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Review Article

COGNITIVE BIASES IN PERCEPTION AND INTERPRETATION OF PURPOSE IN DECISION MAKING

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ABSTRACT
For reducing delusion severity and increasing metacognitive ability, individualized metacognitive training is an effective therapy. Emotional biases in attention, interpretation, and memory are imperative cognitive processes underlying symptoms of depression. Until now, The researchers got a limited understanding of the interplay among processing biases. Complex brain processes are involved in human cognition. Biases involved in decision making often overlap. With in a single decision making process, often two different biases represent quite opposite ends of cognition spectrum. Cognitive biases play a stringent role in clinical decision making in emergency departments as well. Strategies must be implemented to limit their negative impact on patient care outcomes. This study tested the various cognition related biases in attention and interpretation.

Keywords: *Cognition, Biases, Anxiety, Interpretation, Decisions, Therapy*

INTRODUCTION
The bias was not caused by structural asymmetries in fixation control. Pervasive horizontal bias was compatible with known asymmetries of higher level attentional areas related to the detection of novel events (Ossandón *et al.,* 2014). Perceptual biases can arise naturally and may explicitly reflect the brain's tendency to favor recent perceptual interpretation at a given retinal location. An association between retinal location and perceptual state, rather than a physical stimulus, is enough to generate long term biases in perceptual organization (Murphy *et al.,* 2014).Metacognitive training(MCT)was effective in decreasing delusion severity and increasing metacognitive ability suggesting that individualized MCT for a schizophrenic client must be a standard procedure in the treatment of psychosis, administered by a qualified nurse Erawati *et al.,* 2014). In a study testing the dependence of memory on depression related biases in attention and interpretation on subclinically depressed and nondepressed participants, emotionally biased cognitive processes were not isolated mechanisms but instead influenced each other (Everaert, 2014).

Medical Profession and Biases in Decision Making
Physician's gender affected the way in which patient race and cognitive load influenced his decisions in prescribing opioids for chronic pain, suggesting the need to further explore the potential effects of physician gender on racial biases in pain treatment, and the influence of physician cognitive load on pain treatment (Burgess *et al.,* 2014). Most part of clinical work of a doctor is executed through type 1 processes to minimize cost, anxiety, and delay. Type 1 processes are vulnerable to errors. Instead of trying to completely eliminate cognitive shortcuts that serve doctors well most of the time, becoming aware of common biases and using metacognitive strategies to mitigate the effects have the potential of creating a sustainable improvement and minimization of diagnostic errors (Lee *et al.,* 2013). An improvement was noted among internal medicine residents with respect to knowledge levels by doing longitudinal curriculum in diagnostic error and cognitive bias. Recognition of cognitive biases was measured by a novel assessment tool. This suggests further study needed to refine learner assessment tools and examine optimal strategies to teach clinical reasoning and cognitive bias avoidance strategies (Reilly *et al.,* 2013). Common cognitive biases had pivotal role in influencing the unique milieu of the pediatric emergency department. A case series of presumed patients with asthma showed how mental

shortcuts (heuristics) taken in times of high decision density and uncertainty may lead to diagnostic errors and patient harm (Park *et al.*, 2014).

In an experimental test to determine the effect of cognitive forcing strategies(CFS) training in medical students, the educational interventions suggested by experts in clinical reasoning and employed to teach CFS failed to show any reduction in diagnostic error by novices (Sherbino *et al.*, 2014). In the confirmation bias task, patients had reduction of the task performance with no prior instruction. Deficit was readily observed on the most deterministic discriminations. Suggesting the impairments in frontostriatal interaction in schizophrenia, rather than in striatal function per se (Doll, *et al.*, 2014). A modest association was found between children's age and numerical bias. Children also exhibited a small number bias with a smaller response set available, and showed preference specifically for the numbers 1-3 across many datasets (Towse *et al.*, 2014).

Bias and Anxiety

Facilitated attentional engagement with and impaired attentional disengagement from negative information both characterised elevated anxiety vulnerability suggesting that biases represent distinctive facets of anxiety linked attentional selectivity (Grafton and Macleod 2014). Rodents in a putative negative affective state exhibited pessimistic choices in a judgment bias task. Research done in judgment bias tests and a novel affective bias task suggest that these types of assay do provide translational methods for studying Major depressive disorder (MDD) using animals (Hales *et al.*, 2014). Attentional biases toward emotional information are a key feature of bipolar disorder (BD), in that an anhedonic lack of sensitivity to positive stimuli during the bipolar depressive episode could be considered a maintaining factor of this clinical state. The trait bias toward threat in asymptomatic patients reflects a marker of vulnerability in BD (García-Blanco *et al.*, 2014). A computerised single session of Cognitive Bias Modification (CBM)

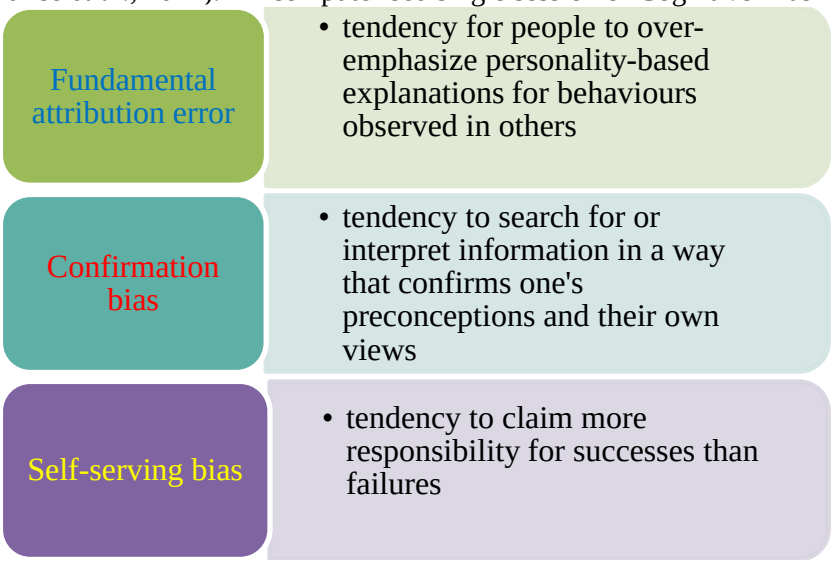

Figure 1: Cognitive biases

and an analogue of computer based test program reduced negative interpretative biases and social anxiety (Mobini *et al.*, 2013). Anterior cingulate cortex, insula cortex, and somatosensory areas showed explicit activation of neural responses to observed pain, in own race than with other race individuals when observing pain, with no significant effect of minimal groups. Racial bias in neural empathic responses was not influenced by minimal forms of group categorization (Contreras-Huerta *et al.*, 2013). The assessment and treatment process of patient showed the significance of applying theory to case formulation and making a care plan for the case management service for patients with first episode psychosis (Lai *et al.*, 2013). Monkeys were biased towards sequences with large peak values, but only following a working memory challenge, suggesting that the preference is driven by memory limitations.

The results demonstrate the cross-species nature of biases in preferences for outcome sequences (Blanchard *et al.,* 2013).

The link between attribution bias and parenting behavior was stronger in severely chaotic environments, with the moderating effect of chaos being particularly strong for internal attribution bias (Wang *et al.,* 2013). Cognitive Bias Modification-I caused a decrease in the social evaluative fear from baseline to day one after starting university than that in the placebo control intervention. State anxiety was reduced drastically indicating a greater lessening in social evaluative fear among members of CBM-I group during the follow up duration of 4 weeks. Results show that CBM-I could be used as a preventative tool to help lessen anxiety specific to challenging life events (Hoppitt *et al.,* 2014). Human ability to use contents of working memory to facilitate selection, correlated positively with the volume of gray matter inside the left superior posterior parietal cortex (PPC).The ability to overcome interference by WM matching distracters was associated with the left inferior posterior parietal cortex in the anterior IPS. Functional activity in the left PPC, measured by functional MRI, predicted the magnitude of WM costs on selection. Both structure and function of left PPC mediated the expression of WM biases in human visual attention (Soto *et al.,* 2014).

Cognitive Processes and Training

Observed bias relates to underlying cognitive processes.It can be used when testingcognitive theories. Guidelines to help researchers identify how to induce the biases experimentally, how to dissociate them in the behavioraldata, and how to quantify them using drift diffusion models, were presented. Decision bias is pervasive across many domains of cognitive science; these guidelines are useful for future work exploring decision bias and choice preferences (White and Poldrack, 2014). Induced interpretation bias congruent with the valence of the training scenarios was beneficial to the participants who assimilated the valenced scenarios. Was not useful in those who tended to evaluate themselves against the scenarios. Influence of CBM on emotional outcomes occurred only for those who had an assimilative rather than evaluative orientation toward CBM training material (Standage *et al.,* 2014). Programs attempting to increase early cognitive skills were beneficial for girls. Increased focus on cognitive skills attenuated the negative effects of some stressors on subsequent anxious and depressive symptoms, regardless of child gender (Weeks *et al.,* 2014). A matched filter hypothesis for cognitive control proposed that the optimal level of cognitive control is task dependent, with high levels of cognitive control best suited to tasks that are explicit, rule-based, verbal or abstract and accomplished given the capacity limits of working memory. With low levels of cognitive control best suited to tasks that are implicit, rewardbased, nonverbal or intuitive, and which can be accomplished irrespective of working memory limitations (Chrysikou and Weber, 2013). Spontaneous fluctuations (SPs) showed some correlation patterns which reflecting on specific profile of individual a priori cognitive biases, coded as synaptic efficacies in cortical networks. SPs offer a new means for mapping personal traits in both neurotypical and atypical cases (Harmelech and Malach, 2013).

CBM-I had benevolent effects on interpretations, but not on emotions. The study findings showed the boundary conditions for CBM-I (Salemink *et al.,* 2014). Metacognitive training (MCT) training has a surplus antipsychotic effect for patients suffering from schizophrenia related disorders who demonstrate only a partial response to antipsychotic treatment. The effect of the intervention persists for 6months after the intervention (Favrod and Rexhaj, 2013). Mindfulness plays a pivotal role in response to CBT among individuals with social phobia through its relation with probability bias, even when the treatment does not target mindfulness (Morgan *et al.,* 2013). Study findings provided evidence of negative cognitions in formerly depressed individuals at both automatic and explicit levels of processing that confer a cognitive vulnerability to depression (Romero *et al.,* 2013). A quasi-experimental design study results suggested that young people, who develop depression after the onset of psychosis, experience a need to re establish a sense of personal control over life events that appear unpredictable (Langdon *et al.,* 2013). CBM-I was effective in selectively targeting obsessive compulsive (OC) beliefs, suggesting the need to replicate results in clinical samples in order to demonstrate potential therapeutic benefit (Williams and Grisham,

2013). In patients without baseline cognitive dysfunction, short term data were most compatible with no adverse effect of statins on cognition. Long-term data supported a beneficial role for statins in the prevention of dementia (Swiger, *et al.*, 2013). Apart from establishing better standards for presentation of data and creating pathways for publication of negative results, extra needed changes to the grant submission and funding system will further improve the reproducibility of research findings (Pusztai, *et al.*, 2013).

Differences in initial biases as well as the differential shifts with time on task, reflected genuine observer subtypes displaying diverging behavioural patterns. Observer subtypes were driven by differences in brain organisation and lateralisation such as asymmetries in varying anatomical pathway (Benwell *et al.*, 2013). A Bayesian framework was proposed to study emotional influences on inhibitory control, providing several hypotheses that were useful to conceptualize inhibitory control biases in mental illness such as depression and anxiety (Harlé *et al.*, 2013).

Animals with either randomization or reversal of somatic left right patterning learned more slowly than wild type siblings. All groups were able to reach the same performance optimum given enough training sessions (Blackiston and Levin, 2013). Rumination was associated with a tendency to interpret ambiguous information in a rumination consistent manner. This tendency exacerbates ruminative thinking (Mor *et al.*, 2014). Cognitivebiases and negative symptoms were not associated with remission. The study findings highlighted the significance of initial symptom severity for short term symptomatic outcomes and the importance of adequate symptomatic treatment and prevention of psychotic outbreaks in patients (Andreou *et al.*, 2013). Ambient and contextual influences had a significant effect on the quality of individual decision making. There is need to address factors known to impair calibration of the decision maker. The importance of introducing these concepts and corollary development of training in critical thinking in the undergraduate level in medical education was emphasized (Croskerry *et al.*, 2013).

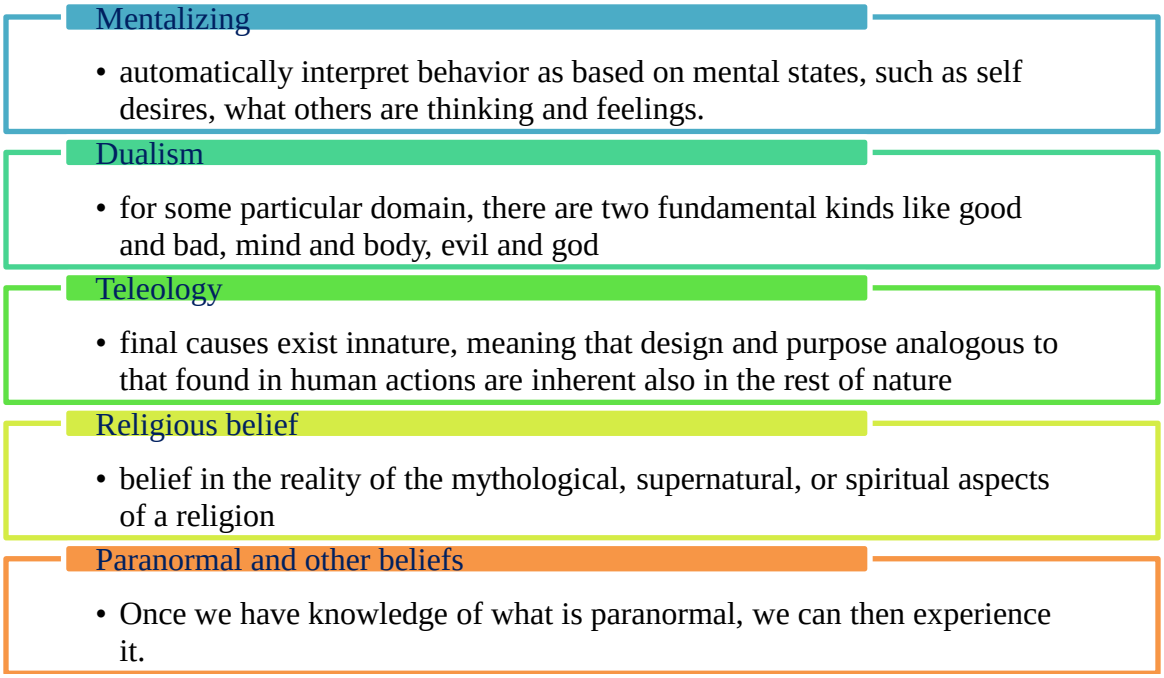

Figure 2: Hierarchy of Origins of religious belief

Religious Belief and Origin of Fear

Cognitive theories of religion in the past have postulated several cognitive biases that predispose human minds towards religious belief. This study used a path model to assess the extent to which several

interacting cognitive tendencies, namely mentalizing, mind body dualism, teleological thinking, and anthropomorphism, as well as cultural exposure to religion, predict belief in God, paranormal beliefs and belief in life's purpose. This model suggested that mentalizing comes first, which leads to dualism and teleology, which in turn lead to religious, paranormal, and life's-purpose beliefs (Willard and Norenzayan, 2013). Initial information given about the animals undoubtedly induced diverging fear levels in the children, and determined their first inclination to search for additional information. The study findings supported the notion that fearful individuals get trapped in a vicious circle in which fear and a fear related confirmation bias mutually strengthen each other, thereby maintaining the anxiety pathology (Remmerswaal and Huijding, 2014). The shift to habit memory after stress was adaptive with respect to present performance but might contribute to psychopathology in vulnerable individuals (Schwabe *et al.,* 2013). For right-handers, the realization of fluent rightward arm movements and the use of an evaluative scale congruent with their valence/laterality associations (left negative, right positive) led to a positive evaluation of neutral words. Nonfluent leftward movements and an incongruent scale led to a negative evaluation. The study demonstrated that emotion action associations are experience based, and influenced by functional and situational constraints (Milhau *et al.,* 2013).

Clinical anxiety had no particular importance for the deployment of attention, casting doubt on the universality of biased attention in elder anxiety patients. No maladaptive biases were detected toward either threat or depression words at pretreatment. Marginally significant differential reduction in bias was found toward threat words following CBT. This reduction did not occur among those in the wait list condition (Mohlman *et al.,* 2013).

Attention biases for food related cues were common for healthy weight women. Restrained eating (per se) was not related to biased processing of food stimuli, at least not in healthy weight participants (Werthmann *et al.,* 2013).

CONCLUSION

A longitudinal curriculum in diagnostic error and cognitive bias is needed to improve internal medicine residents' knowledge and recognition of cognitive biases. Being aware of common biases and metacognitive strategies to mitigate the effects have the potential to create sustainable improvement in diagnostic errors of physicians. Several interacting cognitive tendencies like mentalizing, mind body dualism, teleological thinking, and anthropomorphism, as well as cultural exposure to religion, predict belief in God, paranormal beliefs and belief in one's life purpose. Style of responding to various negative moods, is thought to be maintained by a variety of cognitive biases of that particular individual.

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