Editorial

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Recent Trends of Cognitive Neuroscience Research: An Insight into Bio-behavioural Model System

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Editorial

One of the things I enjoy the most about being a lifelong student of Psychology is the emphasis on multiple levels of analysis seen throughout this field. This has become more the case over the past few decades as the area of Cognitive Neuroscience has grown to become one of the most dynamic fields of Psychological study [1]. Recognition that our place in the world can be viewed from perspectives, or levels, ranging from sub-atomic, through organismic to cosmic is a unique feature of the behavioural sciences. The ability as well as the necessity to explore these many levels is required for progress in understanding the nature of brain and behaviour.

The introduction of this new journal Brain, behaviour and Cognitive Sciences is relevant precisely for that reason. Psychologists have for some time emphasized a multi-tiered approach to psychological research in what has become known as the Bio-psychosocial Model of behaviour [2]. This journal places itself squarely in the midst of this model and serves to provide a home for the rapid dissemination of related findings.

Incorporation of the Bio-psychosocial model is found throughout Psychology. For example, the evolution of our understanding of addiction processes shows how the Bio-psychosocial approach extends our understanding of behaviour and why the theme of this journal is valuable for this purpose. Addiction is a serious behavioural health issue that afflicts millions of people worldwide. In the US, studies have shown that the overall 12-month prevalence of some form of addiction to something maladaptive among U.S. adults varies from 15% to 61% [3]. This is a perfect example of the need for a multi-level analysis approach to understanding, preventing and treating this type of disorder.

Many years ago, it was believed that addiction was nothing other than a moral weakness exhibited by inferior persons. Thus, there was no need for, or interest in, understanding the nature of the problem. The primary "level of analysis" involved was social there was little understanding or interest in any biological substrates and at the behavioural level there was no need for study since addiction was the obvious result of moral deficiency. The key was at the social level getting rid of drugs and the problem goes away. One result of this thinking was the appearance of Prohibition for several years in the US [4].

One factor that slowly changed this situation was introduction of the Disease Model of addiction. With the recognition that addiction was a disease, not just a moral issue, came encouragement to study the disorder at the biological level and treat the individual at the behavioural level [5]. This multilevel approach significantly advanced our initial understanding of the bio-behavioural aspects of addiction.

We subsequently witnessed a further advance in our overall understanding, prevention and treatment of addiction, namely the development of the Dependence Model. According to the Dependence Model, people become addicts when they have consumed enough of a substance to become physiologically addicted to that (and other similar) substance(s). This presented a dramatic shift in society's approach towards addiction since it gave significant credence to the primary role of the Biological level in the nature of addiction. So at this point, we understood that addiction consisted of a disease with specific biological causes that affected a range of individual behaviour's. Unfortunately the Dependence Model had a serious problem. This model could explain, at least in part, why someone would continue to seek drugs once they became physically dependent on the drug, namely to avoid the negative effects of withdrawal. However, this model could not account for why someone would begin addictive behaviour in the first place.

One aspect of these early models was their general emphasis on one primary level of analysis, e.g., the Dependence Model was based significantly on the biology of addiction. While this model certainly included behavioural and sociological dimensions, the core of the model was physiological dependence.

Over the past few decades a new model emerged that incorporated all three levels of the Bio-psychosocial Model. Derived from the area of Operant Behaviour, this new model was termed the Reinforcement Model of addiction. According to this model, when organisms are exposed to drugs under a broad array of conditions, they will find the drug effects positively reinforcing and will seek out ways to repeat the behaviour,

leading to more exposure and more positive reward from the drug [6]. Interestingly, while physiological dependence may develop with extended drug use, it is not a requirement. Indeed, for many drugs, including cannabis, physical addiction has not been proven [7]. However, an estimated 9% of those who use cannabis develop some degree of psychological dependence [8].

Focusing on the positively reinforcing experience at the behavioural level leads to studies on the neuronal mechanisms of reward at the biological level. This also integrates well with studies on the risks for individuals within various group or social settings. For example, it is well established that drug tolerance, a physiological effect, is dependent on the social setting. This model is not without fault. For example, genetics plays an important role in whether or not a substance will serve as a reinforce in the first place [9]. However.to date it has been effective in contributing to our understanding of addictions and developing treatment programs. Notably, many of these programs pay attention to all three levels of analysis: Bio, Psycho and Social.

Thus, the unique perspective of Psychological thought that encourages much more than just improving understanding of some dimension of ourselves and the world in which we live. In fact, it is the Psychologists desire to explore and, critically, integrate information from different levels of analysis that has resulted in the tremendous advances in our understanding of behaviour, its' biological bases and impacts within society. The launch of this journal will hopefully allow researchers in these fields to publish their work in a timely manner and therefore further aid in the progress of this vital area of study.

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