Diogenes sindrome: a case report]. *Revista de la Asociacción Española de Neuropsiquiatría, 30*, 489-495.

Carruthers, A. (2011). *Freedom from toxic relationships: moving on from the family, work and relationship issues that bring you down.* Salisbury South, Australia: Griffin Press.

Cassetta, B., & Goghari, V. (2014). Theory of mind reasoning in schizophrenia patients and non-psychotic relatives. *Psychiatry Research, 218*, 12-19. doi:10.1016/j.psychres.2014.03.043

Castro, C., Moreno-Ríos, S., Tornay, F.J., & Vargas, C. (2008). Mental representations of obligatory and prohibitory traffic signs. *Acta Psychologica, 129*, 8-17. doi:10.1016/j.actpsy.2008.03.016

Clark, A.N., Mankikar, G.D., & Gray, I. (1975). Diogenes syndrome: a clinical study of gross neglect in old age. *Lancet, 305,* 366-368. doi:10.1016/S0140-6736(75)91280-5

Collins, B., Fisher, S., Stojel, M., & Becker, K. (2014). The relationship of thought suppression and recent rape to disordered eating in emerging adulthood. *Journal of Adolescence, 37*, 113-121. doi:10.1016/j.adolescence.2013.11.002

Ekman, P. (1965). Communication through nonverbal behavior: a source of information about an interpersonal relationship. In: S.S. Tomkins & C. Izard (Eds.), *Affect, cognition, and personality* (pp. 390-442). New York, NY: Springer.

Ellis, A. (1958). Rational psychotherapy. *Journal of General Psychology, 59*, 35-49. doi:10.1080/00221309.1958.9710170

Ellis, A. (1962). *Reason and emotion in psychotherapy*. New York, NY: Stuart.

Falzer, P.R. (2004). Cognitive schema and naturalistic decision making in evidence-based practices. *Journal of Biomedical Informatics, 37*(2), 86-98. doi:10.1016/j.jbi.2004.02.002

Freud, A. (1936). *The Ego and the mechanisms of defense.* New York, NY: International Universities Press.

Freud, S. (1954). *The origins of psycho-analysis: letters to Wilhelm Fliess, drafts and notes: 1887-1902*. New York, NY: Basic Books.

García Alba, C. (2003). Procesos de pensamiento en adolescentes anoréxicas [Cognitive functioning in anorectic adolescents]. *Revista Española de Neuropsiquiatría, 87*, 9-29. Available from: scielo.isciii.es/pdf/neuropsiq/n87/n87a02.pdf

Gil Lemus, L.M. (2008). Desensibilización y reprocesamiento con movimientos oculares [Eye movement desensitization and reprocessing]. *Revista Colombiana de Psiquiatría*, *37*, 206-215.

Goodwin, G.P., & Johnson-Laird, P.N. (2010). Conceptual illusions. *Cognition, 114*, 253-265. doi:10.1016/j.cognition.2009.09.014

Grimm, J.Y.W. (2006). Todos los cuentos de los hermanos Grimm [*All tales of the Grimm brothers*]. Madrid, Spain: Editorial Rudolf Steiner & Mandala Ediciones.

Hasher, L.N., & Zacks, R.T. (1979). Automatic and effortful processes in memory. *Journal of Experimental Psychology: General, 108*, 356-388. doi:10.1037/0096 3445.108.3.356

Hergueta, T., & Weiller, E. (2013). Evaluating depressive symptoms in hypomanic and manic episodes using a structured diagnostic tool: validation of a new Mini International Neuropsychiatric Interview (M.I.N.I.) module for the DSM-5 "With Mixed Mixed Features" specifier. *International Journal of Bipolar Disorders, 1*, 1-10. doi:10.1186/2194-7511-1-21

Johnson-Laird, P.N. (1983). *Mental models: towards a cognitive science of language, inference and consciousness.* Cambridge, UK: Cambridge University Press.

Johnson-Laird, P.N. (2006). *How we reason*. New York, NY: Oxford University Press.

Johnson-Laird, P.N., & Byrne, R.M.J. (1991). *Deduction*. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Johnson-Laird, P.N., & Byrne, R.M.J. (2002). Conditionals: a theory of meaning, pragmatics and inferences. *Psychological Review, 109*, 646-678. doi:10.1037/0033-295X.109.4.646

Johnson-Laird, P.N., & Savary, F. (1999). Illusory inferences: a

novel class of erroneous deductions. *Cognition, 71*, 191-229. doi:10.1016/S0010-0277(99)00015-3

Jung, C.G. (2009). *The red book: Liber novus*. New York, NY: W.W. Norton & Co.

Kenrick, D.T., Griskevicius, V., Sundie, J.M., Li, N.P., Li, Y.J., & Neuberg, S.L. (2009). Deep rationality: the evolutionary economics of decision-making. *Social cognition, 27,* 764-785. doi:10.1521/soco.2009.27.5.764

Khemlani, S., & Johnson-Laird, P.N. (2009). Disjunctive illusory inferences and how to eliminate them. *Memory & Cognition, 37*, 615-623. doi:10.3758/MC.37.5.615

Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago, IL: University of Chicago Press.

Marinoff, L. (1999). *Plato, not Prozac! Applying philosophy to everyday problems*. New York, NY: Harper Collins.

Martin Luther King, 1968. Available from: http://www.thekingcenter.org/archive/document/if-i-can-help-somebody

Mayer, R.E. (1992). *Thinking, problem solving, cognition*. New York, NY: W.H. Freeman & Company.

McBride, R.S. (2011). *Peace, power, and a sound mind*. Bloomington, IN: Balboa Press.

Neisser, U., & Weene, P. (1962). Hierarchies in concept attainment. *Journal of Experimental Psychology, 64*, 640-645. doi:10.1037/h0042549

Piaget, J. (1950). *The psychology of intelligence*. New York, NY: Routledge.

Petrie, A., & Petrie, J. (2004). *Mother Teresa: the legacy* [motion picture]. New York, NY: Petrie Productions.

Popper, K. (1959). *The logic of scientific discovery*. New York, NY: Basic Books.

Posner, M.I. (1980). Orienting of attention. *The Quarterly Journal of Experimental Psychology, 32*, 3-25. doi:10.1080/00335558008248231

Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences, 1*, 515-526. doi:10.1017/S0140525X00076512

Rath, J.F., Simon, D., Langenbahn, D.M., Sherr, R.L., & Diller, L. (2003). Group treatment of problem-solving deficits in outpatients with traumatic brain injury: a randomised outcome study. *Neuropsychological Rehabilitation, 13*, 461-488. doi:10.1080/09602010343000039

Richardson, J., & Ormerod, T.C. (1997). Rephrasing between disjunctives and conditionals: mental models and the effects of thematic content. *Quarterly Journal of Experimental Psychology, 50A*, 358-385. doi:10.1080/713755713

Schacter, D.L. (2001). *The seven sins of memory: how the mind forgets and remembers*. Boston, MA: Houghton Mifflin.

Seligman, M.E.P. (1975). *Helplessness: on depression, development, and death*. San Francisco, CA: W.H. Freeman.

Shin, N.Y., Lee, T.Y., Kim, E., & Kwon, J.S. (2013). Cognitive functioning in obsessive-compulsive disorder: a meta-analysis. *Psychological Medicine, 44*, 1121-1130. doi:10.1017/S0033291713001803

Shrauger, J.S., & Schoeneman, T.J. (1979). Symbolic interactionist view of self-concept: through the looking glass darkly. *Psychological Bulletin, 86*, 549-573. doi:10.1037/0033-2909.86.3.549

Simon, H.A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics, 69*, 99-118. doi:10.2307/1884852

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: an integrative review and research agenda. *Journal of Environmental Psychology, 29*, 309-317. doi:10.1016/j.jenvp.2008.10.004

Stein, N., & Trabasso, T. (1982). Children's understanding of stories: a basis for moral judgment and dilemma resolution. In: C.J. Brainerd & M. Pressley (Eds.), *Verbal processes in children* (pp. 161-188). New York, NY: Springer-Verlag.

Studerus, E., Kometer, M., Hasler, F., & Wollenweider, F.X. (2011). Acute, subacute and long-term subjective effects of psilocybin in healthy humans: a pooled analysis of experimental studies. *Journal of Psychofarmacology, 25*, 1434-1452. doi:10.1177/0269881110382466

Swann, W.B., & Read, S.J. (1981). Self-verification processes: how we sustain our self-conceptions. *Journal of Experimental Social Psychology, 17*, 351-372. doi:10.1016/0022-1031(81)90043-3

Swann, W.B., Wenzlaff, R.M., & Tafarodi, R.W. (1992). Depression and the search for negative evaluations: more evidence of the role of self-verification strivings. *Journal of Abnormal Psychology, 101*, 314-371. doi:10.1037/0021-843X.101.2.314

Teasdale, J.D., Segal, Z.V., Williams, J., Mark, G., Ridgeway, V.A., Soulsby, J.M., & Lau, M.A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*, 615-623. doi:10.1037//0022-006X.68.4.615

Thompson, V.A. (2000). The task-specific nature of domain-general reasoning. *Cognition, 76*, 209-268. doi:10.1016/S0010-0277(00)00082-2

Vigo, R. (2009). Categorical invariance and structural complexity in human concept learning. *Journal of Mathematical Psychology, 53*, 203-222. doi:10.1016/j.jmp.2009.04

Vilchez, J.L. (2013). The locus of stimuli meaning in the influence of attention on movement: meaning-dependent activation model. *The Journal of Mind and Behavior, 34*, 165-176.

Vilchez, J.L. (2015). Effects of mental footnotes on the trajectory movement in a driving simulation task. *Journal of Motor Behavior, 47*, 211-225. doi:10.1080/00222895.2014.974492

Vilchez, J.L., & Tornay, F.J. (2012). Irrelevant stimuli produce a path deviation in a driving-simulation task. *Cognitive Systems Research*, *17-18*, 81-89. doi:10.1016/j.cogsys.2011.11.003

Watson, N.F., Harden, K.P., Buchwald, D., Vitiello, M.V., Pack, A.I., Stachan, E., & Goldberg, J. (2014). Sleep duration and depressive symptoms: a gene-environment interaction. *Sleep, 37*, 351-358. doi:10.5665/sleep.3412

Weiner, M., Sussman, S., Sun, P., & Dent, C. (2005). Explaining the link between violence perpetration, victimization and drug use. *Addictive Behaviors, 30*, 1261-1266. doi:10.1016/j.addbeh.2004.12.007

Wells, A. (1997). *Cognitive therapy of anxiety disorders: a practice manual and conceptual guide.* Chichester, UK: Wiley.

Young, N.D., & Michael, C.N. (2015). *Beyond the bedtime story: promoting reading development during the middle school years*. Maryland, MD: Rowman & Littlefield Publishers.

YuChi, L., & Payne, H. (2014). The BodyMind Approach™, medically unexplained symptoms and personal construct psychology. *Body, Movement and Dance in Psychotherapy: An International Journal for Theory, Research and Practice, 9*, 154-166. doi: 10.1080/17432979.2014.918563