

The ABCs of cognition, emotion, and action

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It has been over 35 years since Albert Ellis first formulated his ABC model of human disturbance, and 70 years since Woodworth described the SOR (Stimulus - Organismic response - emotional and behavioural Response) mechanism of human behaviour, an early ancestor of Ellis' theory. While the ABC model has made a great impact on the development and current popularity of cognitive-behaviour therapy, it has also been at the centre of significant controversy in cognitive neuroscience over the past three decades. In this article, we address the main controversies from our somewhat radical perspective, and provide a simple example that we utilise clinically with our patients to help them gain a quick and meaningful insight into this ABC model of their own emotions. We support our position with a brief overview of the neuropsychological mechanisms involved in emotional reactions and the psychoneuroimmunological implications of this perspective. Finally, we will present the basic rules for healthy thinking as put forth by Maultsby and modified by Simonton, and discuss their clinical role in the treatment of patients with life threatening diseases and challenges concerning spiritual/religious/philosophical/existential issues.

Key words: cognition, cognitive-behaviour, ABC

Controversies surrounding the ABC model

Albert Ellis, considered by many the father of cognitive therapies, originally formulated his ABC model of human disturbance in order to describe the manner in which our environment impacts our emotional and behavioural reactions. Simply put, Ellis [1] argued that human beings for the most part create their own emotional consequences. From his perspective, when a highly charged emotional consequence (*C*) follows a significant activating event (*A*), it might seem that *A* causes *C*. Yet, in actuality, emotional consequences are largely created by *B*, the individual's *belief system*. *A* (*activating event*), filtered through *B* (*person's beliefs, thoughts and attitudes*), leads to *C* (*emotional and overt behaviour consequences of B*). Ellis' model was consistent with the underlying assumption of Stoic philosophy - that facts (*A*) do not upset (*C*)

people, people upset (*C*) themselves with the view (*B*) that they take of those facts (*A*). The model originally received scientific validation by psychosomatic research of Grace and Graham [2, 3, 4]. This ABC model became the basic foundation for most cognitive therapies and has gone through many modifications over the past 30 years, [5, 6, 7, 8, 9, 10, 11, 12, 13]. Even Ellis [14] has criticised his original model for being oversimplified because it omitted salient information about the human experience.

Of these numerous theoretical revisions, we consider Maultsby's A-b,C model of attitude-controlled emotive and motoric reactions as the most accurate for explaining how salient (attitude-controlled, non-verbal, and not conscious) information triggers emotional and motoric responses [6]. Based on psychophysiological research of Razran [15], Maultsby extended the traditional ABC model to a more comprehensive and clinically useful A-b,C model. Maultsby argues that an individual experiences an event and reacts instantly, without having the time to think consciously about the process that is taking place. As with any learning, this instantaneous reaction is created through the repetitive pairing of the same (*A*)s with the same (*B*)s and the same (*C*)s. A simple example of this is a beginning typist who has had to learn the positions of all the keys and the proper fingering, and consciously "talk herself through" each typing exercise, pairing the same (*A*)s with (*B*)s to get (*C*)s. At first, the typist has to accurately perceive the letter to be typed (*A*) and consciously consider which key to press with which finger (*B*), so that the correct letter appears on the page (*C*). Usually, the errors far outnumber the successes. With each mistake that is made, the typist has a mild negative emotion, but each triumph also elicits a mild positive emotion. As the number and frequency of those positive emotions increase through practice and the accurate pairings of (*A*)s and (*B*)s with (*C*)s, the typist gradually develops a "typing attitude" and is soon able to copy an entire page without even a single mistake. Moreover, the need for conscious thought disappears and success occurs seemingly automatically, accompanied by a sense that it simply "feels right". This sense becomes the bridge from the antecedent event (*A*) to the consequence (*C*), and the conscious evaluative process that Ellis identified at (*B*) is replaced by a not conscious attitude. Maultsby calls this not conscious quality "supraconscious" to emphasise that the process of acquiring attitudes involves over-learning of behaviours, as opposed to innate or instinctual "unconscious" [16]. In the typing example, there is no identifiable belief at (*B*), as the ABC model would argue, but it is clear that *something* happens between (*A*) and (*C*). If not, this would suggest that the letters on the page to be copied caused the letter to be correctly typed, which is clearly a form of magical thinking! (for detailed discussion, see Maultsby 1984 [6], pp 50-68).

This model also contradicts those authors who "follow a phenomenological tradition, and argue that thought, emotion and action are structurally and functionally inseparable" [17, 18, 19, 20]. In Muran's terminology we instead fall into the "associationist/behavioural" camp and "argue for clear, conceptually discrete definitions of the constructs of the ABC model, which would allow for reliable and valid measures of these constructs". Furthermore we fall into a more radical wing for reasons that will become clearer as we proceed. While we agree with Ellis that perceptive (*A*), inferential/evaluative (*B*), and affective/motoric (*C*) processes cannot be experienced by an

individual in isolation due to the instantaneous character of neurological processing, we argue for a causal, mutually dependent relationship between cognitions (thoughts, beliefs and attitudes) and emotional responses, in that emotional responses only in an appropriate cognitive context can motivate us to specific actions. As Maultsby put it, “with our cognitions (B - thoughts, beliefs and attitudes) we create, maintain and eliminate all our emotional feelings (C) about events (A)” [6].

In addition to debating the ability of humans to experience perception, cognition, emotion, and action as separate entities, the phenomenologists also argue that because more clinically important cognitive content is best accessed in affectively aroused states [21, 22, 23, 24, 25], it is further evidence that the *Bs* and *Cs* in the ABC model are really the same phenomenon. As both theorists and practitioners of cognitive-behaviour therapies, we agree that most effective work is done when the patient is experiencing intense negative emotions and concede that this state may sometime be more difficult to elicit in the office during a scheduled session than in the actual crisis situation. We believe, however, that intense emotional expression occurs *because* a person is actually thinking those disturbing beliefs, not the other way around. More often than not, a patient in the office setting is naturally avoiding getting into emotional distress, therefore resists thinking distressing thoughts and works hard to create more tolerable thoughts instead. On some level they know that if they sincerely re-experienced those disturbing thoughts in your office, they would get as upset as in original crisis. Furthermore, anyone who has effectively worked using cognitive methods with people in intense emotional distress knows that as soon as the patient sincerely begins to think healthier thoughts, his or her affect quickly follows. We agree that affect colours perceptive and inferential/evaluative functions, but in our understanding this new affect also becomes a new activating event (*A*), about which we have new beliefs (*B*), which in turn may create new emotion or change the intensity of original affect.

The burglar story

To help our patients better understand the ABC model, we attempt to employ examples or stories that they can easily relate to. The following example is a brief description of one of our more popular illustrations, “The Burglar Story,” which the reader might find more impactful by employing the emotional drama and charge that the written word compromises for the authors.

“Let’s imagine a person alone at her house at night, suddenly awakened by a loud noise in the hallway. The woman’s first thought is, ‘It’s a burglar!’” Most of our patients and trainees have no problem thinking of cognitive responses to this situation along the lines of “The burglar is going to hurt me!”, “He will rob and destroy my property!”, or “He might even kill me!”, and can easily imagine the feelings of intense fear in this situation. “In ABC terms, the noise in this example is the activating event - *A*, the catastrophizing (negative, emotionally charged) thoughts are the *B*, and the intense fear is the *C*. Let’s imagine further that the person is just about to call the police and, in that moment, recalls that earlier that day she ran into her best friend from high school, who was in town for two days on business. The person had invited her friend to stay at her

house, but as her friend would be busy until late, she had given her a spare key to the house. At the moment of that realisation the person stops dialing the phone because, her thoughts changed to, 'It's not a burglar, it's Charlie', and her fear was immediately replaced by the feeling of joy in reuniting with an old best friend. The *A* in this case was the same (the noise), but when she changed her *B* from 'It's a burglar, he may kill me!', to 'It's my best friend, we will have a lot of fun!', then, logically in *C*, she flip-flopped from an intensive negative emotion (fear) to intensive positive emotion (joy). This simple story illustrates how quickly we can calm ourselves down just by changing our mind, even faster than we could swallow any tranquilliser. The fact is, however, that changing one's minds is what people resist the most. They want to feel better, but try to do so without thinking better."

Such a sudden change from fear to joy is possible only when the person changes her mind from one intensely held belief to another at least equally intense opposite belief, which happens rarely in clinical situations. Usually, before people can make such a polar change, they have to go through a series of less and less negative emotions, neutral emotions, and then more and more positive emotions. (Agreeing with Maultsby, we believe that we are always experiencing emotion, and naming neutral emotions like calm or quiet, "no emotions", is a mistake.) We have three basic emotional choices depending how we evaluate any given situation: if we believe a situation is a threat to our survival, comfort, or self-control, we experience negative emotions which motivate us to a flight or fight response; if we believe the situation is beneficial to our survival, comfort, or self-control, we experience positive emotions which motivate us to stay or go after the source; finally, when we determine that a situation is neutral (indifferent) to our survival, etc., we experience neutral emotions and can motivate ourselves to pursue our goals independent of the current situation [26].

Let's return to our story for a moment. "When the person, out of joy, cries her friend's name and opens the door of her bedroom, she is hit in a head by a burglar with a baseball bat. It is possible that even though she indeed met her friend earlier that day, by coincidence her house also became a target for a burglar. What does this tell us about our brains? Our brains do not care about the facts. Our brains will process and convert any sincerely-held belief into the internal, virtual reality of that moment, and this belief-triggered, cognitive/affective virtual reality will then control our actions."

Even though we experience thoughts, emotions, and actions as one unit, with the above story we help our patients and trainees experience how changing thoughts and beliefs can cause emotions and actions to change instantaneously. As clinicians and therapists, we have sometimes felt hopeless ourselves upon hearing a patient's problems, and sometimes we could not even believe that a particular patient had any chance of feeling better emotionally in what appeared to be an "objectively" miserable and hopeless situations. Yet, even in those times, our commitment to applying RBT to the letter despite those feelings never ceased to amaze us when patients began to change their beliefs and actually feel better, despite their dire life situations (e.g., prisoners with advanced AIDS and life expectancy much shorter than the term served). It was those patients with advanced, life threatening illness who have really led us to our current radical take on Ellis' ABC model.

Neurophysiology of the ABCs of fear

While the traditional explanation of the ABC model, as illustrated in the above story, has been based primarily on psychological phenomena, recent research on fear conditioning provides us with an alternative view of the fear response in the burglar story. One caveat must be noted, however, in that as most of this scientific exploration has been conducted with rats, parallels to possible human responses are only hypothetical at this point. Nonetheless, current cognitive neuroscience with live neuroimaging in humans does provide us with a fresh perspective on the ABC paradigm, and though a detailed discussion of the neural structures and mechanisms involved is outside the scope of this paper, we will present a brief overview of what we believe to be the future of exploration in this field.

First of all, we must emphasise the point that all human beings experience intense fear in a similar, predictable way. When confronted with a threatening stimulus, each one of us will tend to react in a seemingly scripted manner: Initially, we may encounter a stereotypical startle response in which we can become immobilised, our heart may slow down (with a felt sense that one's heart "stops"), and we may have piloerection in which our hair stands up. Then, almost immediately, the heart starts to race, blood pressure increases, we encounter cold sweats, our skin becomes pale, our pupils dilate, stress hormones are released, etc., all to prepare us for the fight-or-flight response. Obviously, these reactions are instinctual and involuntary at the outset, originating in the physiological control centre that is the brain.

However, as depicted in Figure 1, even though different neurologic pathways may be responsible for the various types of reactions that this response generates, each can be traced back to a single originating source in the central nucleus of the amygdala (CNA) [27, 28, 29, 30, 31, 32]. In other words, as with any unconditioned response, all of the elements of the typical fear response are "hardwired" and networked to a central processor in the CNA which, when activated, initiates the series of commands that lead to the predictable fear reaction [33]. This, then, begs the question of how and where the CNA gets its input and "knows" to trigger the fear response. Figure 2 provides a schema for how this information is conveyed. In this diagram, the role of the neocortex and the associative processes occurring therein has to be emphasised. In order to mediate simple fear conditioning, either cortical projections (2 & 3 on Fig. 2) or thalamic-amygdala (1 on Fig. 2) projections would alone be sufficient [34], but both cortical functions and projections are necessary to elicit a response when the conditioning involves discrimination (e.g., when two conditioned stimuli are similar but not identical) [35].

In addition, the extinction of learned fear responses requires a well functioning cortex and seems to be mediated by cortical projections to the amygdala (2 and 3 on Fig. 2)[36]. That means that our responses to a stimulus (*A*) will be affected by whatever meaning the neocortex assigns it (*B*). If it ascribes a negative-for-survival meaning (e.g. "Burglar"), then this information is relayed to lateral nucleus of the amygdala (LNA), gains access to CNA triggering the physiological cascade and fight-or-flight response (*C*). Conversely, any person may be startled by the noise in the hallway, but

if it is processed by the neocortex and ascribed a positive-for-survival meaning (e.g. “Friend”), then another set of pathways are activated, the fear disappears and we experience what might be described as a stereotypic joy reaction (*C*). The more detailed discussion of modulation of emotional state by the neocortex (right prefrontal cortex in particular) and baso-lateral amygdala is an area of intensive research providing additional support to our arguments [37, 38, 39, 40]. A recent study using functional MRI in humans concluded: “These results provide evidence for a network in which higher regions attenuate emotional responses at the most fundamental levels in the brain and suggest a neural basis for modulating emotional experience through interpretation and labelling” [41].

So, what conclusions might we draw from this information? The first important lesson is that our emotional responses seem to be built, or hardwired, into the brain. Depending on what meaning the neocortex ascribes to a stimulus, a particular neural pathway will be activated that will consistently lead to a particular emotional or physiological response [33]. Second, emotional learning appears to be *stimulus learning* as opposed to *response learning* [33], meaning that we learn the meaning of the stimulus, not the particular emotional response. We learn what to think, or what attitude to have towards certain stimuli, and these cognitive processes, these thoughts, beliefs and attitudes, control which areas of the brain will be activated or inhibited. In other words, we learn which stimuli we should fear, when we should be angry, what we should like or love, etc., our brain responds accordingly, and we respond in a seemingly natural, effortless manner.

The Mind-Brain-Body connection

Yet perhaps the most important and radical line of reasoning that emerges from recent neurocognitive research findings is the idea that thinking in particular ways can actually affect our health, either positively or negatively, through those other neurophysiological networks, including the immune system, in which the amygdala plays a significant role. It has been well-established [30] that projections from the amygdala to the limbic system and hypothalamus have a strong influence on the autonomic nervous system (ANS) and the hormonal system via the pituitary gland (Fig. 1). Felten [42] has shown that the ANS has endings in the bone marrow, thymus, spleen, and peripheral lymph nodes, and that it affects the production, maturation, and action of immune cells. Similarly, as illustrated in Figure 3, there are numerous mechanisms by which the limbic-hypothalamic system may influence the healing process in our bodies [43]. The fact that the amygdala directly influences the hormonal system is extremely important because science has firmly established how strongly hormones can influence the immune system and other healing systems in the body [42]. It is no coincidence that the limbic-hypothalamic system secretes neuropeptides and other substances that have their receptor sites on immune cells and directly affect the functional processes of those cells, and, conversely, it has been established, at least in mice, that substances secreted by immune cells have their receptor sites in the limbic-hypothalamic system and influence the functioning of that system [44, 45, 46].

The deeply interrelated functioning of neurophysiological structures such as the amygdala, hypothalamus, limbic system, ANS, hormones, neuropeptides, and immune cells seems to suggest that there are numerous processes by which healing can be promoted in the human body. Moreover, as we have discussed, emotion and behaviour appear directly related to those cognitions generated in the neocortex and mediated by the amygdala. Thus, as the functional role of the amygdala is similarly critical in and immune responses, we are forced to consider that inasmuch as thinking and believing can change feelings and behaviour, so can it alter the state and rate of healing in the body. Research has already shown that the immune response can be behaviourally conditioned and that the state of the immune system can directly affect behaviour [42] and it is likely that the systems and mechanisms we have discussed are playing a significant role in this healing process.

Outside of the theoretical realm or mouse laboratory, in actual clinical practice this line of thinking already appears to be making a difference. In patients with advanced cancer, Simonton [47] has shown that cognitive-behavioural interventions qualitatively improve quality of life, actually double survival time and increase the number of long-term survivors, and, for those patients who do eventually die, significantly improve their last days and quality of death. These findings have been confirmed by prospective, matched controlled trials by Spiegel (metastatic breast cancer) [48] and Fawzy (malignant melanoma) [49], and the latter author concluded that anything that reduces emotional stress in cancer patients (such as cognitive-behavioural interventions) unquestionably affects their health in a positive way and improves the rate and quality of survival. Thus in both neurocognitive and human terms, it appears that changing one's thinking can actually change one's life.

So, what is healthier for me to think

There is no agreed way of deciding whose beliefs are right and whose are wrong, but there is a practical way to decide which beliefs are healthy or not. Although many prominent cognitive-behavioural theorists (e.g. Ellis, Beck) have identified and discussed the problems that come with problematic thinking, few have ventured as far as to provide specific guidelines for living. The authors have found that perhaps the most clear and effective guidance on adaptive/healthy/rational thinking has come from Maultsby and his Five Rules for Healthy (Rational) Thinking [5, 6, 26, 43]. These Five Rules are as follows:

1. Healthy thinking is based on obvious facts.
2. Healthy thinking best helps us to protect our lives and health.
3. Healthy thinking best helps us to achieve our short and long term goals.
4. Healthy thinking best helps us to avoid most unwanted conflicts with others.
5. Healthy thinking best helps us to feel the way we want to feel without a need to use alcohol or other substances.

Simonton, in his work with cancer patients, has reformulated the fourth rule to state that "Healthy thinking best helps us to resolve or avoid most unwanted conflicts

with others” [50], which successfully amends Maultsby’s initial effort. The authors have found this reformulated rule useful in dealing not only with patients with somatic diseases, but also with patients with personality disorders and other nonpsychotic psychiatric disorders. Application of these principles to psychotic patients is promising but not conclusive at this time.

All Five Rules are equally important. Healthy thinking has to obey at least three of the Five Rules at any one time, and, furthermore, what is healthy for a person today doesn’t necessarily have to be healthy at any other time. For example, when I see a huge truck and trailer coming toward me at great speed, it is healthier for me to feel fear and jump away. Yet, for most (95%) of the modern life situations, the fear that we experience is driven by irrational, unhealthy beliefs. On the basis of his Five Rules, Maultsby has promoted Rational Self-Counselling [6] -analogous to Linehan’s case self-management for patients with Borderline Personality Disorder [51] - and has emphasised that what is healthy for the patient doesn’t even have to be seen as healthy for the therapist as long as the thinking obeys at least three of the Five Rules. If the readers reflect on any time in which they have achieved some success, it is obvious that the thinking that accompanied the success obeyed at least three of those Five Rules, which also makes them Five Rules for Success.

It is also worth noting that Maultsby’s Rational Behaviour Therapy (RBT), particularly as applied by Simonton [52], is a very useful and effective tool in addressing spiritual/religious/philosophical/existential issues. We know that these types of beliefs, regardless of the specifics, affect all spheres of our lives, and we all are driven by our personal philosophies. Yet by just using the Five Rules (except the first because “facts” are elusive), many individuals confused with these areas might find some sense of peace and contentment. The Five Rules supersede the need to use any hierarchy of beliefs and divide them to “core and more core”, as we can be satisfied simply that the healthier our beliefs are, the healthier and more successful we will be. Moreover, in those times in which our personal philosophies no longer fit with our experience, regardless of how strongly we feel about our faith or lack thereof, the process of changing our existential meanings is as simple as changing a “Burglar” to a “Friend”.

Conclusion

In this brief exposition, the authors have endeavoured to present a general overview of the state of the art in cognitive-behavioural therapy, cognitive neuroscience, and the interface of the two. In our thinking, there is room for change in the ABC model of human behaviour, but not along the lines that other critics have suggested. Instead, it appears that Maultsby has provided us with a model that allows for the integration of new ideas in neurophysiology and psychoneuroimmunology. The knowledge that thinking can change feelings and behaviour has been around for thousands of years, yet the mechanisms by which this actually occurs in the brain are only now beginning to be sorted out. Perhaps more important, however, is the realisation that thoughts, through neurophysiological processes, can make a difference in our physical as well as mental health. We realise that there is still a great deal of scientific research to be completed before we might truly understand how our thinking can make us feel better, but numer-

ous real-life examples have demonstrated that the clinical technology is available now. But, do not let the things that we do not know stop us from applying what we already do know. Our minds are far more powerful than we could have ever imagined, and if we can learn to use them correctly, they can literally change our lives.

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Figure 1

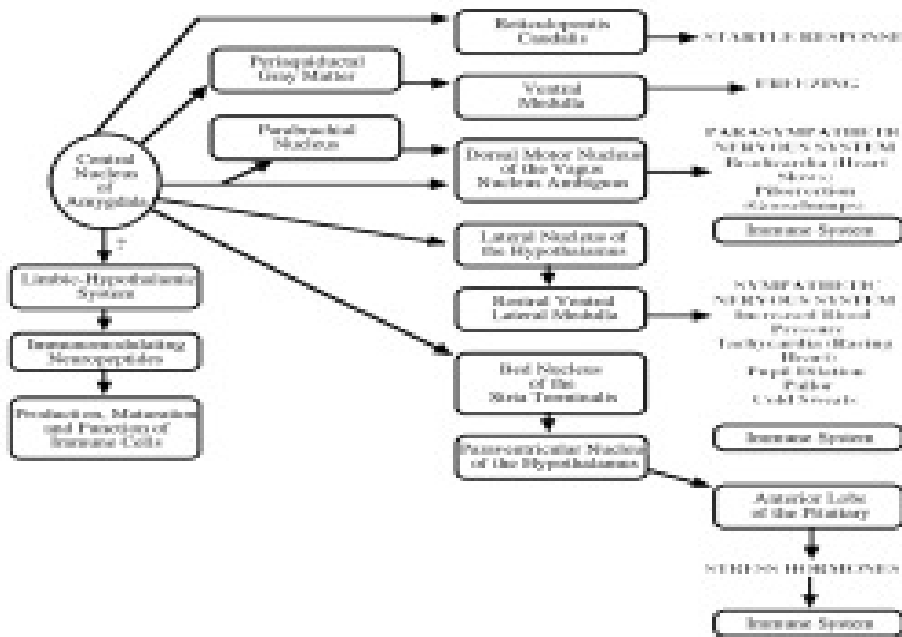


Figure 2

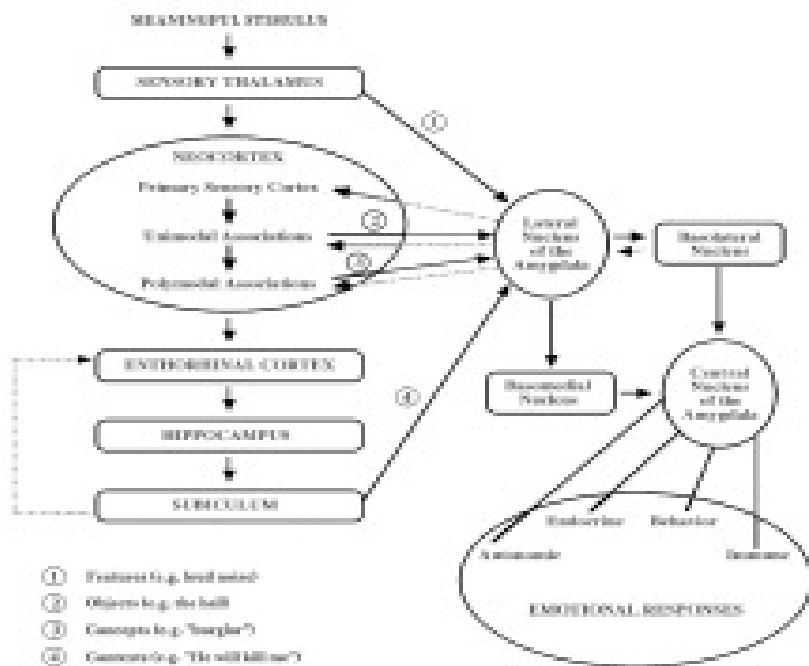


Figure 3

