CHAPTER-III

PROBLEM AND HYPOTHESES

Every single minute individual are confronted with an overwhelming amount of information. Despite this, one experiences a seemingly effortless understanding of the world. This requires separating the wheat from the chaff, selecting relevant information out of irrelevant. Budgeting of attention is a must because it is the mechanism that turns looking into seeing; else the overburden may turn everything into a mess. Attention allows an individual to selectively process the vast amount of information with which they are confronted, prioritizing some aspects of information while ignoring others by focusing on a certain location or aspect of the scene. It is a means by which one actively processes a limited amount of information from the enormous amount of information available through one’s senses, stored memories and other cognitive processes (De Weerd, 2003a; Duncan, 1997; Motter, 1999; Posner and Fernandez-Duque, 1999; Rao, 2003).

Attention is one of the most intensely studied area within psychology and cognitive neuroscience. As already discussed in chapter – I, Attention is the first step in the learning process. Of the many cognitive processes associated with the human mind (decision-making, memory, emotion, etc), attention is considered the most concrete because it is tied so closely to perception. Attending to an object is to bring that object to consciousness. To perceive an object, to think about it, to solve the related problems, to remember it and the like are not possible without attending to it. Thus, attention is the heart of the conscious process and is basic to all mental activity and behaviour.

Paying attention refers to the brain’s ability to take in, categorize, and prioritize sensory information and to focus on those things deemed most important. Attention problems do not result from an inability to take in sensory information but instead from an inability to distinguish among and respond appropriately to different types of information – some important, some insignificant.
In today’s scenario, stressful life and technological advances are giving rise to a number of physical, psychological and behavior disorders. Over the centuries, humans have developed a series of technologies that have had a profound impact on one’s ability to learn from the environment and to devise strategies that will enhance their ability to transmit what have been learned. The technologies developed over the past seventy years have begun to change the way one learns, thinks and understands the world—they have distracted the brain with a constant stream of visual stimuli and information that has diminished the ability of the individual to attend and process information deeply and to later use remembered information in a novel way. Research has suggested that besides creating health hazards like obesity and diabetes etc it may have profound effects on memory and attention, altering or in some cases impairing its function. The attention related problems may include diagnoses of Attention Deficits Hyperactive Disorder (Jensen, Mrazek, Knapp, Steinberg, Pfeffer, Schowalter, and Shapiro, 1997; Armstrong, 1995), Attention Deficit Disorder (Acevedo-Polakovich, Lorch, Milich, Ashby, 2006; Christakis, Zimmerman, DiGiuseppe, McCarty, 2004), coordination disorder, developmental delays (Davidson and Bressler, 2010; Jennings, 2005; Kershaw, 2009), language delays (Christakis, Gilkerson, Richards, Zimmerman, Garrison, Xu, Gray, and Yapanel, 2009; Chonchaiya and Prusksananonda, 2008) sensory processing disorder, anxiety and depression (Menzoni, Brunborg, Molde, Myrset, Skouveroe, Hetland, and Pallesen, 2011; Strasburger, Wilson and Jordan, 2009). These problems are associated with technology overuse, and are increasing at an alarming rate. It also affects attentiveness, learning and engagement (Christakis, 2011; Fried, 2008; Lee, Lin and Robertson, 2012; Rosen, Lim, Carrier, and Cheever, 2011), and leads to attentional problems (Christakis, 2011; Mossle, Kleiman, Rehebin, and Pfeiffer, 2010; Swing, Gentile, Anderson, and Walsh, 2010) and decreases academic performances as well (Sharif, Wills, Sargent, 2009; Zimmerman, and Christakis, 2005).

Electronic devices and pharmaceutical drugs all have an impact on the micro-cellular structure and complex biochemistry of our brains. While many people say multitasking makes them more productive, research shows that multitaskers actually have more trouble focusing and shutting out irrelevant information, and experience more stress that often leads to forgetfulness, depression and poor judgment( Matthews and Desmond,1995; Wickens, Strokes, Barnett and Hyman, 1991).
In such a scenario, it is the right time for searching attention enhancing ways. It was mentioned in Chapter 1 that easy and less time consuming techniques yet need to be devised. Negative air ions have shown an improvement in cognitive tasks. Therefore, to the view of researcher, perhaps one such technique could be negative air ion therapy.

Ions are ubiquitous, whereby any molecule with an unbalanced electron to proton ratio results in a net positive or negative electrical charge (Bracken, 1987). Air ions are electrically charged clusters consisting of atmospheric molecules or atoms that have lost or gained electrons to impart a net positive or negative charge. Atmospheric space charge in the form of small air ions may be generated from natural sources, such as changes in atmospheric and weather conditions, including rain, wind, and snow, as well as natural radioactivity in geological formations, cosmic radiation, waterfalls, and combustion processes (Bracken and Johnson, 1987; Chalmers, 1967). They are also generated by air ionizers sold commercially and by corona activity on the surface of high voltage conductors of transmission lines.

Air ions are physiologically active and can produce functional alterations varying from barely discernible to considerable. Sometimes both positive and negative ions induce essentially the same reactions; in other cases they elicit the opposite effects. Positive ions seem to increase the respiratory rate, basal metabolism and blood pressure, and in general produce unpleasant subjective symptoms. Complains of headache, sense of fatigue, nausea, dizziness, and general malaise increased when exposed to positive ions (Dessauer, 1931). Air bounded with positive ions increases body pain, sickness, headaches, dizziness, twitching of the eyes, nausea, fatigue, faintness, respiratory difficulties, allergies, asthma, heart and circulatory disorders, low B.P., slowing the reaction time, more pain sensitivity. Whereas psychological side effects of increased positive ions are increased irritation, insomnia, tension, emotional imbalance, exhaustion, compulsion to medication, apathy or restlessness towards work (poor school achievement), learning disability, insecurity, anxiety, depression (especially after 40-50 years of age), suicidal rate increased by 20%, larger number of admission to clinics in drug cases.

Negative air ions are natural components of atmospheric air, which exist in a good quality environment and are considered to have beneficial biological actions (Iwama, Ohmizo, Furuta, et al, 2002). Of these, a relaxing effect, for example decreases of anxiety, depression, irritability and tenseness, has been demonstrated (Buckalew, and Rizzuto,1982; Livanova, Levshina, Nozdracheva, Elbakidze, and Airapetyants,1998; Nakane, Asami, Yamada, and Ohira,2002) whereas positive air ions have an opposite effect (Giannini, Castellani,
Dvoretsky, 1983). Negative ions give relief from hay fever (Kornblueh, Piersol, and Speicher, 1958), Sinusitis, bronchial asthma, (Jones, O’Connor, Collins, and Watson, 1976), allergies, migraine and burn (David, Minehart and Kornblueh, 1960; Kellogg, 1984), and post operative pains. Research indicates that negative ions increase positive affect (DeSanctis, Halcomb, And Fedoravicius, 1981) and improve work performance (Baron, 1987a).

Studies conducted have shown some impact of negative air ions on various processes such as learning, memory and psychomotor performances (Vinay and Batra, 2010; Savita and Batra, 2008). Since attention is considered to be a gateway to all other cognitive tasks, enhancing learning and memory are indicative that attention also gets influenced. But this needs to be tested. A look at the literature indicated that this preposition has not been tested elsewhere whereas its implications are very wide. So, the following problem was formulated.

**Problem:**

“To study the impact of negative air ions exposure on attentional process.”

**Objectives:**

1) To study the effect of negative air ions on attentional processes.

2) To compare the effect of various doses of negative air ions on attentional processes.

3) To compare the effect of various duration of exposure of negative air ions on attentional processes.

4) To compare the effect of various doses of negative air ions on various types of attention.

5) To compare the effect of various durations of exposure of ions on various types of attention.

6) To study the residual effects of negative air ions on attentional processes.

**Hypotheses:**

1) Negative air ions would enhance the attentional processes.

2) Higher the dose of negative air ions more would be the improvement.
3) More the duration of exposure of ions, more would be the improvement in attentional processes.

4) The effect of various doses of negative air ions would not differ significantly across various types of attention.

5) The effect of various durations of exposure would not differ significantly across various types of attention.

6) The residual effects of negative air ions would be observed amongst the students at least for two months.