EXAMINING THE NOTION OF SCIENCE IN PSYCHOLOGICAL DISCOURSE: A CASE OF COGNITIVE PSYCHOLOGY

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MASTER OF PHILOSOPHY

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DECLARATION

I declare that the dissertation entitled **"Examining the notion of science in psychological discourse: A case of cognitive psychology"** submitted by me for the award of the degree of **Master of Philosophy** of Jawaharlal Nehru University is my own work. The thesis has not been submitted for any other degree of this University or any other university.

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CERTIFICATE

We recommend that this thesis be placed before the examiners for evaluation.

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INTRODUCTION

1.1 Statement of the Problem

It is only in the present century, and particularly in the past few decades, that there has been a general acceptance of the view that psychology is a natural science. "In the early days, the widespread view of Psychology was that it is a biological science; and that the experimental method provides the key to scientific objectivity; and pandering to public interest in clinical and social psychology would certainly weaken and eventually destroy the scientific core that holds the field together as a recognizable and respectable discipline" (Miller, 1985). Since the present research focuses on tracing the notion of science as the field was emerging as a new independent discipline, it becomes essential to highlight the observations, from both within and outside of the discipline, regarding the scientific status of the discipline. In this regard, according to Giorgi (1985), "psychology's disciplinary status is ambiguous at best and chaotic at worst". Here, by 'discipline' he does not refer to the socio-cultural meaning, wherein psychology is equally systematized and institutionalized as many other areas of formal investigation, rather in "the theoretical and scholarly sense, where its precise meaning and its place among the other sciences are still to be determined in a manner acceptable to the majority of psychologists" (Giorgi, 1985).

We can see how it is not difficult to assemble a series of quotes showing the attitudes of major psychologists who were critical of the discipline's foundational (scientific) status, for instance, Franz Brentano in the 1870s, Carl Rogers in 1973, Lewes in 1879, and the latest, Kantor in 1979 and, Koch in 1976. In 1879, G. H.

Lewes, a British psychologist-philosopher, quoted, "In every science we define the object and scope of the search, the motive of the search, and the means whereby the aim may be reached. A glance at the literature of psychology discloses the utmost discordance on these cardinal points. The conception of the argument and scope are different and lead to the adoption of antagonistic methods" (Lewes, 1879). Similarly, in 1979, in an article titled "Psychology: Science or Non-science, " Kantor wrote, "It is quite apparent that in spite of all the historical efforts to make psychology a science, and the ambitions of psychologists to convert psychology to a science, this discipline cannot fully qualify as a natural science"(Kantor, 1979). Some researchers went on to point out that the persisting universal opinion at that time actually assigned psychology to the special group of Moral Sciences, both in matter treated and in methods of inquiry (Lewes, 1879; Shooter, 1975).

We can see how it was only in the last few decades that Psychology started receiving the status of a natural science. And this transition from scepticism to confidence can be viewed as a sudden development rather than a gradual one. The answer to how psychology acquired this scientific confidence all of a sudden would require a little understanding of the very grounding of the earlier scepticism and the thinkers who were advocating such views. The collective sentiment shared by such thinkers/philosophers was that "the determinants of psychological processes and outcomes were simply too diverse and numerous to admit of systematic experimental manipulation and that the social, moral, and uniquely personal dimensions of human life were unfit for the sorts of analyses expected of a developed science" (Mill, 1865, 1979; Robinson, 1983).

So what is it that made contemporary psychology so accepting of the current scientific status that it acquired? This question poses serious considerations about the views and objections held by the major thinkers like Wundt, Kant and Mill (which will be discussed subsequently); either their objections have been negotiated or have been conveniently ignored. The source of such problems lays within, to some extent, the abandonment of those concerns and gaps i investigation which have earlier been responsible for the exclusion of psychology from the branch of sciences like physics or biology. Further, this exclusion was combined with the convenient adoption of those issues which the discipline was capable of inquiring with the available method.

"And by the end of that century in 1879, an independent, scientific psychology was introduced by the establishement of the first ever laboratory dedicated to the psychological scientific inquiry. This establishment was soon followed by the release of the first journal of psychology called "*Philosophische Studien*" (as quoted in Koch, 1985). And since then, for the next hundred years, what has been seen is an ever growing presence of an "independent, scientific psychology". It was at this point that this notion of psychology as being an independent field and as a 'scientific' field started to become problematic (to some) with the emergence of questions concerning the very 'independence' of the discipline which assumes or envisions a psychology which is aseptically free of philosophy but yet borrows authoritatively from the philosophy of science for every definition of a "proper" subject matter.

With this background in place, the present research aims at understanding and exploring the scientific notion of psychological discourse as conveyed in formal academic writing and practice. The larger idea of this work originated out of the need to address some of the deeply ingrained fundamental issues concerning the conceptualisation and growth of the discipline of psychology in the understanding of cognition, from a theoretical as well as methodological standpoint. The focus of the present research is specifically on Cognitive psychology, which boasts of a scientific demeanour which is at par from the other sub disciplines of psychology. To dissect this scientific superiority inherent in cognitive psychology is a major goal of the present thesis. While doing so, attempts would be made to trace the growth of cognitive psychology from its scientifically enriched historical grounding. Therefore, the larger objective is to map out the underlying notions of science which have been guiding the discipline; how they were changing and the factors which were involved. To critically dwell with the thought that which features of science were conveniently adopted by the discipline (particularly cognitive psychology) to acquire the scientific status. And what was the reasoning behind adopting such methods and to analyse the practices that shaped the evolution of cognitive psychology in a particular way would be the major areas of inquiry for the present work. And to boil it all down to the fact that how much the field of cognitive psychology is doing justice to the study of cognition by continuing with the so-called scientific approach which is seemingly too narrow to address the process of cognition. How the discipline developed from philosophical speculations about the mind into modern day behavioural science.

In order to examine this objective completely, it first becomes imperative to understand the historical grounding of the discipline of Psychology which helped in its emergence as an independent discipline, particularly its evolution into a scientific field of enquiry. Even by the mid 19ᵗʰ century, Psychology had not emerged as an independent academic discipline. Apart from people like Francis Galton and Herbert Spencer, who had started to collect statistics on individual abilities and construct elaborate theories of human nature, the field was still devoid of any academic characteristics like formal degree courses, academic journals or research laboratories devoted specifically to psychology. Then in 1867, American philosopher William James declared that "perhaps the time has come for psychology to begin to be a science. Some measurements have already been made in the region lying between the physical changes in the nerves and the appearance of consciousness, and more may come of it… Helmholtz and a man named Wundt at Heidelberg are working on it" (as cited in Bunn, 2017). Wilhelm Maximilian Wundt, a physicist, contributed to the first academic textbook of Psychology in 1874 named 'The Principles of Physiological Psychology'. He also opened the first laboratory to be exclusively devoted to psychological experimentation at the University of Leipzig in 1879. This was the event which is considered the hallmark for the birth of psychology as an independent discipline. Finally, in 1883 Wundt launched an academic journal, *Philosophical Studies*, to publish the Leipzig school's research. Such developments may hint to the idea that Wundt, as the founding father of the discipline, envisioned a particular kind of science to grow within Psychology which would give rise to a 'new' psychology which is strictly scientific in its appeal and practices. As a result of Wundt's physiological training, in 1874, he affirmed the "the new psychology should be a science modelled after fields like physics and chemistry". And the subject matter of the new science, according to Wundt would be consciousness, that is, the awareness of immediate experiences. In very simple terms, this was the trajectory psychology took in becoming the scientific study of conscious experience.

Wundt, however, had no desire to bring a new discipline of psychology. His principle goal was to revitalise philosophy using physiological methods to produce data about the humans (Bun, 2007; Baldwin, 1921). For Wundt, introspection also was a highly controlled process, which he adopted to investigate the mind by dividing the mind's consciousness into fundamental sections of thoughts, images and

sensations. He believed that focusing too much on one's mental state could compromise the experiment. In practice, introspective reports tended to consist of simple judgments of the size, intensity and duration of physical stimuli, occasionally supplemented by judgments of the simultaneity and succession of stimuli. Wundt viewed psychology as essentially a branch of philosophy, and attempted "to apply the experimental methods of natural science to essentially philosophical problems concerning the nature of mind and its metaphysical status. Wundt insisted that there is no fundamental difference in kind between the ideas arising directly from perception and memory images" (Wundt, 1912). Thus, Wundt's "experimental psychology was largely a study of cognitive processes, and, for him, the mental image played essentially the same crucial, representational role in cognition that it had played for most of his philosophical predecessors" (Wundt 1912; as quoted in Dufour, 2018) This gives insights into the deep philosophical grounding of the newly envisioned scientific psychology by the very founding father of the discipline. Yet the mention of Wundt is strangely invisible while talking of Cognitive psychology, at least formally. If we try to look closely, Wundt's conception of Psychology was always received as a controversy and was rather misunderstood. And the controversy was reflected in the exclusion of Wundt's empiricism from philosophy departments, striving to maintain their speculative purity, and the institutional establishment of experimental psychology as an independent discipline. But, this is not what Wundt had envisioned for the discipline of psychology. Wundt wanted to reform philosophy by incorporating both the natural and human sciences. For Wundt, "his psychological 'scientism' was never a threat to philosophy. On the contrary, he considered his psychology to be a part of philosophy, one necessary for both philosophy and psychology to take its proper place in the totality of the sciences" (Boring, 1950). Wundt's importance as a pioneer in investigation and master in scientific elaboration renders acquaintance with his doctrines indispensable, and hence the present research would draw upon Wundt's core ideas which led to the emergence of a scientific psychology.

Psychology emerged as a separate discipline from Philosophy with an aim of becoming scientific. While examining the discipline from its very core, it is only legitimate to dissect the notion 'science' which Psychology was aiming to acquire. If the aim was, in fact, to become more scientific, it is again imperative to mark the

inclusion of philosophy of science as the most crucial as philosophy of science is the vantage point through which the 'science' of psychology could be better understood and appreciated. In this regard, Koch (1959-63) has pointed out that psychology bases "its understanding of vital questions of methods on an extrinsic philosophy of science which is twenty years or more out of date." The core of the larger issue which the present research is contesting lies within the fact that Psychology, in terms of its methodologies and procedures has advanced a great deal in knowledge generation, but the insights from philosophy of science, in which the scientific discipline is rooted, have not changed much as seen in the contemporary psychology (Manicas & Secord, 1983). The discipline of Psychology may be in a situation which calls for being updated with the progresses made within philosophy of science as that is where we are borrowing our 'scientism' from, at least on the surface level. It is interesting that the implications of calling something 'un-scientific' are much clearer than calling something 'scientific', at least in the discipline of Psychology. The idea is that if the current philosophy of science as used by the discipline of Psychology does not contain a satisfactory model, the need is to find a refined one. If it does, the need is to make its presence more explicit so that its applicability can be seen (Westland, 1972).

In this regard, Giorgi (1976, 1982), has laid down some of the prominent issues that revolve around the inadequate or ambiguous scientific status of psychology. He affirms that "most of the difficulties cited by psychologists concerning the disciplinary status of psychology can be grouped under three headings: (1) the lack of unity in psychology; (2) the irreconcilable split between the scientific and professional aspirations of the field; and (3) the apparent discrepancy between psychology's commitment to be scientific and its inability to be faithful to either the givens of the human person or the characteristics of concrete phenomena" (Giorgi, 1982). A possible resolution to these collective problems of the discipline of Psychology resided in the fact that an updated and well refined theory of science is needed which is compatible with the diversity and complexity of human reality to be attained.

Talking specifically of cognitive psychology, despite the strong philosophical influence in the origin of cognitive psychology, the way it is theorised and practiced is strangely devoid of the very same philosophical underpinnings. Although it is

completely legitimate to acknowledge this liberation of cognitive psychology from the long ties with philosophical underpinnings as appropriate because concerns in cognitive investigation are not reducible to philosophical ones. However, the view held by many modern cognitive psychologists that philosophy of science is irrelevant for psychological research is also incomplete (Furedy, 1988). Philosophical rootedness helps in providing a broader perspective on the queries taken up by specific disciplines like Psychology. It helps in addressing questions that concerns various areas of investigation, thereby providing a unified picture of what otherwise appears to be diverse approaches to exploring mind and cognition. In the past, philosophical ideas have played crucial role in stimulating important scientific investigations. For instance, "Wittgenstein's ideas about language helped stimulating important work regarding the prototypical nature of concepts, and Daniel Dennett's views of intentional action leading to impressive research tradition in the area of developmental psychology related to children's judgments about false beliefs" (Thagaard, 2009). Philosophy of science provides defences against philosophical arguments questioning the fundamental assumptions of cognitive psychology regarding the representation and computation approaches to cognition. In this way, philosophy of science can provide self-defence methods for cognitive scientists against philosophers critical of the whole field. Therefore, this perceived irrelevance of philosophy of science to cognitive psychology would be critically negotiated with in the present work.

The research would further proceed towards providing a critical appraisal of the way mainstream cognitive psychology evolved in what it is today. Some of the major theoretical and methodological issues would be discussed after reviewing major cognitive psychology frameworks and other relevant text based sources. Issues like the asocial nature of cognitive psychology, superficial inclusion of emotions at a theoretical level, exclusion of the philosophy of science etc are some of the issues that are going to be dealt with. Finally, the last section of the dissertation would talk about the major thinkers who conceptualised cognitive psychology as rooted in strong philosophical grounding. The thesis would seek to provide a larger picture of the current trends in cognitive psychology and the markers of potential growth and the places which are inhibiting the growth so that new alternatives could emerge which

make the field of cognitive psychology more democratic and inclusive in its appeal and practice.

1.2 Review of Literature

The discipline of psychology as an independent field of inquiry marked its birth in the year 1879. Along with being independent, the field was also characterised by its newly acquired scientific status. Since the larger goal of the present research is to trace the notion of science the discipline carried along with it, throughout its development from being a step child of philosophy and physiology to a newly found scientific discipline, the literature review would attempt to explore the various factors that played a role in marking this scientific trajectory of the discipline of psychology; particularly cognitive psychology.

According to Robinson (1976), "psychology is necessarily the most philosophy-sensitive discipline amongst all the disciplines that claim empirical status. He affirms that one cannot discriminate a so-called variable, pose a research question, choose or invent a method, project a theory, without making strong presumptions of philosophical cast about the nature of our human subject matter. And such presumptions can be ordered to age-old contexts of philosophical discussion. Even our nomenclature for the basic fields of specialized research within psychology has its origin in philosophy" (Robinson, 1976) In fact, even during the period when the claim to independence was most aggressively asserted, psychology was basing, and explicitly so, its "official" epistemology on logical positivism and cognate formulations within the philosophy of science.

So when the early psychologists declared themselves to be scientists, they probably forgot the imaginative and exploratory nature of much previous scientific discovery. Stirred by the salient successes of the natural sciences in the late nineteenth and early twentieth century (Cattell, 1966), they ignored particularly the establishing of functional relationships by tinkering with variables (Tyndall, 1961). A different kind of psychological science, labelled Science2 here, was salient at the turn of the nineteenth century. Its protagonists saw people as active searchers for, and processors of, information. In this regard, Cattell (1890) asserted that "It is not possible for

Psychology to attain the certainty and exactness of the physical sciences, unless it is grounded in experiments and measurement... Experimental psychology is likely to take a place in the educational plan of our schools and universities.... It teaches accurate observation and correct reasoning in the same way as the other natural sciences".

According to Koch (1974), general and experimental psychologists have devised contrasting and competing positions to a degree that is unknown in the theoretically coherent physical and biological sciences (Koch, 1974), and have often tied themselves to laboratory phenomena about which they have no stable interpretations. Allport (I975), himself an experimentalist, has pointed out some criticisms of laboratory studies. He affirms that "an uncritical or selective, or frankly cavalier attitude to experimental pervasive atmosphere of special pleading; a curious parochialism in edging even the existence of other workers, and other approaches phenomena under discussion- the near vacuum of theoretical within which to interrelate different sets of experimental results, or search for significant new phenomena" (Allport, 1975). According to Argyris (1975), this is due to the lack of realism that results from experimental methods. Independent variables never switch with dependent variables and the conditions manipulated bear no relation to those of the context in which people must operate (Argyris, 1975).

Exponents of psychology as Science, Harre and Secord (1972) and Giorgi (1970) differ in many ways but they come together in disliking the application of the methods and approaches of the natural sciences to human behaviour " (Giorgi, 1970). For them, psychology as a science and other scientific counterparts are essentially following the same ritual. They all test hypotheses by the systematic manipulation of variables setting in which the subjects are restricted or controlled in some sense. In Milgram's (1974) studies of obedience to authority, for instance, the overt meaning of the experiment was controlled by Milgram's decietful instructions which appear to have the same effect as Pavlov's on his dogs (Osgood, I953). Although Science psychologists never accept the behaviorists' position that the organism is a passive respondent to the stimulus, it has been argued by Argyris (1975) that their "common use of the experimental method drives them into position of a unidirectional approach to causality and, by implication, into accepting the responses of the organism as

relatively restricted". In fact, "the very capacities to behave in certain ways may be abrogated by the laboratory situation" (Harre & Seccord, 1972).

What makes a field like scientific psychology? Is it formed by the major thinkers of the field; by the scientific findings that the field has developed; by the theories it has extended; by its concepts, techniques, or professional associations? According to Danziger (1990), "certain components of any field define the field more effectively than others by the way we organize our knowledge". For instance, in the systematic presentation of information derived from the field of psychology or one of its parts, the material is most commonly organized in terms of prominent contributors, important findings, or influential theories. A perhaps unintended message of such communications is that psychology is its theories, is its findings, or is its individual contributors.

Danziger (1990) further affirms that "the way in which we organize a field will determine the way we organize its history". Thus, if the field of psychology is seen as essentially a cumulative of individual contributors, the history of the subject is likely to be treated on the lines of a series of the major thinkers of the field. Similarly, if the discipline is defined in terms of its major theoretical grounding, then its historical foundation would also become the historical grounding of its theoretical base. These observations are important because the manner in which the field is organized will also determine how the field functions and is perceived in the present. Due to this, most researchers of the discipline see their scientific practices deriving from the classical model of natural sciences. This way the thinkers of the discipline are seen as individualistic investigators inquiring about various aspects of nature.

The question that should be asked, with this background in place, is that "how would one know that psychology had become a science if, in fact, it were to succeed in its purposes" (Robinson, 1980). Robinson further asks "Would it be content, for example, to remain in the realm of what nineteenth-century German scholars called Geisteswissenschaft, forever and in principle cut off from Naturwissenschaft? Or is the prevailing urge one that will only be satisfied by full membership in whatever community it is that is now occupied by physics, chemistry, and biology? In either case, what must psychology achieve for it to become a permanent fixture in one of these categories is the question" (Robinson, 1980). According to him, "there can be

no final consensus as to what makes a body of facts and methods a science". According to Studtmann (2007) "Aristotle made the first attempt to categorize the various modes of human understanding and to establish the nature of scientific understanding within a larger metaphysical context". And, "fundamental to Aristotle's theory of knowledge is the concept of causation, for on Aristotle's account one may be said to know something only to the extent that one knows its cause" (Studtmann, 2007).

Coming particularly to the aspect of cognitive psychology, Cognitive psychology can be seen as the rising movement in psychology since its emergence in the 1960's. It reaches from cognitive psychology into social psychology, personality, psychotherapy, development, and beyond. While talking of Cognitive Psychology, reference to interdisciplinarity becomes crucial. Yet in the daily practice of cognitive psychology, philosophy is usually non-existent or less visible. "Cognitive psychology, ideally, overlaps with philosophy in many of its most central areas like the theory of knowledge, philosophy of mind, philosophy of language, logic etc" (Green, 1994). If we look at it closely, 'cognitivism' is a massive field of enquiry incorporating practically every side of Psychology. Apart from the standard 'cognitive psychology', there also has been a strong emergence of cognitive development, cognitive therapy, cognitive neuropsychology, social cognition, animal cognition, and so forth. There is cognitive science too, which merges cognitive psychology with aspects of philosophy, artificial intelligence, linguistics, neuroscience, and cognitive anthropology to form a separate discipline. The ever prevailing prefix 'behavioural' which ranged over everything from language to emotion now has been substituted by "cognitive". Considering the importance and status assigned to 'cognitivism' in Psychology, it is only imperative to dissect this very cognitive element as used in Psychology and by Psychologists.

It is believed by some that the origins of this shift from behaviourism to cognitivism lies within the discipline of Psychology and from there spread to philosophy, linguistics, etc. (for example, Craik, 1991) when in fact, "cognition was a growing concern in philosophy, artificial intelligence, and linguistics long before it rose to prominence on in experimental psychology" (Green, 1994). "The term cognitive was derived from early 20th-century philosophical theories of ethics"

(Ayers, 1936), and made its way, via the logical positivistic philosophy of science of the 1930s and 1940s, into the philosophical psychology of the 1950s and 1960s. Before the emergence of 'cognitive psychology' as a separate field ", the term was made popular among psychologists mainly by social psychologists such as Asch, Festinger, and Heider (Festinger, 1957; Asch, 1952; Heider, 1958). About almost the same time, the information processing approach rose to prominence by thinkers like George Miller in the late 1950s and early 1960s. There was a strong link between this work and that being done in linguistics by Chomsky, who was philosophically informed (1957, 1965), and in computer science by people like Newell and Simon who were logically informed (1956, 1963). Despite having such similarities, the technicalities of writing was much more sophisticated in the works of Chomsky and Simon and not so much in that of Miller's because somehow the broadly 'mental' category could not acknowledge the 'truly cognitive' (Green, 1994). Rather, it seems that "cognitive" was adopted primarily as a trendy new way of saying "mental." In this case, Miller affirms, "I don't think anyone was intentionally excluding 'volition' or 'conation' or 'emotion.' I think they were just reaching back for common sense". In using the word 'cognition' we were setting ourselves off from behaviourism. We were looking for something 'mental' but, "mental psychology" seemed very redundant and that's how we ended up choosing 'cognitive'" (as quoted in Baars, 1986).

Therefore, a tangible meaning of 'cognitive' was never realised in psychology and this led many psychologists to efficiently equate the 'cognitive' with almost anything loosely regarded as "mental." Moreover, the application of the term "cognitive" to issues of mind by philosophers was intended particularly to create a division of the 'mental' into two categories, one, to which the methods of logic and computer science could be successfully applied or the "cognitive" and one to which they could not be applied. We can see how the term "cognitive" was never advocated by its philosophical advocates to be synonymous with the term "mental" and thus, a lot of that goes by the name of "cognition" in psychology is not even "cognitive" in the firmest sense. In this regard, Thagaard has proposed why "philosophy has a crucial role to play in cognitive science with respect to generality and normativity" (Thagaard, 2009). He affirms that ignoring philosophy in the context of cognitive psychology would lead to "assumption of persistent but inadequate philosophical views about the general nature of investigation. The best science (here, cognitive

science) is highly philosophical because it pays attention to general issues as well as normative ones" (Thagaard, 2009). With this background in place, we are now in a position to state the research objectives for the present research.

1.3 Research problem

To explore and examine the potentials and inadequacies of the field of cognitive psychology in the understanding of cognition, by critically analysing the notion of science as held by the discipline.

1.4 Objective

1) To examine the transformation of Psychology into an independent scientific field by reviewing the field from the vantage point of Philosophy of Science and thereby discussing the perceived irrelevance of Philosophy of science.

2) To understand the concept of cognition as reflected in the writings of the mainstream cognitive psychology thinkers. And to see how far the academic practice of cognitive psychology is delimiting the understanding of 'cognition'.

3) To begin an understanding of the possible 'alternatives' to broaden the horizon of cognitive psychology, both at a conceptual as well as the methodological level.

4) To explore the future pedagogical relevance and direction of the present work using information from the abovementioned objectives.

1.5 Method

The present research is inter-disciplinary in nature and grounds itself in the critical analysis of extensive theoretical data set. In order to achieve the goals of the present research, extensive use is made of relevant knowledge structures. From theories, views and approaches to concepts in order to make a sound and theoretically strong case for seeking the research objective, all the relevant sources are tried to be incorporated. To achieve a firm theoretical anchoring, the present research incorporates various text-based sources including journal articles on cognitive

psychology and philosophy of science, original research papers, text books and biographies of relevant thinkers. Effort has been made to use original readings as much as possible in order to take better insights into the area of investigation by being closer to the data.

Since the present work aims at providing reasons behind some observable event by connecting various ideas and pointing out a descriptive causal relationship; the work is explanatory in nature. Further, as the research also aims to broaden the horizon of cognitive psychology, it makes some suggestions and regarding the same. However, these suggestions are still in the process of establishing themselves and as a result this work is also an exploration for the various alternatives and suggestions that could be made to achieve the research objective. Therefore, the present research is a combination of an explanatory as well as exploratory orientation.

1.6 Overview of the dissertation

Chapter 1

This is the introductory chapter which begins with stating the statement of problem indicating the rationale behind the existence of the present work. To make the rationale for engaging with the present work more enriching, the chapter then proceeds to present a brief review of literature. After this, the chapter would state the specific research problem followed by various research objectives which the present dissertation seeks to fulfil. Finally, the chapter concludes by describing the method used in the present work.

- Statement of the problem
- Review of Literature
- Research problem and objective
- Method

Chapter 2

This chapter would include an extensive review of the emergence of psychology as a scientific discipline from the stand-point of the philosophy of science. The aim here would be to examine the kind of science the proponents of the discipline were seeking to acquire as their disciplinary identity. This would involve tracing the development of psychology from philosophy and physiology into a scientific psychology. Further, the chapter would throw some light on the various factors that led to this disciplinary transformation. A major goal of this chapter would be to raise the question of the perceived irrelevance of the philosophy of science in the discipline's desire to become 'scientific' whilst stating explicitly its importance in the same.

Chapter 3

The previous chapter talked about the emergence of psychology as a scientific discipline. The chapter dealt with this idea by examining the nature of 'science' which the proponents of the discipline were seeking to acquire as their disciplinary identity. Since dissecting and commenting on the scientific status of the entire discipline of psychology goes far beyond the scope of the present research, the focus in this chapter would be stressed upon only a subfield of psychology; cognitive psychology. Keeping this objective in mind, the current chapter aims to provide an overview of the kind of science the cognitive psychologists/thinkers were trying to acquire and cater to. This is done by reviewing the larger understanding of 'cognition' by tracing the development of the field through the major pioneers (Neisser, Miller, Bruner, Vygotsky and Piaget) and their contribution to the field of cognitive psychology. An attempt is made to understand what cognition meant for these pioneering figures and what kind of scientific grounding these pioneers were rooted in. Since the field of cognitive psychology is known for its strictly scientific demeanour and rigid set of methodologies, the larger goal here is to dissect this very 'scientific-ity' of the field of cognitive psychology.

As we move ahead in the chapter, an exploration is carried out to examine the direction the field of cognitive psychology has taken today and reached to a point where it can be called the standard or mainstream conception of cognitive psychology. The main point of enquiry here would be to assess the scientific nature of the approach which standard cognitive psychology pursues. Also would be important here to comment upon the points of differences between the earlier conceptions of a scientific cognitive psychology and the later evolved mainstream cognitive psychology. This enquiry would leave us questioning the inherent motive of the mainstream cognitive psychology; to understand human cognition or to acquire and maintain its scientific legitimacy? This question will be dealt with by focusing upon some of the pressing theoretical and methodological issues present in the field of cognitive psychology as it quests to understand the phenomenon of cognition while maintaining its prototypical scientific behaviour.

Chapter 4: Broadening Cognitive Psychology

The goal of this chapter is an attempt at envisioning a broadened conception of cognitive psychology. This is to negotiate with the apparent narrowness in the discipline of cognitive psychology and to come up with cognitive 'psychologies' rather just one way of doing cognitive psychology which treats the notion of as something very rigid and at a superficial level. The goal of cognitive psychology is to enquire about cognition. The debate between philosophy and psychology, somehow, takes over the main task of exploring cognition. The way cognitive psychology was conceptualised by the founding figures reflected no sense of constraint in taking insights from philosophy of science as to be used by cognitive psychology. Nor there exists any inherent constraint by the very nature of science which would keep cognitive psychology from ground itself and take along with it, the insights from philosophy of science. In an attempt to achieve this objective, the present work would enquire into three main approaches of cognition which provide a fundamentally different (and broader) view of cognition which doesn't stem from only the human

mind and goes far beyond the individualistic notion of cognition. These approaches are:

1) Social constructionist approach
2) Embodied cognition
3) Role of self in cognition.

After a description of these approaches, the chapter would conclude by presenting an integration of these three alternative perspectives so that a unified relationship could be made explicit for understanding human cognition. Another insight to be drawn from these approaches is the question whether these alternatives show some similarities with the vision of cognitive psychology which the pioneers of the field envisioned. And finally a commentary would be made upon regarding the evaluation of these approaches from the standpoint of the philosophy of science.

Chapter 5: Pedagogical implications and concluding comments

One of the major goals of the present work would be to locate and reflect on its pedagogical implications, thereby commenting on the practical utility of this research. The manner in which any idea or a particular field is organised decides the survival and impact of that idea on the larger society. The sources and tools that are used to establish and develop a field of enquiry say a lot about the impact of the field and the direction it might take in the future. Similarly, the way the field of cognitive psychology is organised by the discipline of psychology and the way the whole idea of cognition is spread across cultures are sure to have strong implications on the way the knowledge of cognition is received by the larger society. At the end of the day, the core goal of any field of enquiry is either to add on to the existing knowledge systems or to establish a new knowledge system. Similarly, the understanding of the idea of cognition by the field of cognitive psychology also adds to the knowledge structures present within the society. In this context, the goal of the present work is to locate the potential of the field of cognitive psychology to add to the knowledge system of education in the society; both in terms of learning as well as teaching cognition. To do this, the chapter would try to provide some basic points of contention regarding the pedagogy of cognitive psychology in the academic setting. Themes like the language

of this discipline, the organization of the content of cognitive psychology, use of qualitative methods and an inherent segmentation with the structure of cognitive psychology would be discussed. Finally, as a conclusion to the present work, the chapter would bring with itself an aspiration and hope towards a holistic understanding of cognition which may even give rise to a second cognitive revolution, who knows.

Understanding the Scientific Status of Psychology

2.1 Introduction

The aim of the current chapter is to trace the history of Psychology's efforts to achieve scientific status. The current chapter would include an extensive review of the emergence of Psychology as a scientific discipline from the stand-point of the philosophy of science. The aim here would be to examine the kind of science the proponents of the discipline were seeking to acquire as their disciplinary identity. This would involve tracing the development of psychology from philosophy and physiology into scientific psychology and what factors led to this transformation. A major goal of this chapter would be to raise the question of the perceived irrelevance of the philosophy of science in the discipline's desire to become 'scientific'.

The process of psychology turning into a scientific discipline can be seen as a long history having its roots in a vast philosophic heritage. Even by the mid 19th century, Psychology had not emerged as an independent academic discipline. Apart from people like Francis Galton and Herbert Spencer, who had started to collect statistics on individual abilities and construct elaborate theories of human nature, the field was still devoid of any academic characteristics like formal degree courses, academic journals or research laboratories devoted specifically to psychology. In 1867, American philosopher William James declared that "perhaps the time has come for psychology to begin to be a science. Some measurements have already been made in the region lying between the physical changes in the nerves and the appearance of consciousness, and more may come of it… Helmholtz and a man named Wundt at Heidelberg are working on it" (as cited in Bunn, 2017). Wilhelm Maximilian Wundt,

a physicist, opened the first laboratory to be exclusively devoted to psychological experimentation at the University of Leipzig in 1879. This was the event which is considered to be the hallmark for the birth of psychology as an independent discipline. Finally, in 1883 Wundt launched an academic journal, 'Philosophical Studies', to publish the Leipzig school's research. Such developments may hint to the idea that Wundt, as the founding father of the discipline, envisioned a particular kind of science to grow within Psychology which would give rise to a 'new' psychology which is strictly scientific in its appeal and practices. Taking insights and experiences from his training in Physiology, in 1984, Wundt declared that the new psychology which is to be born should be a science modelled after fields such as physics and chemistry. And the subject matter of the new science would be consciousness; the awareness of immediate experiences. And that's how the new psychology became the scientific study of conscious experience.

The scientific status of the new psychology is the major area of dissection for the present research. What was the vision with which the founding figures of the discipline moulded the discipline's scientific status? What was their understanding of 'scientific' while conceptualising the new psychology? How far the scientific nature of the discipline has deviated from the initial conception and what were the major forces responsible for those changes? These are some crucial questions this chapter seeks to answer by exploring the deep historical grounding of the birth of Psychology, as a scientific discipline.

2.2 The question of science and its relevance for Psychology

In order to understand the scientific nature of the discipline of psychology, it becomes imperative to explore the very notion of science that the discipline of psychology entertained. It is only legitimate to explore in great detail about the theories of scientific method which the discipline incorporates as a part of its inquiry process. This is crucial because these scientific theories are, in some way, science's centrepiece, and one cannot be properly informed about science without knowing about them. Along with them being the centrepiece of the science, these theories also provide researchers with chief sources of guidance in their quest to attain knowledge

about the world. Some thinkers maintain that "any attempt to define science is going to be a futile attempt, as the specific methodological procedures used in one domain often bear little or no resemblance to the procedures used in others" (Bauer, 1992). Yet this argument overlooks the possibility that certain higher-order epistemic commonalities do exist amongst most or all scientific domains. According to Skinner, science authorizes a ''willingness to accept facts even when they are opposed to wishes" (Skinner, 1953). Meehls (1978) assert that "this emphasis of science on disconfirmation instead of confirmation corroborate with Popperian and neo-Popperian views of the philosophy of science, which underscore the need to subject one's most cherished hypotheses to the risk of falsification". Moreover, "this emphasis dovetails with the point that science is a prescription for humility" (McFall, 1996) and a method of ''arrogance control" (Tavris & Aronson, 2007). "The incorporation of scientific procedures like control groups, is an explicit acknowledgement that our beliefs may not always be true" (Sagan, 1995), as the purpose of these procedures is to protect us from fooling ourselves. Others like Titchner maintains that ''common sense is the very antipodes of science" (Titchner, 1929). To this Skinner says ''It is science or nothing". For Cromer (1993), all non-scientific systems of thought recognize intuition, or personal insight, as a legitimate source of critical knowledge. Science, whereas, is the rejection of this very belief, and its substitution with the idea that knowledge of the external world can arrive only through objective examination. This insight form Cromer gives us an understanding about how "science requires us to overrule the more automatic and intuitive modes of thinking with relatively more controlled and reflective modes of thinking" (Stanovich, 2009). But what is interesting to notice here is that some "concepts like the concept of control groups, which we take for granted today, did not emerge in psychology until the early 20th century" (Dehue, 2000). For instance, if a group of depressed clients improves after therapy, we can conclude that the therapy worked. Nonetheless these conclusions are erroneous, because they do not control for a multitude of factors running causally in the background, for example, "regression to the mean, placebo effects, spontaneous remission, effort justification etc" (Lilienfeld et al 2008).

Enquiry regarding the nature, issue, and justifiable methods of Psychology, and concerning the relations with other forms of science and to metaphysics, are far from being settled to the entire satisfaction of all those involved in the controversy and thus

an important area of enquiry. The very conception of science embraced by psychology is at odds with the subject matter it seeks to comprehend, and thus we witness and experience multiple conceptualizations of both science and psychology. "The line of division on this issue lies between those who make a commitment to some conception of existing science first and then turn to their phenomena of interest armed with the criteria of science as filters, and those who first make a commitment to approach human phenomena with fidelity and either ignore the question of scientific approaches or slowly adopt some procedure of scientific method, which then leads to the same difficulties" (Giorgi, 1970). Few, however, question "whether existing science is appropriate for the study of human psychological phenomena, and many historical reasons exist for raising that question" (Giorgi, 1970).

There is an established understanding that Psychological ideas have been in existence long before the present century. What keeps altering is the social context in which such ideas emerge and develop. This change in the immediate social context also defines the historical path the discipline takes. To take an example through the recent history of psychological developments, the new trend that can be seen is the appearance of groups of specialists making increasingly successful claims to the monopoly of psychological truth. The members of such groups are seen as the arbiters of what does and does not constitute a valid form of psychological knowledge. This may raise an important question as to what is, in fact, indicative of 'development' in psychological knowledge. Danziger (1979) points out that it is "this development towards a single psychological knowledge rather than the methodological advancements which defines the nature of the well known transition from psychology's long past to its short history" (Danziger, 1979). For instance, empirical techniques were a part of psychological enquiry in the nineteenth century and were heavily used by professional philosophers and natural scientists. But the significant changes did not come until the application of these techniques was used to legitimise the claims to a monopoly of valid psychological knowledge by a self conscious and organized committee of specialists.

If the trends in the discipline of psychology in the 1950's are to be observed, we may find how psychology was, in fact, lacking something very concrete. And this lack of 'something' was hindering the growth of psychology as a discipline. This made

some to reflect on the fact that why our understanding of the human person was not advancing the way the knowledge of nature was progressing. And what, in essence, was stopping the vigorous development of the discipline. The reasons are many and are all rooted in the disciplinary and societal context of that time. To begin with, for psychologists then, the human person was not so much the theme as an animal was, and even if a human was thematized as the focal point, it was not the essential human that was studied. It was the human phenomena with primarily sensorial and physiological manifestations. The reason for such a rigid and narrow focus of the discipline was Psychology's quest to become a natural science. This quest required the subject matter of psychology to show characteristics that were similar to nature and therefore they had to have an empirical basis. Thus, for psychologist's then, whether or not such an approach explored and understood human phenomena was not as important as psychology's attainment and portrayal of a scientific status. More important than the clarification of human phenomena was psychology's determination to be a natural science, although mainstream psychologists believed that they were doing both.

The discussion till now leaves many questions about the scientific status of the psychology of that time. Should Psychology have to be a natural science, in the first place? Should Psychology have left the realm of science altogether? Or, should a completely new kind of 'science' have been devised and implemented by the psychologists? These are some of the crucial questions which the Psychology's disciplinary identity begged to answer. To have some context here, we know that there was still awareness about the German tradition of *Geisteswissenschaft* (a set of human sciences) but the American intellectual scientific culture did not look upon that tradition with favour and kept nudging for a strictly scientific approach. Leaving the realm of science completely did not seem appropriate either and the idea that psychology could be a *Wissenschaft* made its way. According to this idea, psychology could well be an organized body of knowledge without extending any kind of commitment to the methods and procedures used by the physical or natural sciences. This distinction (between the social and natural sciences) was largely popularised by the historian Wilhelm Dilthey (1833–1911). Dilthey wanted the discipline of psychology to be wary of one thing that its primary subject matter was the subjective psychological world; not mere physical properties that made the existence of this

world possible. "Dilthey further suggested that "if we are to find out 'why', priority must be given to the psychological world and the manner in which people make sense of their experience and the meanings they attach to them" (Banyard et al, 2015), This puts psychology in a rather ambiguous situation. So, if the psychological world was its suitable subject matter, then certainly psychology was a humanitarian discipline. For this reason, Dilthey felt a social scientific approach was preferable. But the existence of a psychological world is possible only through the physical world. Psychology couldn't ignore this either. Therefore, psychology needed to study the physical world along with the natural scientific model dominated in this domain. "This double-edged nature of psychology was (and still remains) both a challenge and an opportunity. Psychology had the opportunity to bridge this division between the natural and the social sciences and it could do so by retaining a foot in both the sides" (Danziger, 1990). By doing this, an acceptance and appreciation of both the nomothetic and idiographic knowledge, quantitative and qualitative methods, could have been possible. The need was to approach its subject matter from both the perspectives. Wilhelm Wundt made efforts to support this vision (as did other early psychologists), but it could not transform into a long lasting vision that psychology would ultimately sustain and look up to.

"If one concentrated on specifically human characteristics, one could have a thing called 'human science'. And logically, such a decision made sense, but sociologically and politically it would be a challenge to implement" (Giorgi, 2014). To do this means having to walk in strict opposition to the scientific wave of the times. The important question here is to see the importance as well as an advantage of treating Psychology as a human science. The importance, as conceptualised by Giorgi (Giorgi, 2014), lies in the fact that "it would prioritize the philosophical anthropology of being human in a distinctively personal sense and not human's commonalities with nature". But whilst proposing this primacy of philosophical anthropology was a useful and novel approach to making the discipline scientific, differences persisted still. For most psychologists, an inquiry into humans did not imply departure from the realm of nature altogether. Humans were, by nature, more complex possibly, but still as natural as a thing. This led to the adoption of the philosophical view called naturalism. According to the Runes's dictionary of philosophy (1958), "Naturalism affirms that the universe needs no mystic cause and government, because it is self-existent, self-

explanatory, self-operating, and self-directing; that the world process is not teleological and anthropocentric, but is purposeless, deterministic, . . . and apropos productive of man; that human life, physical, moral, mental and spiritual, is a regular natural occurrence attributable in all respects to the ordinary operations of nature; . . . naturalism means to assert that there is only one system or level of reality; and that this system is the totality of objects and events in space and time; and that the behaviour of this system is determined only by its own character and is reducible to a set of causal laws." Therefore, if one followed the naturalistic assumptions, hardly any change in perspective was needed to study humans, and that precisely is the path that the mainstream psychology ended up following.

But the need was not for a naturalistic philosophy. What was actually needed was a philosophy that would overtly acknowledge the idiosyncratic human characteristics and methods for exploring those characteristics. And in this sense, the task of psychology should have been to be as faithful to humans as natural science was to nature. But Psychology seemed more interested in becoming a science based on the natural sciences (Giorgi, 2014). In this attempt to become more scientific, psychology may have run the risk of imitating the methods and procedures of the natural sciences even though it referred to a reductionist understanding of what it meant to be human. In other words, it became more interested in being natural scientific than being interested in exploring the intricacies of human mind and functioning. Mainstream psychology found the methods and approaches they needed to use to be previously in existence. They only adopted them or modified them slightly to fit human phenomena. This also meant that they choose phenomena that could fit into these pre-existing methods. In this regard, Koch maintains how ''during its commencement, psychology was exclusive to the degree that its institutionalization preceded its content and its methods preceded its problems'' (Koch, 1959). Thus, despite psychology's conviction to be empirical in nature, its aspiration to become a natural science seemed like an ideological commitment which was forced upon its subject matter. In this sense, psychology's yearning to become a natural science sidetracked the examination of its content. And by utilising the pre-defined scientific methods, the methods ended up in a prior existence to its problems.

2.3 Psychology as a natural science: Reactions and objections

Despite all the debates, disagreements and conflicts, Psychology ended up being heavily influenced by the successful natural sciences model and this model played a massive role in shaping the disciplinary identity of Psychology and its overall growth. This hegemony of the natural sciences prevalent in those times also "established the view that natural scientific methods were the only reliable methods for securing useful and reliable knowledge about anything" (Danziger, 1990). In order to thrive, psychology had to align itself with the methods of the natural sciences. Although a lot of opposing views were also seen to such a conclusion that natural science is the only way ahead for psychology. For instance, Imanual Kant had disapproved the possibility of a 'science of mind' on the lines that mental phenomena held no spatial dimension, were too brief to observe, could not be experimentally played with in a controlled manner. By and large, Kant reached to the conclusion "that mental phenomenon could not be mathematically analysed or described" (Fancher, 1996). Such phenomena, he believed, could only ever support a qualitative and philosophical examination. To overcome this barrier, psychology went ahead with the idea that all mental phenomena could, in fact, be explained in terms of physiological causes. It also ignored Kant's objections. Now subjective mental phenomena were no longer psychology's primary subject matter, instead it was physiology. And natural scientific methods operated very comfortably in this physical domain. In this regard, Leahey (2004) affirms that "by insisting that the nervous system is the basis of all mentality, and by defining psychology as the investigation of the physiological conditions of conscious events, the new field could establish itself as a natural science" (Leahey, 2004). Similarly, according to Kuhn, "it is impossible for psychology to become a science as there is no one paradigmatic framework guiding the discipline" (Kuhn, 1962). Because of the absence of a unitary paradigmatic framework, it was argued that psychology is a 'pre-science' with no clarity regarding its content and theory base. Others made a case that scientific approach may not be appropriate for at least some issues of psychologists, such as the social constructionists who debate in favour of psychology not being a science. The humanistic psychologists also debate that psychology should not be a science, in an ideal situation. For instance, R.D. Laing (1965) argued that 'scientific' explanations of schizophrenia may have missed crucial elements of the disorder, for example, the distress experienced by the patient.

Furthermore, Laing asserted that "the scientific approach is to make generalisations about behaviour (a nomothetic approach)" whereas, he felt, that "treatment could only be succeeded if each patient was treated as an individual case (an idiographic approach)" (Laing, 1965). Karl Popper (1972) provides an insight which questions Psychology's attempt to appear objective as objectivity is a major goal and characteristic of the natural sciences. Popper debated that "it is impossible to observe something and remain completely objective. As psychologists don't observe without an idea of what they're looking for their scientific observations are always driven by hypotheses and theories, which stops them being objective altogether" (Popper, 1972). Doubting the scientific status of psychology based on the natural sciences was not only limited to the philosophers like Kant and Popper. Many pioneers of the field were also sceptical of attaining this identity. For instance, Miller suggested that "psychologists who attempted to be scientists were doing no more than 'dressing up'. They may take on the tools of sciences such as quantified measurements and statistical analysis but the essence of science has eluded them. Perhaps at best psychology may be a pseudoscience but it is a dangerous one because psychologists can claim that their discoveries are fact" (Miller, 1983).

From the discussion till now, we can establish how differing viewpoints persisted about the scientific nature, role and methods of Psychology. And even after the emergence of experimental psychology there was a major controversy regarding what constitutes the scientific psychological knowledge. This controversy is usually represented as one between those who used the method of introspection and the behaviourists. Interestingly, "arch introspectionist like E. B. Titchener always justified his investigative practice in the name of *science* and denigrated the practice of his opponents as being not science but technology" (Danziger, 1990). This kind of distinction inferred that there can be only one plausible true version of what actually constitutes scientific psychological knowledge. Danziger further adds that "the introspectionists' choice of a different kind of knowledge was a matter of preference, not a matter of error. Whether what they did was scientific depends on one's definition of science. If their definition turns out to be different from that of the behaviourists, this again is a question of preference, which can only be seen as a matter of being right or wrong if a particular definition of science is accepted as the only true one in some absolute, ahistorical sense" (Danziger, 1994).

2.4 The philosophical beginnings of the newly formed scientific psychology

It is now important to notice that those who first envisioned the idea of a scientific psychology were not unaware of the fundamental conceptualisation of the mind. The pioneering figures of the newly formed scientific psychology were conscious of their philosophical underpinnings and were aware of their position regarding the mental realm. These pioneering figures disseminated their philosophical ideas and identified themselves with both psychology and philosophy. In this sense, their backing of psychology as a scientific discipline was a result of their acquaintance with the philosophical intricacies of the mind. The core goal of the present chapter is to explore, broadly, the philosophical grounding from which the new scientific psychology grew. Hence, the views of the pioneering figures about the vision of the new psychology were not devoid of the fundamental philosophical grounding.

While talking about such founding fathers, it is only imperative to discuss Wilhelm Wundt and his conception of the new psychology. When Wundt proceeded to give a well defined direction to his program for a new kind of psychology, he based himself on three traditions of investigative practice. Outwardly, Wundt grounded his assumptions in the special type of scientific experimentation which was emerging the discipline of physiology. This grounding enriched him with subject specific skills and a manner of formulating research problems. Secondly, Wundt made a case for the application of these skills and techniques to some other area of examination except physiological science. It was at this point when Wundt asserted that this area of examination could be the human "consciousness". With this conception in mind, Wundt decided to discard the introspective method while keeping its object of inquiry. The third aspect of Wundt's examination process was the way psychology related experiments were socially organised. This element of social organization of the new experiments assisted Wundt in establishing a formal laboratory which was to become the site for psychological experiments to examine human consciousness. This led to the formal emergence and development of modern psychology as a prominent area of investigation. Wundt achieved this by institutionalising his prior

knowledge of physiological experimentation which soon became the traditional method for psychological investigation.

The studies conducted within Wundt's style of investigation through physiological experiments incorporated data from one's conscious reality. Wundt attempted to create a distinction between "self observation", the introspective method used by most philosophers and "internal perception", the grounding of human consciousness. The difference resided in the fact that the method of self observation no longer qualified as a scientific method. For the new laboratory of Wundt, "a scientifically guided introspective method was needed which could place appropriate controls on various stimuli which would lead to some observable event to examine" (Fuch & Milar, 2002). Wundt established specific guidelines to operate introspection scientifically. He affirmed that "the observer, if at all possible, must be in a position to determine when the process is to be introduced and that he must be in a state of strained attention". He also said that "the observation must be capable of being repeated several times and "the conditions of the experiment must be such as to be capable of variation of the strength and quality of the stimuli" (as quoted in Weiner et al, 2013). Such specific requirements by Wundt for his psycho-physiological experimental methods made his reluctance stronger in accepting various classical methods wherein the relationship between the experimenter and subject seemed more in sync with the methods that would qualify as the standard way of doing psychological experimentation in the later years to come.

2.5 Wundt's philosophy of Science

Wundt's approach could be seen in a constant conflict with the well established philosophical schools of thought like empiricism and inductivism. Wundt's reaction against these schools of thought was crucial to notice as these schools were supported by many predecessors of Wundt (for example, Mill and Herschel) and by going against the flow of the tide, Wundt was attempting create a fundamentally different approach towards studying human consciousness, methodologically. In reaction to these philosophical approaches, Wundt stated that "all sciences involve an inherent logical organization of its experiential content" (as quoted in Danziger, 1990).

However, the inherent logical association that Wundt spoke about should not be seen as a result of some kind of generality emerged through the data-set, rather this association in itself is a logical characteristic feature which the data-set brings with itself. According to Wundt, "The basic ideal of mechanical physics is no more taken from experience, in any immediate and complete way, than are Aristotle's concepts of dynamics and energy. Rather, this idea emerged out of a logical demand and only received its justification through its successful application. Every scientific explanation of nature strives for the harmony and interrelatedness of phenomena" (Wundt, 1907).

Owing to Wundt's strong reluctance to inductivism, he defined his position in more and more disagreement with the positivistic philosophy of science. Wundt felt that "Positivism drew wrong conclusions from the history of science" (as quoted in Danziger, 1990). The assumed inspiration of the new science and its evolution has been to improve upon the theory based appreciation of the lucidity of actions rather than establishing empirical results for prediction and control. "The fundamental motive of all scientific research is the claim of the non-contradictory connection of facts" (Wundt 1903). "Not only does positivism undervalue the fundamental role which purely presuppositions play in science, it also places a great deal of importance on the accumulation of isolated facts of observation" (Wundt 1883). Wundt believed that "science does not progress merely through the compilation of somewhat isolated observations; but through establishing the regularity of facts" (Wundt 1907a). In fact, Wundt's approach to strategic psychologically guided research presented a significant realistic appearance of the viewpoint that he held. For Wundt, "science was never simply a collection or a summary of observations; it was always more about explanation" (Danziger, 1990). Therefore, "the division of the world of experience into physical science and psychology entailed a division in types of explanation too" (Danziger, 1980). Danziger further reflected how "if the science of physics had developed its own forms of mechanical explanation for the phenomena to which it restricted itself, then any science of psychology worthy of the name must look for its own exclusively psychological forms of explanation". Wundt articulated this in terms of the "differentiation between physical and psychic causality as for Wundt, scientific explanation referred largely to the principle of causality" (as quoted in Blumenthal, 1975).

The insights received from Wundt's account of philosophy of science are crucial for understanding the 'scientific' grounding of the discipline of psychology. They help in illustrating a crucial element of his revolutionary action in setting the foremost laboratory for psychology related investigation. This element generally goes unnoticed by the people who talk about the historical grounding of the discipline of scientific psychology and thus provide us with a view which is quite different from the original ideas that Wundt propagated. And the difference or conflict in the perspective largely stems from a difference in their vision for the new Psychology. Different scientific vision motivated different thinkers. Wundt's vision of a scientific psychology was firmly rooted in a particular kind of philosophy of science. "It was the systematic, programmatic nature of Wundt's contribution to experimental psychology that transformed that field from a collection of separate empirical studies into something that could begin to call itself a discipline" (Danziger, 1990). However, Wundt's involvement in establishing this vision could be comprehended only through the incorporation of a sophisticated and intricate philosophy of science whose main focus resided in the logical lucidity and this was to be the core goal of any scientifically grounded practice. And this very articulated philosophy of science is somehow missing from the way scientific psychology was operating in the 19th and 20th century continuing till date.

2.6 Problems of the new scientific psychology

To give some more contexts to the problem of scientific psychology and its functioning, we should see how the historical relationship between psychological knowledge and the scientific method were always inverted. Sciences, like physics, chemistry and biology acquired independence and institutional status by achieving enough knowledge to become such kind of sciences. According to Koch (1956), the methods used by sciences like physics and chemistry were developed following preliminary leads of knowledge. However, the reverse holds true for much of scientific psychology. Koch declared that "at the time of its inception, psychology was unique in the extent to which its institutionalization preceded its content and its method preceded its problems" (Koch, 1959; as quoted in Leary, 2001). Thus, instead of its methods being the tools to defend its knowledge base, the scientific

psychological knowledge was defended by the mere application of scientific methods. By 1956, Koch began to see "the harm that was done by stereotyping science as some kind of 'inexorable bulldozer' which carves out great, linear, ever-lengthening highways of truth" (Koch, 1956; as quoted in Leary, 2001). Koch argued that "this mindless application of methods was a syndrome of 'ameaningful' thought" (Koch, 1956). "Ameaningful thought treats knowledge as an almost habitual result of a self-corrective rule structure, a fail proof heuristic, a methodology, rather than discovery. As a result, much of the psychological history is seen as a form of scientist-ic role playing which entails trivialization of important issues and concerns" (Koch, 1981, p. 257). Koch affirmed that "psychology was never in fact separated from philosophy, and although parts of it are scientific, it cannot be considered a coherent scientific discipline. Because it cannot be unified, it should instead be considered a collection of loosely related studies rather than a single coherent scientific field" (Koch, 1962).

In spite of the meaningful and philosophical contribution that Wundt brought to the discipline of psychology, most psychologists then (and now also) were more or less indifferent to his fundamental principles. What were the reasons for this deviation? Three major factors may be seen as responsible for this. First, a lot of influential psychologists from the younger age group were deeply enticed by the discourse of a positivistic orientation which markedly influenced the basic viewpoint within the realm of physical science. From this point of view, "Wundt's idea of psychological causality was as good as a metaphysical burden which had to be set free for true sciences to prevail" (Danziger 1979). As a result, Wundt's insistence on only controlled type of psychological experiment as being capable of providing causal insights stopped making sense, and led to the propagation of vaguely experimental methods called the 'Pseudo-experiments'. The second factor was "the development of an intense interest in the potential practical uses of psychology to the point where psychological technology became equated with psychological science" (Danziger 1979). In fact, according to Danziger, "Wundt had no interest in what was to become crucial for his successors in 20th psychology, namely the 'practical applications' of psychology and, importantly, Wundt was not interested in establishing psychology as an 'autonomous discipline' independent of philosophy. He treated psychology as merely another contribution to the philosophy of mind, culture, and society (although Wundt hoped that the experimental psychology would have great influence on

philosophy). What Wundt hoped to achieve was to reform philosophy by new means"
(Danziger, 1979). His aim was never to establish an entirely new and autonomous
discipline. To do this the traditional object of philosophy (mind) had to be preserved
even as the means of studying mind had to be radically changed by means of
appealing to experiments. Finally, the emergence of a radically individualist approach
to psychology played a crucial role. For this approach, "even social psychology was
the psychology of individuals and for which Wundt's group psychological and
historical approach and methodology were simply incomprehensible" (Danziger,
1980).

All these developments and influences were somehow responsible for the burial
of Wundt's original vision for the science and the method of psychology. In fact,
Wundt's ideas and vision, as mentioned in the later texts were highly deviated from
the original writing and consequently Wundt's whole viewpoint was misunderstood
and rubbed off. Wundt's idea of the transformation of philosophy suffered backlash
from philosophers, and experimental psychology was not accepted by forces that
would have provide it with an academic home base. Psychology was increasingly
forced to make its own way an independent discipline (rather than remain part of a
philosophy or physiology department). In contrast to Wundt's conception, the new
psychology did not prosper in relation to other disciplines like philosophy and history.
Instead, it deviated to biology got affiliated with the natural sciences. In this move it
was greatly encouraged by the enormous rise of the natural sciences in the 19th
century. The progress in the natural sciences promoted the idea that only its methods
were the methods for securing reliable and valid knowledge about anything. Anything
which was not straightaway linked to such methods was considered shallow and not
worthy of serious investigation. The divide between the natural (Naturwissenschaften)
and human sciences (Geisteswissenschaften) became too large for reconciliation and
psychology ended up in a tricky mid-path. That which Wundt was trying to hold
tighter had started to break apart. All the students who came to Wundt because of his
laboratory ended up on the natural science side pursuing experimental research and
consigning the rest of Wundt's psychology to the burial of metaphysics.

Although, from the vantage-point of our own times the limitations of Wundt's
approach are not difficult to discern. But at least there is a learned appreciation of the

grave limitations and dubious biases of those who came up with various alternatives on how to do scientific psychology. This implies that understanding Wundt's historical action in establishing the very first structured programme of purely psychological experimental research was a crucial even in the history of Psychology and insights from it would prove to be fruitful. Wundt possessed a degree of sophistication in his fundamental questions about the scientific method that was not matched by thinkers before him. It is important to remember the questions Wundt raised regarding the relationship between psychological theory and psychological method. He also raised questions about the experimental method and its specific requirements.

The way mainstream psychology functions, these issues raised by Wundt are far from settled and thus must be relooked into from time to time. If what it takes for psychologists today to have new look at our implicit assumptions is revisiting Wundt's ideas, then Psychology can definitely gain substantial insight into the matter and Wundt's ideas would come to be known much more than mere historical facts which are also presented in a highly distorted version. To sum up, the field of psychology did manage to achieve the status of a scientific field but keeping up with the prefix of 'scientific' required much more than adoption of laboratory methodology modelled after the natural sciences. The scientific status of psychology demanded more attention and thought beyond the mere oscillation between being or not being a natural science. When the debate of psychology being a human science was propagated by some of the members in and out of the field, the discipline failed to resist the natural science's wave of 'legitimate knowledge'. This did not leave with the discipline even enough scope to have thought about the possibility of actually surviving as human science. Between the desire to imitate the natural sciences and the subject matter of studying human consciousness, psychology was stuck as an ambiguous oscillator. Concluding on this note, the subsequent chapter of the dissertation talks about the case of cognitive psychology and discuss its scientific status and cognitive psychology's attempt to understand cognition whilst using the same scientific identity.

Negotiating the Scientific Status of Cognitive Psychology

3.1 Introduction

The previous chapter talked about the emergence of psychology as a scientific discipline. The chapter dealt with this idea by examining the nature of 'science' which the proponents of the discipline were seeking to acquire as their disciplinary identity. Since dissecting and commenting on the scientific status of the entire discipline of psychology goes far beyond the scope of the present research, the focus would be stressed upon only a subfield of psychology; cognitive psychology. Keeping this objective in mind, the current chapter aims to provide an overview of the kind of science the cognitive psychologists/thinkers were trying to acquire and cater to. This is done by reviewing the larger understanding of 'cognition' by tracing the development of the field through the major pioneers and their contribution to the field of cognitive psychology. An attempt is made to understand what cognition meant for the pioneering figures and what kind of scientific grounding these pioneers were rooted in. Since the field of cognitive psychology is known for its strictly scientific demeanour and rigid set of methodologies, the larger goal here is to dissect this very 'scientific-ity' of the field of cognitive psychology.

As we move ahead in the chapter, an exploration is carried out to examine the direction the field of cognitive psychology has taken today and reached to a point where it can be called the standard or mainstream conception of cognitive psychology. The main point of enquiry here would be to assess the scientific nature of the approach which standard cognitive psychology pursues. To comment upon the

points of differences between the earlier conceptions of a scientific cognitive psychology and the later evolved mainstream cognitive psychology. This enquiry leaves us questioning the inherent motive of the mainstream cognitive psychology; to understand human cognition or to acquire and maintain its scientific legitimacy? This question is dealt with by focusing upon some of the pressing theoretical and methodological issues present in the field of cognitive psychology as it quests to understand the phenomenon of cognition while maintaining its prototypical scientific behaviour.

3.2 History of the cognitive revolution

The term cognition has gained a lot of interest over past many decades. The last decade has particularly witnessed a new and dynamic interest in the field of Cognition. To trace back the historical grounding of this field, cognitive psychology emerged in the 1950's when the discipline of Psychology was largely preoccupied with the behaviouristic ideology and methodology. This became one of the major reasons due to which Psychology could not become a cohesive part of the cognitive revolution. Psychology's active participation in this newly evolved revolution was not possible until it had untied itself from the behaviouristic guiding, thus restoring cognition to scientific respectability. By changing the subject to the study of behaviour, psychology could become an objective science based on scientific laws of behaviour. In this sense, the beginning of the cognitive revolution in psychology was more of a counter revolution against Behaviourism.

The year 1956 and 1957 were very crucial and acted as catalyst in the emergence and growth of the cognitive revolution in Psychology. Apart from the dominance of experimental psychologists in within the discipline, many other important events were taking place which triggered the growth of the cognitive revolution. Newell and Simon (1972) had published 'Human Problem solving' wherein they stated that "1956 may be considered a critical year for the progression of information processing psychology". The reason this was said was quite evident as this was the year when path-breaking work was happening in the field of artificial intelligence. Bruner's and Goodnow's "A Study of Thinking" was also published in the year 1956 which dealt

deeply with the notions of cognitive strategies. Many important theoretical frameworks also developed in the same year (for example, Tanner et al – signal detection theory and the idea of the magical number seven by Miller). In essence, the year was very important to explore more about the 'mind' and its functioning.

Miller dates the conception of cognitive sciences to the 11th of September, 1956. This was the second day of a symposium organized by the 'Special Interest Group in Information Theory' at the Massachusetts Institute of Technology (Elias, 1959). The symposium widely discussed the ideas provided by some of the major contributors like Chomsky (Syntactic structure, 1957), Newell and Simon (paper on 'logic machine'), Miller (work on the bottleneck and short term memory), Szikali (work on speed of perceptual organization) and Swets and Birdsall (work on significance of signal detection theory). After attending this symposium, Miller was convinced that the revolution that is beaming is not taking place in isolation, rather it is an amalgamation of many different pieces which form a larger whole. For Miller, fields like experimental psychology, theoretical linguistics and computer processing were a part of a bigger system and that "the future would witness a progressive elaboration and coordination of the shared concerns emerging out of these individual fields."

While the area of the study of cognition (which was inter-disciplinary at this point) was developing, it still did not have a concrete name attached to it. It was called the 'cognitive studies' at the Harvard, 'information processing psychology' at the Carnegie-Mellon and 'cognitive science' at La Jolla. According to Miller, what it was called, at that point, did not matter a lot. But in 1976, the Alfred P. Sloan foundation began an inquiry in the area of cognition with the aim of bridging the gap between the mind and the brain. They needed some way to achieve this goal and thus selected 'cognitive science.' They created a Sloan Special Program in Cognitive Science in order to explore the possibilities. Miller mentions that the organization was also considering investing in the area of artificial intelligence. To which Miller firmly established that a focus solely on artificial intelligence would be incomplete as AI was merely a part of a much larger movement catering to the cognitive sciences. Then in the year 1977, a new scientific journal called the 'cognitive science' was introduced by Schank, Charniak and Collins. This journal was later turned into the official journal of a cognitive science society established in 1979. In 1980, a renowned new

format journal of psychology, The Behavioral and Brain Sciences, dedicated a special issue of 1980 to the 'Foundations of Cognitive Science' (Chomsky, 1980; Fodor, 1980; Pylyshyn, 1980) after it already had a discussion of 'cognitivism' (Haugeland, 1978) in its very first volume. And since then, the area of cognitive psychology has been witnessing a rigorous application of the computational and connectionists model to understand the intricacies of human cognition. If the journey of cognitive psychology remained successful in doing is a question for the subsequent sections of the chapter. To do this, the next section gives an account of the beginning understanding of the field of cognition by the founding figures of cognitive psychology.

3.3 The beginning of defining cognition: through the lens of the Pioneers

3.3a. Ulrich Neisser and ecological approach to cognitive research

William James (1890) believed "that some degree of vagueness is beneficial to science when attempting any new research direction" (James, 1890). In 1890, James used the term 'cognition' in his definition of psychology. "Psychology is the science of mental life, both of its phenomena and their conditions. The phenomena are such things as we call feelings, desires, cognitions, reasoning, decisions, and the like". In his book 'cognition and reality', Neisser defined cognition "as the activity of knowing: the acquisition, organization, and use of knowledge" (Neisser, 1976). Neisser's definition of cognition was seen as the most influential description of what all cognition could encompass. According to this definition, cognition referred to "the mental process by which external or internal input is transformed, reduced, elaborated, stored, recovered, and used". All these mental processes make use of the internal representations to different degrees, and may also operate independent of each other at various stages of processing. Moreover, these processes can be empirically probed (to some extent) which then leads to scientific investigation by incorporating methods used by the natural sciences.

Ulric Neisser is widely known as the "father of cognitive psychology" and an avid supporter of the ecological approaches to cognitive research. Neisser's 'Cognitive Psychology' in 1967 can be said to have marked the emergence

of the field of cognition. This publication helped Neisser bringing together research ideas on topics like perception, attention, and problem solving etc. Neisser preferred to see cognitive psychology as an assault on behaviourism as his discomfort with behaviourism for limiting the area of study of the discipline of psychology was humongous.   In his book 'Cognitive Psychology', apart from critiquing the behaviourist approach he also provided with robust alternatives to study humans. The book grew instantly popular and various researchers working on problems throughout the field saw a unified theory that connected their research to this approach. Because Neisser was the one who first arranged these areas together, he was frequently referred to and introduced as the "father of cognitive psychology." Neisser's work comprehensively looked at the various components of cognitive psychology, addressing the subjects of cognitive and dynamic memory, memory and thought etc. In each of these components, Neisser was careful to discuss and critique the prevailing assumptions and research. In addition to all of this, Neisser interspersed his ideas as to why behaviourism was not able to adequately handle these concepts.

If we look at Neisser's academic journey and the growth of the field of cognitive psychology, we would be able to see many similarities. For example, Neisser gained an admiration of the information theory while interacting with George Miller at Harvard and MIT. He then went on to work with the some of the gestalt psychologists. Gradually, Neisser also developed an admiration of Gibson's theory of direct perception before eventually getting disappointed with the information processing approach towards studying cognition.

After writing 'Cognition and Reality' in 1976, Neisser started to express his concern regarding the special emphasis the field placed on the computational and information processing approach. He was particularly dissatisfied with the over-emphasis on researching strictly within the laboratory. In this regard, Neisser challenged cognitive psychology and advised not to restrict itself to these mechanical approaches without taking considerations from the actual contextual setting. To elaborate more on the importance of studying cognition in a socially grounded setting, Neisser (Neisser, 1976) affirmed that "1) there is a need for cognitive psychologists to make efforts in understanding cognition as it occurs in the ordinary environment and in the context of natural activity. This would not mean an end to laboratory

experiments, but a commitment to the study of variables that are ecologically important rather than those that are easily manageable. 2) It will be necessary to pay more attention to the details of the real world in which perceivers and thinkers live, and the fine structure of information that world makes available to them. He says that we may have been investing too much effort on hypothetical models of the mind and not quite enough on analyzing the environment that the mind has been shaped to meet. 3) Psychology must somehow come to terms with the sophistication and complexity of the cognitive skills that people are really capable of acquiring, and with the fact that these skills undergo systematic development. A satisfactory theory of human cognition can hardly be established by experiments that provide inexperienced subjects with brief opportunities to perform novel and meaningless tasks. 4) Finally, cognitive psychologists must examine the implications of their work for more fundamental questions: human nature is too important to be left to the behaviourists and psychoanalysts" (Neisser, 1976).

In response to his concerns, Neisser began an inquiry into the ecological approach to cognitive research and soon became an ardent advocate of the same. He argued that the research design should help in exploring the ways people perceive and think in under real life situation. In 'Cognition and Reality' (1967), Neisser worked on presenting an integration of the Gibsonian concept of direct perception with the constructive processes in cognition through his perceptual cycle. The perceptual cycle involves information being picked up through perception which results in activation of the schemata, which in turn guides attention and action which leads to the search for more information. In fact, Neisser was the first one who documented the merits of an ecological approach to cognitive psychology (particularly research on memory) through his opening address (Neisser's, 1978) at the first International Conference on Practical Aspects of Memory. Neisser stated three main challenges to a traditional laboratory approach to memory research (Bruce, 1985; Poon, 1993). First, that the laboratory approach gives rise to very few new discoveries and theories (Cohen, 1985; Zacks & Hasher, 1992). Second, memory research is preoccupied with broad theoretical issues (for instance, forgetting) and tends to neglect other crucial areas of inquiry. Third, the challenge of focusing too much on the laboratory setting which is not an ideal representative of the real word was a major issue for Neisser. Further, the laboratory experiments are formulated in such a way that they bear no actual

resemblance to the real world activities. This leads to the issue of generalisation and thus limits the applicability of such research. Neisser calls these practices as having no ecological validity and should be complimented with more humane and contextual element to such studies.

Neisser's (1978) conference paper on applying an ecological approach to memory research is one of the most seminal papers of all the time (Bruce, 1985; Cohen, 1989; Davies & Logie, 1993a; Gathercole & Collins, 1992). And as a result, in the years that followed Neisser's paper, an increasing number of researchers began tackling many of the topics outlined by Neisser, and others that appeared to have been neglected by traditional laboratory research. However, Neisser's ecological approach to memory research faced with some criticism also. And despite the fact that the paper he published captured instant attention, it may have unknowingly invited some misconceptions too. Specifically, it gave rise to three major misconceptions about the aims and the character of an everyday memory approach (Kvavilashvili and Ellis, 1996). "First, an ecological approach to memory research advocates the abandonment of controlled laboratory research and supports only naturalistic observation, second, an ecological approach neglects or minimises the importance and necessity of theory development and hypothesis testing in memory research, and third, the primary aim of proponents of everyday memory research is to offer solutions to practically significant problems" (Kvavilashvili & Ellis, 1996).

It can be seen how when Neisser spoke of these 'suggestions' or 'prescriptions' to the practitioners of the field of cognitive psychology, he did not do it from a preaching stand-point, rather he himself documented how such research is possible in the field of cognitive psychology which is more sensitive to the real world nuances and complexities. For example, in his article 'Five kinds of self-knowledge' (Neisser, 1988), Neisser explores the kinds of information that specify the 'self'. He argues that information individuating the self varies a great deal and thus it is plausible to suggest that every information is capable of establishing a different "self." Neisser's selves include the ecological, interpersonal, extended, private, and the conceptual self. "During his career, Neisser was awarded a long list of honours, and he would seldom found himself in the centre of broad movements. Neisser, however, always saw himself as an outsider challenging psychology to move ahead. He first worked

towards creating an alternative to behaviourism and then tried making sure that cognitive psychology was investing itself with significant problems" (Hyman, 2012).

3.3b Jerome S. Bruner and going 'beyond the information given'

For Bruner, cognition means "the great question of how you know anything." Along with George Miller, Bruner was successful in bringing the cognitive revolution to the forefront of psychology by institutionalising it leading to the birth of the centre for cognitive studies at Harvard University. Bruner's work concentrated mostly in the area of perception and throughout the 1950's he was writing about perception. This made his belief firm enough to establish a case for a broader and non-mechanistic view of perception. In his seminal work 'Perception, cognition and behaviour' (Bruner & Postman, 1949), Bruner talks about the ways in which perception is generally studied which is rather narrow and mechanistic in its appeal. For instance, perception is generally understood through perception itself, without any regard for the manner in which perception is embedded in the other and also the ongoing activities of the perceiver. This kind of approach adapts to the intrinsic laws of perceptual organization also. Bruner affirms that in this kind of research, it becomes imperative to control some aspects of the experiment like the set, the past learning of the participants and motivation. The participant is further required to be neutral, accurate and attentive and is not supposed to react in ways other than being neutral towards the stimulus presented. This means that the stimulus variables and the organism variables remain superficially tied in a 'prototypical experimental situation' and hardly any attempt is made to obtain truly representative examples. In this paper, Bruner challenges this very standard way of studying perception and helps in changing "the image of man from a passive receiver and respondent to an active selector and constructor of experience". Bruner and Postman (1949) made a new case for the role of emotional and motivational states of the perceiver in the process of perception. Contrary to the classic view which considers these states as constant, unchangeable and having no effect on the perceiver, their experiments depicted that emotional distress in fact influences perception, and that perceptual defences are sometimes raised to avoid processing unpleasant or threatening stimuli. These experiments gave a better insight into the process of perception by showing how even

affective and motivational states convey important information about a person's existing priorities, and that the processes of perception should be better tuned and oriented toward such priorities.

Bruner's book 'The study of thinking' (Bruner, Goodnow & Austin, 1956) is considered one of those writings that marked the beginning of the cognitive revolution, at a rather formal level. This writing gave immense insights into the process of concept formation and categorization. For Bruner et al, a concept is "the network of inferences that are or may be set into play by an act of categorization" (Bruner, Goodnow, and Austin 1956). Concept attainment deals with the decision-making and categorization processes which leads to the development and understanding of a concept. In this regard, Bruner et al (1956) examined many instances of concept attainment in order to devise regularities in the decision-making processes. He refers to these regularities as strategies or "a pattern of decisions in the acquisition, retention, and utilization of information that serves to meet certain objectives" (Bruner et al 1956). The approach then makes use of the various positive and negative cues which help in guiding categorization into distinct groups which results in a guided tour of the entire concept. Bruner et al (1956) pointed out that individuals often call on the past relevance of cues for this. This implies that "complete understanding of a concept varies from individual to individual, and consequently from culture to culture. Concept attainment involves not only the decision-making processes involved with categorization but it also incorporates a personalized historical experience of each student or individual" (Bruner, 1956). In essence, Bruner viewed people as constructive problem-solvers rather than passive media as they mastered new concepts.

In the year 1962, Bruner published a slim volume titled 'On knowing'. He very well establishes in this piece that "Man does not respond to a world that exists for direct touching. Nor is he locked in a prison of his own subjectivity. Rather, he represents the world to himself and acts on behalf of or in reaction to his representations. The representations are products of his own spirit as it has been formed by living in a society with a language, myths, a history, and ways of doing things" (Bruner, 1962). Further in 1966, Bruner's interest in the functioning of the mind led him to write yet another path breaking book called 'Studies in cognitive

growth'. This work was focused upon children and Bruner believed that infants were much more competent, active and organised than had ever been believed (Judge, 1984). Through 'Studies in cognitive growth', Bruner takes a stance that follows that mental development should be looked upon in terms of changes and developments in the modes of internal representation which are available to the child at various stages. According to him, there are three kinds of internal representations which govern cognitive development, enactive, iconic, and symbolic (i.e. representation by means of actions, images, and symbols). "At first the child's world is known to him principally by the habitual actions he uses for coping with it. In time there is added a technique of representation through imagery that is relatively free of action. Gradually there is added a new and powerful method of translating action and image into language providing still a third system of representation. Each of the three modes of representation-enactive, iconic and symbolic-has its unique way of representing events" (Bruner 1966). According to Bruner, it is by means of these three systems that human beings "represent their experience of the world" and ". . . "Organize for future use what they have encountered" (Bruner, 1966). It is interesting to note here that Bruner saw these different stages of representation as a gradual development of cognitive skills and technique into more integrated and holistic cognitive techniques rather than three separate modes of thought working in vacuum at different stages of development.

Bruner had a revolutionary observation to make regarding the link between psychology and computer science that occurred in the cognitive revolution. The link got even stronger when the latter started providing a metaphor for the former. This provided some share in the relative confusion that was already present between the intention of the cognitive revolution to rehabilitate the study of mind and the use of computer simulation as one of its major tools. Bruner believed that "computers do not mimic development, nor do they build representations and meanings" (Bruner, 1990). Thus, these discomforts from the field of cognitive psychology on the basis of equating the human mind with an information system made Bruner to lose interest in cognitive revolution.

3.3c. George Miller

George Miller, Bruner and Chomsky are known to have led the "cognitive revolution" together that substituted behaviourism as the major psychological force in understanding the mind in the 1950s. Miller is well-known for writing one of the best papers in psychology – "The magical number seven, plus or minus two: some limits on our capacity for processing information". Apart from this, Miller's contributions ranged from fomenting the cognitive revolution to inventing psycholinguistics and cognitive psychology. He imported powerful ideas from the theories of information, communication, grammar, semantics, and artificial intelligence and expanded the knowledge of the human mind. Miller believed that "language must be treated as a key element of any psychological theory because it is a means of making private or internal psychological phenomena observable, measurable, and public" (at the APS annual convention, 1989). The concept of immediate memory was made popular by George A. Miller's (1956) article on capacity limits in information processing, suggesting that it is limited to about seven units. It is one of the best-known works in the cognitive and psychological sciences, with about 20,000 scientific citations as of this writing (17 October, 2014). Its wider popular appeal is illustrated in a Google search for the key phrase from the article's title, the magical number seven, which yielded about 873,000 results.

Miller and Chomsky collaborated in the year 1956 to work together on grammar and parsing that later on formed the basis of mathematical linguistics. In the early 1960s, Then in the 1960's, Miller worked on sentence memory demonstrating the psychological reality of Chomsky's theory of grammar (Pinker, 2013). Both the experiments and the theory didn't prove to be successful, however "they established the new field of sentence processing, and one finding that words are easier to recognize in grammatical and sensible sentences was the first demonstration of top-down processing in language comprehension" (Pinker, 2013). Soon, Miller started seeing larger implications of the study of the mind. Miller said "I now believe that mind is something more than a four letter, Anglo-Saxon word. Human minds exist and it is our job as psychologists to study them" (Miller, 1960). Miller wrote a book 'Plans and the Structure of Behaviour', which suggested that psychologists are in a need to rethink the most fundamental unit of behaviour. Instead of focusing on the

stimulus-response arc, they should focus on a feedback loop. This book was majorly a manifesto for a cognitive revolution in psychology, which Miller also showcased in the subtitle of his 1962 history 'Psychology: the science of mental life' (Harper & Row, 1962).

Despite being an adamant proponent of the cognitive revolution, Miller did never hesitate in critiquing the same. Miller had objections regarding the way how a lot of psychological events are almost always reduced to mere biological events (Miller, 2010). Miller was very sceptical of the assumptive causal relationship that exists between biological and psychological events and the question of which one guides another. He says that in the last twenty years of cognitive psychology, there has been an increased tendency to speak routinely of the neural factors as the sole causation for every mental phenomenon. This reductionist approach, for Miller, was incomplete and premature (Miller, 2009).

3.3d. Jean Piaget and Lev Vygotsky: an integrated view of the human mind

In the pursuit of understanding human mind, knowledge acquisition and knowledge production, it is important to discuss two very prominent developmental psychologists who were working towards proposing an integrated approach of the human mind. This approach proved to be rather holistic and culturally situated in its appeal and opened new gates for further study in the area of cognition. While Vygotsky adopted a socio-historical approach to cognitive development, Piaget was interested in knowing "the mode of construction of knowledge in terms of its means of acquisition both over the course of early scientific enquiry and during the development of the infant and the child" (Vauclair & Parett, 2003). For Vygotsky, cognition develops through social interactions; cultural practices and internalisation of various cognitive tools (Vygotsky, 1978).

Piaget identified himself largely as a genetic epistemologist. "What the genetic epistemology proposes is discovering the roots of the different varieties of knowledge, since its elementary forms, following to the next levels, including also the scientific knowledge," (Piaget, 1950). Genetic epistemology is, in its essence, multidisciplinary, and Piaget stated that "to work in such a discipline it does not suffice to be a

psychologist vaguely acquainted with a smattering of philosophy and biology: one must be, moreover, a logician, a mathematician, a physicist, a cybernetist and a historian of science, to mention the essential" (Piaget, 1972). In essence, Piaget's ultimate goal was the understanding of the dynamics of scientific thought more than anything else (Mey, 1992). To substantiate, Piaget studied the developmental cognitive psychology of children, not to provide parents with schemes for educational guidance or control, but to develop a firm mechanism of knowledge construction. "The basic assumption was that the mechanism that allows children to move from inferior knowledge about some natural phenomena to superior knowledge is the same mechanism that is responsible for scientific progress, so that an understanding of the cognitive dynamics in children provides a key to understanding development in science" (Piaget, 1972).

Both Piaget and Vygotsky shared the approach that "the study of the mind should not be pursued by a single discipline but rather required the contribution of conceptual and methodological tools borrowed from various scientific fields" (Vauclair & Parett, 2003). For them, the human mind is the result of some biologically and culturally mediated processes. Therefore, examining the human mind is not possible without looking into the developmental processes that gives rise to various cognitive potentials and limit their organization. "The constructivist framework (of which Piaget was a major proponent), in which high level representations are derived from lower ones, is a crucial contribution to cognitive science" (Drescher, 1991). And according to Karmiloff Smith (1994), "this research program was born in the 1950's and is still very much alive, taking the developmental perspective seriously" (Karmiloff-Smith, 1991).

An inquiry into cognition involving socio-historic and epistemological basis is sure to raise one question. The question of how much the functioning of our mind can be attributed to the computational processes and how much to the larger socio-cultural context (Frawley, 1997). Many cognitivists agree with the first view while some do not. For Frawler (1997), this dichotomy between symbolic computation and social contextualization is not complete. The social mind and the computational mind must come together for us to understand cognition at a deeper level. This combination of a social and computational mind could be better understood by taking insights from

Vygotsky's work. Vygotsky's larger theoretical framework talks about the idea that social interaction plays a very crucial role in the development of cognition. For Vygotsky, "Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals" (Vygotsky, 1978). The core assumption of Vygotsky's approach is that an individual's mental functioning is essentially social in origin. In this sense, mental activity which is initially shared amongst individuals is later actively reconstructed on an internal plane. According to Wink and Putney (2002), "there are three major principles underlying Vygotsky's social development theory". First, social interaction plays a significant role in cognitive development in the context of what is learned and when and how something is learned. "Without the learning that originates from social interaction and without self-awareness that make us think in more complex ways, we would remain slaves to the situation, which responds directly to the environment" (Nicholl, 1998). "The second principle associated with Vygotsky's theory is the idea that the potential for cognitive development is limited to a certain time span" (Kearsley, 2001). Finally, Vygotsky affirmed that "the only way to understand how humans come to know is to study learning in an environment where the process of learning takes place rather than studying the product that is the result of learning" (Lutz & Huitt, 2004).

Now, building upon the last four sections of the present chapter, we get a fairly decent picture of the salient ideas around which the field of cognitive psychology revolved during its emerging years. The understanding of cognition and various approaches to study human cognition as propagated by the main pioneers reflect some sense of agreement at least among certain things. To begin with, the range of the field of cognitive psychology as envisioned by the pioneers seemed broader in appeal as they approached human cognition with a very broad beginning. No restriction and specifications were established right from the moment of defining cognition or its focus of investigation. For instance, what cognition entailed for the pioneers was the question of how does one know anything. This broad focus on the subject of inquiry leaves immense scope for the subject to be investigated rather deeply from all the

perspectives possible in the living world rather than just focusing one aspect of the conscious experiences or the physical body.

Moreover, all the pioneers showed a fair amount of agreement to considerations from the natural surrounding reality despite the surge of the cognitive revolution which drew heavily from the computational mode and thought of human cognition as a mechanistic activity having minimal influence from the outside world. The pioneers of the field were aware of this trend and time and again kept stressing on the importance of grounding their data-set in the naturalistic and larger contextual setting. Even if the laboratory method is the 'the way' to study cognition, it should always be supplemented with the role the larger society plays in shaping the mind.

To take these points further ahead in more detail, the next chapter discusses the conception of cognitive psychology as it works majorly within the well-established field of cognitive psychology soon after the beginning years of the cognitive revolution were rubbed off. While doing so, the section would throw some light on the central tenet of the mainstream cognitive psychology which lies in its majorly used approaches for studying cognition.

3.4 Mainstream Cognitive Psychology: Of computation and neural networks

Cognitive psychology is concerned with the functioning of the human mind. It deals with questions like "how the human mind creates meaning, how it processes information it receives to develop responses and how those responses in turn can influence subsequent input" (Anderson, 2000). Anderson believes that "cognitive psychology is not only the science of human information processing by itself, but it is an information-processing perspective that can be used in the attempts to understand the workings of the human mind, including cognitive processes, behaviours, and emotions" (Anderson, 2000). It is generally assumed that human mind is a mental system and is governed by two main functional processes; representation and computation (David et al, 2004). To put it simply, the central assumption of cognitive psychology affirms that thinking can be best understood in terms of various representational structures in the mind and computational procedures which operate on these representative structures. In this sense, the computational-representational

model of cognition assumes that the mind has mental representations analogous to data structures, and computational procedures similar to algorithms.

Program	Mind
Data structures + Algorithms = Running programs	Mental representations + Computational procedures = Thinking

In terms of actual working, a cognitive theory postulates a set of representational structures and a set of procedures that operate on these structures. A computational model makes these structures and processes more precise by interpreting them by analogy with computer programs. This way, "vague ideas about representations are supplemented by precise computational ideas and mental processes are defined algorithmically" (Thagard, 2004). Computation, both conscious and unconscious, refers to the transformation of representations into other representations in a rule-governed manner. To answer the question, "How do we know about the mind's functioning and about what takes place between observable input and output?", cognitive psychology answers, "By computational models supported by experimental evidence" (Eysenck & Keane, 2000). A set of inputs or stimuli is associated with a set of outputs or human responses (subjective, cognitive, behavioural, and biological) by several cognitive constructs. These cognitive constructs maybe both conscious information processing (for example, explicit perception, explicit learning, and explicit memory) and unconscious information processing (for example, implicit perception, learning, and memory) (David, 2000; Eysenk & Keanne, 2000).

In the theoretical foundation of cognitive psychology, "it is now a commonplace to analyze the cognitive structures of the mind on three different levels: computational, representational, and implementational" (Marr, 1982; Newell, 1990). These different levels of analysis generate different levels of theories of the human mind. "Different level theories are essential because of the widespread acknowledgment that complex systems have multiple levels of organization" (McClamrock, 1991). According to Marr, it is important to understand the three levels

at which any machine carries out an information-processing task. Each of the three levels tries to answer fundamental questions.

The computational level explains the "goal of a given computation, as well as the logic of the strategy by which this computation can be carried out" (Marr, 1982). This level gives insights about the goal, utility and appropriation of the computational level. One of the fundamental assumptions of cognitive psychology is that to understand and explain behaviour, a prior description of the task involving that behaviour is essential. As a result, the main requirements of a problem are at the core of any computational analysis. Therefore, computational analysis is the most important pathway to understanding human information processing. "Cognitive psychology dedicates most of its efforts toward constructing specific experimental tasks to understand specific information processing" (David, 2004).

The representational level specifies in detail the representations and the algorithms that govern them. At this level, some questions that are faced are: "How are input and output represented?" and "What is the algorithm for the transformation of input into output?" (McClamrock, 1991). Currently, two types of computational models are used by the field of cognitive psychology; symbolic and non-symbolic. Symbolic models assume that representations are symbols (for example, pictorial, verbal) and that computation involves the manipulation of these symbols by rules (for example, semantic rules). Non-symbolic models (connectionist models) "assume that a representation is due to the activation of cognitive units organized in networks similar to neural networks, and that computation occurs when the activation of these cognitive units is modified according to some rules" (David, 2004). David further affirms in relation to the representational level that the "representational-level theory, by incorporating detailed computational models, not only allows us to have a clear description and understanding of human information processing, but also extends the scope of psychology by influencing artificial-intelligence projects" (David, 2004). Further, the implementational level theory answers the question of how representations and algorithms can be realized physically. The implementational level consists of neural systems, neural networks, neuronal cells, synapses, and molecules, each of a different size.

The multi level analysis provided by Marrs has been proved to be beneficial in cognitive psychology. Higher-level theories allow us to generalize and to approach things with different underlying implementational theories. "Such higher-level explanations allow for reasonable explanations and predictions in the basis of less detailed information about the system" (McClamrock, 1991). Among the higher-level explanations, the algorithmic–representational theory usually is seen as the central goal of cognitive psychology because it can predict and explain human behaviour in its ecological conditions and can accommodate human errors. "The other levels are of interest primarily to the extent that they contribute to the clarification of this level" (David, 2004). Apart from the computational model, the mainstream cognitive psychology employs another class of the computational approach to study human cognition. This approach is known as the connectionist approach and embodies a perspective that is based on the idea that the understanding of behaviour and of mental states can be comprehended by gaining knowledge about various neural processes that underpin cognition. Although the history of neural network modelling can be traced back to the 1950's, the approach gained attention only at the beginning of the 1980s. The growth of this approach was further accelerated by the works by Rumelhart & McClelland (McClelland & Rumelhart, 1986; Rumelhart & McClelland, 1986), in which the basic principles of the connectionist approach were laid out, and its application across a range of psychological areas were discussed. Cognitive processing, according to the connectionist approach, takes place through activation among simple units of neurons which are linked to each other through weighted connections representing synapses. Each such unit then transmits its activation level to other units in the network through connections to those units. Connectionist models provide a new paradigm for understanding how information might be represented in the brain.

To gain more insight into the approach of the mainstream cognitive psychology and its implications to address the issue of human cognition, in more detail are discussed the various implications of having cognitive psychology works the way it has been working since the past many decades. To dissect some core areas of contention that made the need to look at mainstream cognitive psychology more critically is the goal of the next section.

3.4a. Narrow research focus of mainstream cognitive psychology as a resistance in understanding cognition

One of the first concerns that any area of inquiry faces lies in defining the focus of the research in that particular field. To define the focus of the research, it is imperative to define the major constructs that are going to get explored in the research process, for instance, defining 'cognition' in the field of cognitive psychology. The beginning of this chapter presents a summarised account of what cognition meant for the pioneers of the field of cognitive psychology. While describing the meaning of the term, cognition, each one of them proposed different definitions of cognition. Neisser defined cognition as "the activity of knowing: the acquisition, organization, and use of knowledge" (Neisser, 1976). For Bruner, cognition means "the great question of how you know anything". For Vygotsky and Piaget, the organization of the human mind is the combination of biologically and culturally mediated processes of development. Chomsky, borrowing from his natavistic approach, maintains that "certain skills and abilities are hard wired into the brain at the time of birth and that humans are born with certain cognitive abilities that enable them to learn and acquire certain skills" (Costley & Nelson, 2013).

Looking at these definitions, one can have a fair amount of idea regarding the scope of research in the area of cognition. The scope of inquiry, as can be seen, was rather broad and open to further negotiations. The central theme in most of these definitions concerns with the larger question of 'knowing'. And the question of knowing is such that it is inherently rooted in firm epistemological grounding. Another important aspect of these definitions is the focus on 'knowledge' and its creation, organization and utilisation. Every field of enquiry has an inherent goal of contributing to knowledge expansion. And every knowledge system must be looked at critically if it doesn't help in improving the knowledge base of what is already known. In this sense, every field of enquiry should have some basic assumptions about the very nature of knowledge and how that knowledge can be improved upon. These assumptions about the nature of knowledge may be explicitly stated by an approach or a school of thought or may exist as a manifestation of some latent underlying tenets. Basically, an epistemological grounding is essential in order to fully appreciate the role and contribution of any approach of enquiry.

The American psychological association defines 'cognition' as "the study of higher mental processes such as attention, language use, memory, perception, problem solving, and thinking." Here, in an attempt to be more specific and precise, cognition may have been reduced to a set of different processes which work in isolation. There is a "tendency to make so restrictive a definition of the field of study as to render the study beside the point or, indeed, finished before begun" (Koch, 1992). Koch has called this tendency 'operationism'. How a particular term is defined regulates and control the meaning of those sentences and phrases in which that term appears. But defining something does not necessarily guarantee that those sentences, in themselves, would make a valid argument. They may or may not, depending on the contextual setting. One might ask that the mere definition of something does not imply the overall working of that field. And that even if the definition of cognition appears to be specific (rather, restrictive), it does not necessarily limit the area of enquiry of which cognitive psychology seeks to embark upon. In this regard, it is important to acknowledge how the core assumptions of any field and the way something in it is defined are in a symbiotic relationship where both feed into each other. The guiding core assumption of cognitive psychology is that "people have mental states and the manipulation of which can be described in terms of rules or algorithms" (Marr, 1982; Overskeid, 2008). This core assumption has become the defining paradigm of the discipline which, in turn, guides the discipline's theoretical and practical functioning.

We can see how despite broad ranged elaborative definitions given by the pioneers of the field; the practical research focus of the field has become very narrow. Or probably always was. "As knowledge has continued to grow in psychology and neuroscience, this narrow focus has become increasingly clear" (Overskeid, 2008). It is quite evident from our institutional training and practical working that the core areas of focus in cognitive psychology include processes such as thinking, reasoning, memory, decision making, and problem solving. Yet there are issues present which are important to the understanding of human choice that have not been taken seriously by most cognitive psychologists. There is still very little that is known of so much of cognition. Detachment from animate cognitive systems and the massive neglect of real world activities keeps the research and practical focus narrow. There is more and more a need to understand that human cognition is different from artificial cognition and hence both cannot be equated. It order to gain a holistic and better understanding

of cognition and cognitive processes, it is important to incorporate the role of cultures, social interactions, motivation and emotions along with the existing areas of study.

Every school of thought, explicitly or implicitly, makes certain assumptions about human nature. So does cognitive psychology. Cognitive psychology sees humans as a physical symbol system with a component of pure cognition which can probably be described through a computer like model. But humans and human nature is much more than that. The human is a conscious organism, with a biological basis and a rich evolutionary and cultural history. More importantly, humans live in a relational world interacting with others, with the environment, and with itself. Yet when it comes to studying cognition, these crucial factors are neglected. Mainstream psychology treats human cognition similar to artificial cognition and thus keeps the socio-cultural factors outside of the realm of cognition. The idea, whereas, should be to include in the study of cognitive psychology a complex interaction among different issues of concern, an interaction that will not be properly understood until all parts are understood, with no part independent of the others, the whole requiring the parts, and the parts the whole. Unlike the commonly held belief that cognitive psychology is individualistic, there is a need to question this very stance and appreciate the role of the 'other' in 'doing' cognition. A very simplistic argument in this regard would be to understand that cognition doesn't happen in isolation within an individual. The very fact that knowledge production and knowledge sharing requires the presence of a larger social structure is evident of a 'social cognition' rather than one which is claimed to be individualistic in nature.

Mainstream cognitive psychology tries to understand processes like perception, language, thinking, memory, and learning. And in order to explain these through a cognitive standpoint, the general assumption is to understand these by defining the locus of psychology as the inner domain of the mind. The subject matter of the investigation is always the individual. Any cognitive processes that pertain to more than one individual are regarded as the integrated products of information processes in the minds of the individuals engaged in the social interaction at hand. In other words, the individual still remains the primary unit of investigation and everything else remains in the background. In essence, the main area of cognitive activities lies inside of an individual instead of the interactive plane between the individual and the larger

social setting. In such a scenario, an alternative to this individual centred cognitive psychology would be to adopt a different locus of Psychology which is deeply situated in the social context and which sees 'self' as playing a mediating and articulating role between the internal psychological processes and the social world. To gain some context here, a review of most of the major introductory textbooks revealed that of 36 textbooks, the environment was only mentioned in one of the definitions while "mental", "mind", "cognitive", or "experience" was mentioned in 34 of the 36 definitions (Dunwoody, 2006).

3.4b. The information processing approach: and exclusion of context and culture

For a very long time, cognition was understood as a purely 'mental' endeavour. The role of culture or any other external factor in cognition, for that matter, was considered futile researching into. The lack of consideration of other aspects of human behaviour apart from the purely 'mental' faculties, as propagated by the information processing approach, is incomplete in its appeal and results in a linear, rigid and narrow understanding of cognition. The role of environment and culture has always been specifically isolated from the study of cognition. In order to gain a complete appraisal of the working of cognition, there is a need to take into account several concepts as fundamental parts of the study of cognition. This section particularly aims at making a case for cognition being fundamentally cultural and thus any systematic study of cognition devoid of the effect of culture is considered incomplete. The well claimed idea that cognition is universal needs to be complemented by the cultural diversity of cognition.

The cognitive revolution that started to firm its roots form the 1960's is majorly characterised by the adoption of the information processing approach (Lachman et al, 1979). The main idea behind the information processing approach comes from the fact that it is possible to develop such theories that can describe the way in which information relating to overt stimuli and responses is represented and processed by human and nonhuman organisms. And further, this is done at varying levels of processing, say from high level plans to neural events. The approach makes use of a range of specific methods to evaluate the nature of the elementary units involved, the

operations that acting upon them when performing specific tasks. In fact, according to David et al (2004), the core reason behind the prominence and success of the field of cognitive psychology is this very approach, for most parts. Mainstream cognitive psychology's argument that human mind is better understood and described in terms of information processing helped the field to gain scientific legitimacy. And the incorporation of multi-level analyses and experimental tools made their case further stronger.

Despite the strong influence of this approach on the field of cognitive psychology, the approach was under constant criticism. For example, behaviourists have been one of the major critics of the information processing approach. According to Schlinger (2005), the cognitive revolution proved to be a major step backward. Despite the cognitive aspirations being admirable, its strong focus on only mental processes and constructs as its content of inquiry came in the path of psychology becoming a true natural science. Schlinger (2004) affirmed how a different strategy was needed in cognitive psychology, the one that would bring back the attention to the relationship of behaviour and its immediate contextual setting. But one of the most pressing concerns regarding the information processing approach to cognition is its conscious tendency to neglect the environmental factors that are a part of the cognitive realm.

Psychologists, and specifically cognitive psychologists, are at fault for continuously neglecting the role of culture in cognition. In this context, Triandis (1996), substantiates this point by showing how almost all the contemporary psychological theories are presented by the western world when in fact around 70% of the world lives in the non-western countries. He further adds that if psychology has to become universal in its appeal, it will need to draw upon data and theories from the majority of people. Cognitive psychologists approach their area of inquiry with human beings as the central unit of focus. This kind of neglect of external factors by cognitive psychology made way for the development of many theories of human thinking and behaviour and a set of rigid methodologies. But when the role of culture and other factors is acknowledged in these very theories and methodologies of human cognition, they become prone to losing their validity and are questioned on their fundamental assumptions (Cole, 1996; Medin et al, 2002; and Ross et al, 2003).

Brunswik, in his paper on "scopes and aspects of the cognitive problem", states that the discipline of psychology and especially cognitive psychology suffers from one major problem, that is, the problem of neglecting the environmental or ecological textures in favour of the organismic texture and structure (Brunswik, 1957, 2001).

Even if we consider the major theories of psychology, we'll find how most of them are organism or individual centric. According to Hammond (2001) and Brunswik (1957, 2001), there have been only two theories that explicitly talks of the environment: Brunswik's and Gibson's. Such lack of theories on environment leads to organismic attributions of behaviour that will change with experimental paradigms without a clear linkage between contexts. Then the resulting linkage amongst the organism, behaviour, and environment will remain limited to the chaotic changes in experimental paradigms as long as psychology keeps this asymmetric focal point on the organism (and not so much on the environment). Seldom is any attention stressed to the impacts of the experimental context on behaviour as it is covertly believed that the final goal is to learn about cognition, which resides within the organism. Later, when a different experimental procedure produces different results, theories of cognition are modified. What still remains missing from the very beginning is the systemic focus on organism-environment interaction that Brunswik advocated many years ago. Yet mainstream cognitive psychology failed to acknowledge the importance the environment holds in understanding cognition.

According to Gutches and Indeck, there exist "differences in the ways that people from different cultures perceive the world around them" (Gutches & Indeck, 2009). For instance, people from western societies generally pay more attention to that which is object-based and has a sense of relevance for them. On the other hand, "people from eastern cultures tend to focus more on contextual details, similarities, and group-relevant information" (Gutches & Indeck, 2009). Such varied patterns of perceiving the world makes a case for the role of culture in processing information from the environment. In fact, to make a stronger case for the role of culture in the field of cognitive psychology (taking the case of memory research), it has been substantiated that a lot of researches are taking place in this area. For instance, studies have now begun to explore the contribution of culture to long-term memory (for example, Gutchess et al., 2006b), and a few studies have also started to explore the effects of

culture on neural processes that contribute to memory (for example, Goh et al., 2007; Gutchess et al., 2006a; Hedden et al., 2008).

To conclude, the idea of cognition that sees human brain as something which is grossly separate from the world is a sad state of affairs. It implies that the mind is a passive receiver of empty, meaningless causal signals from the environment that exists outside of one's mind. More attention needs to be given to the fact that the individual is the locus of mental activity, not the brain. And that mental activity presupposes the existence of social institutions; therefore, it is only imperative to study the two together and not in isolation. This insight leaves us with the question whether the goal of mainstream cognitive psychology is to understand cognition or to maintain a scientific demeanour. Because if the actual goal is to cater to the idea of cognition, then the exclusion of that that was just discussed raised serious concerns regarding the approach with which cognitive psychology is pursuing human cognition. The next section is a more detailed account of this ambiguity of the role of cognitive psychology.

3.5 Navigating 'the goal of understanding cognition' and 'the desire to be scientific'

Having discussed the major ideas of some of the pioneers of the field of cognitive psychology, we are now in a position to reflect on the kind of cognitive psychology that was emerging. If we take the respective central ideas of these thinkers, we get a rather holistic approach which might be efficient in catering to the phenomenon of cognition. Especially, all the pioneers (mostly) were firmly rooted in a context based study of cognition rather than a purely mechanical one. And even whilst working on the computational model and heavily laboratory oriented set-up, they acknowledged the drawbacks of such a system and thoughtfully offered suggestions against those drawbacks and hence embraced the role of socio-cultural factors in the study of cognition. The major objective of these pioneers was much broader and relevant than today. They were aiming at knowledge expansion and understanding the dynamism of science. They were not looking at the functioning of cognitive psychology as something operating in a vacuum. The means of achieving these objectives may have

been problematic but the larger goal was still more accommodating and inclusive. The means of achieving this was an undying effort to become a natural science because that is the only way the field could get a legitimate standing amongst all other systems of knowledge. But this attempt to become a natural science was seemingly obvious and probably the only choice, at that time. But despite this, the field of cognitive psychology was still more inclusive. It is reflected in the viewpoints of these pioneers who propagated that the study of cognition is incomplete without taking serious insights from other disciplines like linguistics, sociology, biology etc. because cognition as a phenomenon is also studied by these very disciplines, for example, linguistics (Lakoff and Thompson, 1975), biology (Goodwin, 1976, 1977, 1978), sociology (Cicourel, 1973; Nowotny, H. and Schmutzer, M., 1974) and anthropology (Colby, 1975). Understanding cognition was never supposed to be done by staying within the strict disciplinary boundaries. Even if it was, the resulting understanding was most certainly incomplete.

Since the major theme that runs throughout the present work lies in exploring and understanding the notion of science which the discipline seeks to acquire, it is important to talk about the same in the context of cognitive psychology and that is also one of the major objectives of the present research. It is fairly evident by now how the term 'cognitive' or 'cognition' seemed pretty interesting and 'fancy' to a lot of investigators from varied number of fields. Therefore, it is only valid to question as to where this term acquire its superiority and power from which enables it to inspire so many. This interest in 'cognition' also raises an important question, especially for the discipline of psychology, that whether this new revolution was meant to improve upon an understanding of the mind and its process or this revolution was just another attempt to make the discipline appear more scientific. In other words, are we trying to study cognition or just climbing the scientific ladder further up while moving from empiricism towards rationalism. To throw some light on this, the next section brings about a discussion on the current status of cognitive psychology and some of the issues which is resisting the field in understanding cognition and what eventually remains is pretence to become a natural science without dealing with the basic idea of cognition.

3.5a. A cognitive psychology devoid of the philosophy of science: Some implications

As mentioned in the beginning, cognitive psychology boasts of a scientific demeanour which is inherently superior to the rest of the subfields. This may be attributed to 'mental processes' as the field's core area of study or the methodology which is used by following a strict scientific ritual. Psychology has always sought to adopt a scientific status; natural science. So much so that the field derived its legitimacy only by being a natural science and mould itself according to the requirements of natural sciences. But a major concern which arises from this is whether cognitive psychology is actually concerned with the question of science or is it creating a facade of appearing scientific without dealing with important scientific assumptions and questions. This brings us to the question of perceived irrelevance of philosophy of science in the discipline of psychology; especially cognitive psychology. A discipline that always desired to acquire the scientific status of a natural science should ideally keep up with the advancements in the realm of 'science' and should ground itself in its core philosophical assumptions. It can be said that the very conception of science held by psychology is at odds with the subject matter it seeks to comprehend, and thus multiple conceptualizations of both science and psychology exist (e. g. , Cole & Arnold, 1976; Koch, 1959). "The division on this issue lies between those who make a commitment to some conception of existing science first and then turn to their area of inquiry armed with the criteria of science as filters, and those who first make a commitment to approach human phenomena with fidelity and either ignore the question of scientific approaches or belatedly adopt some procedure of scientific method, which then leads to the same difficulties. Few, however, question whether existing science is appropriate for the study of human psychological phenomena, and many historical reasons exist for raising that question" (Giorgi, 1970).

Any body of knowledge should ideally be concerned with the question of philosophy of science. For Mey, the reason being that "it is the philosophy of science that seeks to support and to justify science's claim to genuine knowledge by a theoretical analysis of its methods" (Mey, 1982). Philosophy of science is capable of claiming a special status owing to the special nature it attributes to scientific

knowledge as superior knowledge. And this special nature is essential for justifying its existence as a separate discipline. Philosophy of science seeks to expose the underlying presuppositions that structure important practices and functioning of any discipline. It subjects the structure of an activity to critical examination and makes us think why we are doing what we are doing. It keeps a check on the goals and agendas of any field of inquiry by critically reviewing the methods and procedures by which those goals and purposes are acquired. In doing so, it attempts to provide an improvement of the procedures involved and thereby improving the field of inquiry. These concerns are crucial when a body of knowledge portrays itself as a scientific body because it important to address questions regarding the nature and characteristics of the knowledge that is produced, presented and validated.

Having said this, it is only legitimate to seek an inquiry into the area of cognitive psychology by taking insights and justifications from the philosophy of science. the methods used by the field, the theoretical grounding and the field's core assumptions are to be in some sync with philosophy of science and specially when the field of cognitive psychology has always tried to become a 'scientific' field. Failing to do so only strengthens the doubt that exists regarding the actual aim of cognitive psychology; to become merely scientific or to understand cognition. In this regard Koch (1992) observes how cognitive psychology has a tendency to stick to the idea of binding to the 'rules' that even the role of the organizer is seen as meagre. And more importantly, the tendency to then adhere to those rules so rigidly and blindly that a particular behaviour is taken out of its context completely and treated as if that is the natural way of its occurrence. There is also a great level of reluctance on the part of the cognitive psychologists to re-analyse or re-think their work. And that is why there is no regard given to the basic philosophical assumptions guiding the field and also no concern for analysing if the methods adopted to study cognition are even sufficient to study cognition, completely or there is in fact a need to broaden the horizon and rethink the same methods. These are some of the basic issues the field might need to negotiate in order to gain a complete understanding of the phenomenon of cognition.

3.5b. The cognition-emotion dichotomy

The majorly held view prevalent in the field of cognitive psychology is that, at least until recently, emotion and cognition are separate systems which rarely interact for their respective functioning. Due to the work done in the area of behavioural and neuroscience, the past few decades have witnessed a shift in this view and results of these studies have showed the interactive and integrative relationship of emotion and cognition. There are many topics that were usually studied only in the context of 'cold' cognitive processes (for example, decision-making and memory). The very same topics are now studied acknowledging and catering to the rich interplay of cognitive and affective processes. Although many contemporary psychologists do acknowledge the role of emotion in cognitive processes, comprehensive research work in the area is still very limited (for instance, Zajonc, 1980). Important books on cognition (Anderson, 1976; Estes, 1975-1978; Neisser, 1967) have barely mentioned the topic of emotions or feelings. To bring in the aspect of affect into the study of cognition, the idea of hot cognition' was introduced, so that cognition is better understood. As a result, in an otherwise 'cold blooded' tradition of cognitive science, the idea of hot cognition (Abelson, 1963) became a major humanizing counterstatement during the mid 1960s and early 1970s.

According to Zajonc (Zajonc, 1980), the importance given to affective processes in the study of cognition is way too less as compared to the importance these processes actually hold in our lives. The guiding metaphor for much of cognitive psychology has been the 'brain as a computer'. This kind of metaphor leaves very little scope for emotion barring as a "disturbance in optimal cognitive functioning or as a signalling system that accompanies action and experience" (O'creevy and Soane, 2011). In cognitive psychology, thinking has been understood as separate from feeling and the role of emotions was thought to be better left to other disciplines or poets and writers. In a review of research regarding the relationships between emotions and cognition, Phelps (2006) concluded that "exploring and understanding the role and importance of emotion is critical to understanding human cognition."

Although the trend is now changing and we see cognitive scientists taking heed of the role of emotions in contemporary research, their importance in the forefront of cognitive psychology literature is still emerging. Minsky (1986) stated that the question is not merely of whether intelligent machines can have emotions or not. The real question is whether the intelligent machines can be intelligent without emotions or not. The tendency to regard emotions as separate from thoughts is not beneficial. In fact, they are always inter-related and should be regarded as "various types of thoughts, each based on a different brain-machine that specializes in some particular domain of thought" (Minsky, 1986). But still most of us tend to perceive the two differently. The prevalent view holds that emotions are infused with feelings of pleasure or pain and manifests themselves in readily discerned changes in the body. Cognition, on the other hand, mostly appears devoid of such hedonic, motivational, or somatic features. These perceived differences in the experience and physiology led many thinkers to see emotion and cognition as totally different mental faculties (For example, de Sousa, 2014; Schmitter, 2014). But contemporary theorists are critical of this claim and deny that the existence of emotion and cognition is categorically different (For example, Damasio, 2005; Barrett and Satpute, 2013; Pessoa, 2013). This change can be attributed to the recent imaging evidence demonstrating the overlap of emotional and cognitive processes in the brain (for example, Shackman et al., 2011). The human brain should not be treated like it was evolved to optimize performance on laboratory measures of 'cold' cognition or to give in passively to the experimental manipulations of emotion. It only makes sense to find it reasonable that emotion and cognition are highly intertwined. "Our brain is the result of evolutionary pressures that demanded neural systems capable of using information about pleasure and pain, derived from stimuli saturated with hedonic and motivational significance, to adaptively regulate attention, learning, somatic arousal, and action" (Singer et al, 2015).

To conclude, addressing the interaction of emotion and cognition is an issue of theoretical as well as practical importance. It is needed that emotions are considered an integral part when it comes to understanding human cognition. Rather than being seen as something which disturbs the 'thinking' process, there's a need to see them as

something which is a part of that process. There is a need to look beyond the theories of 'pure' cognition and make way for the interplay that attention emotions might offer.

3.6 The Changing face of science: reflecting on the progression from traditional to mainstream cognitive psychology

The section above discussed the idea of cognitive psychology which some of the major thinkers and founding fathers of the field envisioned. Then a brief overview of the major approaches which the standard cognitive psychology incorporates is discussed. Our aim now is to see through the larger implication of their ideas for the production of scientific knowledge. When these pioneers were coming up with their respective understanding of the field of cognition or cognitive psychology, keeping it under the realm of scientific knowledge was a crucial concern for them. What kind of scientific knowledge it was? Any field of enquiry is considered scientific through some parameters characterising that field. According to Denziger (1990), for instance, what makes a field scientific can be attributed to many things; main contributors of the field, major theories of the field or important findings of the field. Overtly or covertly, there are some prominent aspects of every field which contributes in setting its scientific pace more than other aspects. If we consider the contributions of the individual thinkers in the field of cognitive psychology, we can gain some insight about the organization of the field, both in terms of their vision of the field and also their views about creating a scientific field of enquiry.

It is crucial to understand the goals of scientific knowledge of any kind in order to make a commentary upon the scientific knowledge produced by the field of cognitive psychology. To achieve this, it's important to take insights from the discipline which is dedicated specifically to the study of 'science, that is, philosophy of science. Philosophy as a discipline concerns itself with the fundamental problems which are essential for human activity. It deals with the question of nature of knowledge, nature of reality, the meaning of life and similar queries which are crucial to human existence. Similarly, philosophy of science is the attempt to answer many such fundamental questions about science.

Since the aim here is to examine the scientific approach of the field of cognitive psychology which the pioneers envisioned, it is crucial to first understand the basic aims of 'science' itself. It is crucial because any body of knowledge produced under the name of scientific knowledge must adhere to the basic goals of science. If cognitive psychology calls itself a scientific discipline, it is only obvious that it is fulfilling the goals of science through the scientific knowledge it is producing. One of the most important goals of science is to produce such knowledge which provides a true account of the world (Gorham, 2011). This aim is known as what is called 'scientific realism'. Scientific realism is either understood in terms of the truth of scientific theories or the successful reference of theoretical terms to things in the world, both observable and unobservable. The core idea of scientific realism entails that there is a commitment to the idea that the best theories have a certain epistemic status and that they yield knowledge of aspects of the world, including unobservable aspects. In simpler terms, science aims to produce the true description of the world. But most psychologists who consider themselves scientific are probably not interested either in philosophical disputes about realism, or in ontological matters (Mackay, 2011). Realism is often assumed to be an inherent part of the scientific approach they are adopting and therefore is not considered worth examining into. But for theorists like Neisser, Bruner, Vygotsky etc, the issue of scientific realism was understood in sync with the disciplinary progress. Epistemological questions like the nature of knowledge were tried to be dealt with, if not successfully achieved. Understanding cognition was about improving upon the body of knowledge regarding how we get to know about anything. Studying cognition was a part of the larger meaning making system about the world, rather than assembling some theories together without dealing with the question of knowledge creation which is socially situated.

The pioneers of cognitive psychology saw the production of scientific knowledge as essentially rooted in the larger social context and thus, understood the inherently social nature of science. Scientific thinking can be seen as an essentially human (social) activity rather than an individual centred endeavour. Science does not and cannot exist outside the context of society. Science by the virtue of being a human endeavour relates to the interactive areas of how science and society are related to each other and how they influence daily lives. For instance, Neisser (1976) expressed his worries about "the exclusive emphasis of the field of cognitive psychology on

computer modelling and information processing through laboratory experiments. In this regard, he challenged cognitive psychology not to confine itself to the laboratory and rely on computer modelling, but move to the real world problems and study how people act or interact in a contextual setting" (Neisser, 1976). Since the aim was not to adhere to the prototypical scientific model but to be scientific in its true sense; to build upon the knowledge system. This was the major reason Neisser became dissatisfied with the well-acclaimed information processing model and laboratory experiments very soon. Of course, the wave of computational-ism and reductionism was seeping into the cognitive revolution right from the beginning and the information processing approach provided new models and theories which could be used in framing scientific theories of any cognitive task, cognitive psychology was still a little isolated from the full-blown computational theories of cognition. For instance, Neisser's 'cognitive psychology' (Neisser, 1976), adopted a flow chart approach to depict the tracking of information through various processes and compared the psychologist's task to that of discovering the 'program' for human cognition. But "Neisser was still sceptical towards treating programs as models of actual psychological processes in which the computational steps in a computer are compared to fundamental psychological processes themselves" (Hatfield, 2002). Hatfield further affirmed how the majority of psychologists at that time did not fully join the cognitive revolution movement, neither was the computational model of cognition was holistically accepted.

Most importantly, the pioneers of the field of cognitive psychology realised the role of science as an inherently social enterprise. This view was reflected in the vision of the cognitive psychology that they had in their minds. Their focus on staying close to the natural environment was a major priority even if the field was incorporating the rigid laboratory methods. There existed an amalgamation of the social responsibility and the responsibility of the discipline's desire to be scientific. But as the field progressed with time and also in terms of their practices, this realisation that science is essentially a social activity was somewhere compromised upon. And its social practice of investigation became increasingly attached with its claims to scientific status (Denziger, 1990). This practice led the field of cognitive psychology to approach an experimental method instead of a historical one. According to Denziger, the psychological experimentation has a rich historical grounding along with a social

structure which can be analysed. This institution is part of the history of those societies that contributed in producing and therefore would carry some markers of the past and its influence. Therefore, to improve our understanding of the accepted social framework within which individual participants in psychological experiments function, it is crucial to adopt a historical rather than an experimental approach. For neither experimenters nor the research participants experience the investigative situation as social blanks to be programmed in an arbitrary manner. Both are the products of a distinct historical development that leaves a heavy residue of blind faith and unquestioned tradition. Danziger (1990) further asserts that "psychological research is not something that is practiced by individual investigators working on their own account; nor are its social components limited to the interaction between investigators and the human sources of their data". In making their experiments and publishing them, researchers should be wary of the acceptance of their work to a particular public domain. This acceptance is defined by the degree to which the work that is being produced reflects the contemporary ideals of scientific knowledge. This implies that formal socialization of the researchers is not influencing the way the larger public views the production of scientific knowledge. What this means is that the scientific community is thoroughly involved in the social practice of scientific investigation.

One of the most visible markers of the field of cognitive psychology as a scientific discipline is the use of a strictly scientific methodology, which may or may not be in sync with the subject matter of the field, at times. The individual, who is the core unit of analysis for the field of cognitive psychology, is very complex in its basic nature by the virtue of operating in a multi-dimensional socio-cultural context. The individual is constantly evolving in reaction to the changes occurring in the surrounding and is a thinking being than just a computational model. All this gave rise to a complex set of theories and assumptions to understand the human mind and individual as a whole. But what remained absent or compromised upon in the practice of a scientific cognitive psychology is the lack of complex enough methods to study the intricacies of human existence. What we need is not only these theories but also methods which address these very complexities and chaos of interpretive processes. In this regard, Blumer (1969) affirmed there is a need to respect the reflexive nature of the human subject and organize an appropriate methodological stance to reflect that

respect. What most of the times happens is the incorporation of a strict methodology available from ages ago and then a reflection on what all could be investigated with the available methodology. And this methodology also goes unrevised and lacks critical appraisal of any sort as the discipline hardly engages with the basic philosophy of science and its concerns. Such methodological aberrations made psychological theorising even narrow spaced and closed the possibility of doing things any other way. In this regard, Danziger (1988) in 'on theory and methods in psychology' states how methods in the field were treated nearly universally as 'theory-neutral' tools, the basic assumptions around which they were based would easily work as unrecognised theory based approaches for pre-defining the fundamental characteristics of the area under examination. The more strongly the requirements of a specific method were imposed, the more efficiently those ideas were removed from serious exploration that did not fit the underlying model. The discipline may well be in a situation which calls for being updated with the progresses made within philosophy of science as that is where we are borrowing our 'scientism' from, at least on the surface level. It is interesting how the implications of defining something as 'un-scientific' are much clearer than defining what 'scientific' is, at least in the discipline of Psychology. The idea is that if the current philosophy of science as used by the discipline of Psychology does not contain a satisfactory model, the need is to find a refined one. If it does, the need is to make its presence more explicit so that its applicability can be seen (Westland, 1972). Therefore, the field of cognitive psychology may in fact be asking for some serious reconsideration with respect to its approach, method and more importantly its subject matter in order to approach human cognition more closely.

Building upon this need to revise the basic tenets of the field of cognition, the next chapter is an attempt to envisage a broader and a fundamentally radical (in relation to the mainstream cognitive psychology) conception of the human mind and human cognition. The chapter would call for this broader approach to cognition using various knowledge perspectives which provide a fresh and accommodating view of the human mind and its cognitive potentials.

Broadening Cognitive Psychology:
Reflections on some alternatives

4.1 Introduction

The previous chapter discussed the idea of cognition and what it meant for the pioneers of the field of cognitive psychology. This was done by tracing the historical background of the cognitive revolution that emerged in the very beginning and talking about the central ideas about cognition held by the pioneering figures of the field. Then the scientific notion with which cognition was conceptualised by the pioneers was reflected upon. This reflection was followed by a description of the major trends and practices of the mainstream or standard cognitive psychology whilst commenting upon the scientific status of their approach towards understanding cognition. In this way, the chapter tried to trace the changing understanding of what it meant to be 'scientific' while pursuing the study of cognition by the discipline of Psychology. All of this discussion led to the question of a holistic understanding of cognition which seemed to be lacking in the standard theorisation and practice of cognitive psychology, as pointed out through various inadequacies in the field of cognitive psychology. Now that such inadequacies are discussed in detail, it is only imperative to further ponder upon some of the alternative ways of 'doing cognition' as well as theorising cognition. Thus, the current chapter aims to discuss some of these alternatives which are not a very intimate part of the current trends of cognitive psychology. Such alternatives would be discussed which makes the field of cognitive psychology more inclusive of the larger socio-cultural set-up and one which is responsive to the human reality as opposed to a mechanical one.

The term 'alternative' in the title of the chapter may run the risk of expressing an idea which implies a complete scrapping of the current practices of pursuing cognitive psychology. But in actuality this is not the case. The goal of the current chapter is to further broaden the horizon of the study of cognition by moving beyond the overly generalised computational model. The idea is to look beyond what the human mind is beyond the computer metaphor and thus to offer alternative views of the human mind which talk about the mind in a new, more inclusive and holistic manner. To shake and develop upon the unitary existing understanding of the human mind (and thus cognition) is the major rationale behind presenting these alternative views of pursuing cognition. The chapter tries to provide insights into three main alternatives, namely 1) the social constructionist approach to cognition 2) Embodied cognition and 3) self-referential cognition. Although in isolation these concepts may be well developed, their inquiry in the context of cognition is still in progress. Due to this the accounts of these alternatives, in the current chapter, are in the beginning phase and offers a lot of scope to grow up as independent conceptualisations of cognition.

But before beginning a discussion on these alternative conceptions of cognition, some reflections about the inadequacy of the long running computational metaphor would be highlighted. This reflection leads us to the following section:

Implications of the computational metaphor and the need for more holistic, inclusive and humane metaphors

All academic disciplines contain a range of terms and words that are considered the language of that particular academic community. This language eventually evolves and develops within disciplines to communicate particular ways of seeing and thinking specific to that subject. Along with the development of the language, the discipline grows in a particular way too. In a way, the language used within a discipline helps guiding the progress in that discipline. The phrases, the metaphors, the style that is used within a particular disciplinary socialisation is indicative of the discipline's underlying assumptions and practices. Therefore, it is only reasonable to pay attention to the kind of language a field of inquiry adopts, the kind of metaphors that are used and the kind of sentences that are formed.

Attempts have been made to understand the human mind since ages. And metaphors from technology have come to be known as the most important ones and consequently are widely used. Different metaphors were used before the computer metaphor also. For instance, in ancient Greece, the brain was a hydraulic system, pumping the humors. Similarly, in the 18th century, the philosophers drew inspiration from the mechanical clock. Early neuroscientists saw neurons as electric wires or phone lines, passing signals. And all this gradually led to the widely used computer metaphor. Recent work in cognitive linguistics has demonstrated that metaphors play a very important role in science and in cognition more generally (For example, Lakoff and Johnsons, 1999). Metaphors form an inevitable part of our meaning-making systems, especially when it's about describing things we are not capable of seeing, such as the human mind. Metaphors give us the ability to speak about things we do not understand as if they worked like the things we do understand. Metaphors are a powerful aid to understanding, but they can sometimes also lead to distortions, errors. It is very important to pay attention to the kind of metaphors that a field of enquiry incorporates. Since the metaphors used have the potential of guiding the disciplinary path, and it helps in shaping the disciplinary identity, a metaphor assigned to something becomes attached to it and is difficult to untie.

When we think of the brain, the most common metaphor that comes to the mind is the computer, which is a result of the computational or the information processing model of the brain. The metaphor of the "brain as computer" was fully embraced by the emerging field of cognitive psychology by the 1980's, and this metaphor continues to dominate our thinking of human cognition even today, probably with a greater intensity. So much so that it has now even seeped into the popular culture and become a part of our everyday vocabulary. This metaphor implies that the brain is hardware and the mind is software. The mind is essentially an "information processing," device and our individual agency varies only in terms of its speed and memory capacities. It is due to this reductionist metaphor of the brain that brings us to comment on the inadequacies and limitations of the same and to ponder upon the need of more inclusive and holistic metaphors of understanding human cognition. Reducing the human brain to a computer has implications which usually go unnoticed by the mainstream cognitive psychology. For instance, a person with any mental disorder would be forced to believe that something is wrong with the hardware of his

or her brain and the sole responsibility for it lies within the person's brain. This kind of metaphor usage completely ignores the role of the various external factors which are responsible for such disorders; for instance the role of society in depression. Further, computers do not have the ability to feel or show emotions. And this is one of the reasons why mainstream cognitive psychology has been neglecting the role of emotions as it does not fit under the mechanical computational metaphor. The computational metaphor grossly simplifies the individual differences as all computers work in the same way and process information in identical manner. Computers are not creative because they do what they are programmed to do. They are unable to build knowledge as they merely process the knowledge put into them. Computers are not active in that sense.

In order to expand upon the understanding of human cognition, and if the metaphors used are so important in it then it's only reasonable to pay attention to these metaphors and how they are used. The computational metaphor provides a very simplistic version of the rich contextual system in which the human brain functions. In fact, the computational metaphor completely neglects any such contextual setting and thus the role of the larger socio-cultural set-up goes unnoticed. Maybe it's time now to go back to what Piaget viewed of the human brain as: an evolving organism. There's a need to create new metaphors for the brain which are holistic and inclusive in their appeal and appreciate the societal context in which the human is functioning. A metaphor which is not static or fixed like the computer metaphor as the human brain is far from being a static entity. Rather, it is constantly evolving, changing and transformed into something more complex and diverse. Using a computational metaphor only limits the understanding of such rich complexities of the brain. Also, since humans live in a relational world, the human brain is automatically sensitive and responsive to the larger socio-culture set-up. The human brain should be seen as constantly adapting and in a state of dynamic equilibrium.

Changing the 'sticky' computational metaphor is not an easy task. It has a strong scientific and theoretical backing and more importantly, the use of information processing related language is so deeply ingrained in the vocabulary of cognitive psychology that it is practically impossible to do without it. Therefore, unless a robust

alternative is researched into, the computer metaphor is going to become more and more mechanical.

And now that we have some more understanding regarding the computational metaphor and its implications for the larger organization and understanding of cognitive psychology, the subsequent chapters would bring the focus back on the potential alternatives to broaden the understanding of human cognition. As discussed earlier, the three main perspectives which are going to get discussed in this chapter are: the social constructionist approach, embodied cognition and the role of self in understanding cognition.

4.2 The social constructionist approach to cognition

The social constructionist approach has been developed by eminent educationists like Kenneth Gergen and John Dewey. The central idea as propagated by the social constructionist approach that knowledge construction happens on a socio-interactive plane and the role of social processes is crucial in the in such an interaction (Gergen, 1985). The social constructionist approach derives its agency from social consensus which is deeply embedded in the social interactive process. If absolute knowledge is what we are seeking and if the knowledge has to hold true universally, it must be in sync with the larger societal agreement and have to be efficient. In this sense, a functional and efficient knowledge is the one which would lead to a feasible knowledge structure (Teague, 2000). According to Gergen, the social constructionist approach is understood as "a perspective which believes in the assumption that most of the human life exists as it does because of various social and interpersonal influences" (Gergen, 1985). While this approach focuses on the influence of social interaction, it nowhere states that the role of genetic structuring and its manifestation is not important. Rather it chooses to focus more on examining the effect of society on the individual's collective and personal life. This shared societal aspect of all that is psychological is the area of interest in social constructionism. Two very distinguishing markers of the social constructivist approach are 1) refutation of the fundamental givens regarding the human mind and its assumption regarding causation; 2) focus on the complications and interconnectedness amongst people of a

particular community. While, the factor of causation can still exist in particular cultures, nothing concrete can yet be said regarding such a connection as the evidences are not enough (Owen, 1995). If we look simplistically, the social constructionist approach is about challenging most of the already acquired commonsensical knowledge related to individuals living in a relational world. This implies that it does not have a lot to do with changing the method of analysis; and offering a new one which can be then accommodated in the existing framework. It is about altering this very framework altogether which would then lead to a fundamental change in our perception of the socio- psychological life (Burr, 1995).

The social constructionist approach rose to prominence as a distinct theory based movement that presents a different philosophical grounding to the process of constructing the reality and development of knowledge. It deals with the historical grounding of the knowledge systems within various values and belief practices in different cultures. This approach asserts that the process of meaning making happen through social constructions and by people coordinating amongst themselves in their daily activities and thus is mostly in an active state(Gergen & Gergen, 2012). Owing to a post-modernist coherence, the "social constructionist approach provides a critical review of some of the major assumptions about knowledge production, such as individual rationality, empirical evaluation, language, and the narrative of progress" (McNamee & Hosking, 2012). According to social constructionism, individual thinking only does not lead to his/her rationality. Rather, individual thinking is a result of some culture specific norms. The rationality is reached at through individuals coordinating their actions amongst themselves. This statement provides for a range of methods for investigating the production of knowledge and focuses on relatedness and creativeness which promotes involvement and change. Similarly, the empirical method is not considered as giving the ultimate version of reality. Instead, it is seen as an occurrence conceptualised and looked into by some theories and a set of specific methodologies (Galbin, 2014). In essence, this constructionist invitation aims to make explicit the aspects of the reality that we usually take for granted when in fact they are a result of social constructions. This kind of acknowledgement would make space for an array of possible alternative sensibilities. In terms of methodology, the larger agenda of this approach is not to present 'the correct' explanation of an event; but to expand upon the horizon of understanding.

With this background of the social constructionist approach, its discussion in sync with the area of cognition would now be appropriate. The social constructionist approach can provide a robust alternative to approach the issue of human cognition. An alternative which would be inclusive of the role of context and culture in the study of human cognition and more importantly would provide a fundamentally refreshing view of understanding mind and it's working. If the most prevalent views about cognition are to be considered which are held by the mainstream psychologists, we can see how most of them agree on some basic assumptions. To begin with, almost all of them would be in agreement regarding the existence of fundamental cognitive processes as universal and that they function in more or less the same manner irrespective of the substance they work upon. Further, it is assumed that the basic learning processes mostly give a developing child all that is required to make sense of the world around. The substance is provided by these cognitive processes acting on the environment. Finally, the assumption according to which content of the human mind across cultures is variable owing only to the differences in social, political and economic milieu (Nisbett &Norenzayan, 2002). This kind of endorsement of a formalist and universalist position on cognitive processes was, to some extent, a result of the growing analogy between the human brain and computer system (Block, 1995). While this kind of analogy encouraged the universality assumption, at the same time it also discouraged any other assumption that would leave some scope for the cognitive procedures to be altered or broadened. For example, the heuristics and biases movement by Kanheman and Tversky in 1974 promoted the approach that actions like 'judgement of probability' by representative heuristics and 'judgement of frequency' as showed by the availability heuristics are uniform across cultures and thus are difficult to change (Nisbett &Norenzayan, 2002).

The mainstream cognitive psychology gives a centre space to one basic processing unit of cognition, that is, the human brain or mind. In fact, the major theoretical stances in the mainstream cognitive psychology presume the existence of a central processing device and this processor transcends all the things upon which it operates. It is assumed that it is this core processing unit which engages all the cultural, contextual, text related and stimulus driven material as its content (Shweder, 1991). Such an assumption along with the others discussed above leave enough scope for critically reviewing them as there exists numerous points of contention towards

the widely held view that cognitive content and processes are universal and that the differences in cognitive processes are only due to various socio-political variations (Nisbett & Norenzayan, 2002). While in reality, it is this 'universality' of the cognitive content which places constraints on human diversity of thought and the range of cultures possible. And the differences in culture amongst various cognitive processes are often too tightly linked to the differences in culture in the fundamental presuppositions regarding the characteristic of the world that the line between the substance and processes tends to become a little random. Thus, what might serve as an alternative understanding is that both practices of the culture and cognitive processes, in a way, make up each other. Culture specific activities work at promoting some cognitive processes, which, consequently, disseminate the culture specific activities.

The beliefs and ideas that cultural practices and cognitive processes feed into each other did not emerge suddenly. This acknowledgement was in fact present from the longest time within the discipline, however only in fragments. To take one example, Wilhelm Wundt believed that the human psychology is not possible to comprehend by the incorporation of plain laboratory practices. And that it is important that the cognition related processes examined in the laboratory setting are complimented with substantiated data from disciplines like history and linguistics. This is due to the fact that Wundt also trusted that divergence in historically rich cultural context would automatically lead to a divergence in the cognitive processes also. Wundt said that "Folk psychology's problem relates to those mental products which are created by a community of human life (e.g., language, religion) and are, thus, inexplicable in terms merely of individual consciousness, since they presuppose the reciprocal actions of many. Individual consciousness is wholly incapable of giving us a history of the development of human thought, for it is conditioned by an earlier history concerning which it cannot in itself give us any knowledge" (Wundt, 1916). Therefore, to say that some substance is biologically rooted and to say that some cognition related processes are flexible is something which is not a stranger to the history of the field of psychology. Similarly, Vygotsky affirmed his belief in this idea of deep connectedness between cultural practices and cognitive processes. According to him, all psychological functions manifest on a dualistic plane; the social and the psychological. Before appearing within an individual as intra-psychological category,

it appears between different individuals as inter-psychological category (Vygotsky, 1978). Therefore, the interplay of cultural context and psychological processes has always existed in within the discipline and it only makes sense to bring back the focus on it while exploring the broad area of cognition and hence understanding it from a social constructionist perspective.

In order to appreciate the social constructionist approach to cognition, it is important to enrich our understanding of the key elements involved, that is, the interaction of culture and cognition. The discipline of psychology has come up with many concepts that cater to this interplay between culture and the content of thought through some shared knowledge structures. For example, the concept of 'schema' helps generating such knowledge structures that guide our thought process through selective attentive and retentive processes and incorporation of information regarding a specific part of the surrounding. These schemas may reflect different individuals, circumstances, and also a series of actions and thus rooted in a particular context. In this context, D'Andrade has objected how most cognitive psychologists talk of cognition related processing as though these cognitive schemas are accessed in absolute separation in relation to the cultural context (D'Andrade, 1981). D'Andrade further conceptualised a concept called 'cultural schemas' to address this issue (D'Andrade, 1984; 1995). These cultural schemas refer to the structures of fundamental schemas which help in the meaning making scheme of a particular cultural community. And the cultural schemas which are inter-subjectively pooled are termed as "cultural models" ((D'Andrade, 1995; Holland & Quinn, 1987; Shore, 1996). These cultural models guide the manner through which individuals examine their unique experiences and further their actions across a broad range of life spheres. Schank and Abelson in their work on cultural models have talked about script learning as though script learning occurs in isolation. Moreover, learning of the scripts make use of the 'institutionalized' knowledge; a knowledge which one is supposed to know (Schank & Abelson, 1977). In this regard, Katherine Nelson affirms, "Without shared scripts, every social act would need negotiating afresh" (Nelson, 1981). The concept of schema and especially cultural schema tried to make a case for the non-universality of the cognitive content and thus critically reviewing the very basic and widely held view by most cognitive psychologists.

Mainstream cognitive psychology talks of an agentic individual which is constantly evolving. And the field's focus on the inward world of the individual rather than the outer world makes only this inner complex system responsible for changes in individual cognitive development. It is only imperative to understand the genesis and development of this agentic individual and to see to what extent this view helps in understanding human cognition. The social constructionist approach, as an alternative approach to cognition, helps in providing some insight in the regard. The fundamental theoretical strength of the social constructionist approach lies in the fact that this approach presents a possible explanation for how individualistic psychology emerges in an organised manner, in the very beginning (Martin & Sugarman, 1996). The focus that this approach lays on the everyday conversational and other similar practices while talking about the origin of psychological phenomenon assists in exposing the root of this very emerging and agency based individuality which requires only a collection of primordial neuro-physiological abilities to perceive and function in the context of a particular lived reality(Martin & Sugarman, 1996). This approach provides a fundamentally different approach to cognition as compared to the standard view which attributes major importance to the person in its all round psychological growth thereby offering an atomistic view of cognition.

Despite the fact that standard cognitive psychology has started to talk about the role of societal context in human cognition, its major theoretical conundrum is its inability to propose a decent explanation which causes individuals to be able to share a massive amount of information on a social plane. Further, there is no explanation by the standard cognitive psychology on how people are capable of understanding and managing their individual activities in a collective space. This highly individualistic approach of human cognition as held by the mainstream cognitive approach raises questions regarding this very complex synchronization and organization amongst normal humanly interaction. Considering the highly individualistic and self-sufficient image of the cognitive processing, the existence of such social dynamics is indeed begging for answers. Social constructionism provides answers to such questions by means of re-surfacing the general societal foundations which guide our psychological thought processing and growth. It makes us acknowledge that the individualistic approach to cognition is essentially embedded in a shared sociality of conversational

inter-relational activities. And these activities are in constant reproduction and promotion by the individuals of a particular cultural context.

4.3 Embodied Cognition: Cognition beyond brain

This section tries to expand upon the existing approach to cognitive psychology with the purpose of giving new directions to the field of cognitive psychology which would address some of its limitations and inadequacies. Keeping this in mind, the embodied cognition approach can be seen as the next big step in the evolution of standard cognitive science. The origin and idea of the human cognition is known to reside specifically (and in isolation) within the human brain, according to the standard cognitive psychology approach. The approach of embodied cognition tries to counter or more appropriately, expand the understanding of cognition through situating it within the human body as well. For the sake of initial understanding, the approach of embodied cognition can be understood as an emerging cognitive movement which "gives the physical body a fundamental role in moulding the mind" (Wilson, 2002). If we reflect on the logic of this rather new approach, it would make sense how the study of only the brain in order to understand human cognition is incomplete in itself. To fully understand the process of cognition, what becomes important to realise is that the genesis of cognition is never confined merely to the brain because it is also our biological bodies apart from the biological brains which move and act in the real life surroundings. Therefore, in order to present a broader and holistic understanding of cognition, the exploration of embodied cognition seemed like a necessary and useful enquiry as a robust alternative and extension to the standard view of cognition.

The beginning of formal enquiry into the concept of embodied cognition can be easily attributed to the seminal work of Varela, Thompson and Rosch in 'The Embodied Mind (1991). Through this book, the three writers reject the idea of the traditional view of cognition as computation and instead offer a new understanding of cognition as 'embodied action'. In the process of doing so, they explain how treating cognition as an embodiment means two specific things 1) that cognition depends on various experiences emerging through a physical body equipped with sensory and motor capabilities, 2) that these specific sensory and motor capabilities also make a

part of an even encompassing physiological, psycho-cultural milieu. Here, the term action in 'embodied action' refers to the emphasis they want to lay on the fact that "sensory and motor processes, perception and action, are fundamentally inseparable in lived cognition" (Varela et al, 1991). These points definitely provide a refreshing view of cognition but one might wonder what kind of sensorimotor capabilities are being refereed to here. According to Shapiro (Shapiro, 2011), these sensorimotor capabilities seem to be referring to the capabilities which are required to interact efficiently with one's environment which would involve a rigid loop between perception and motion. Which means, as the organism moves in and around its environment, the motion hence produced will give rise to new opportunities for new perceptions while simultaneously removing the old ones. And in turn, the perception of new features will give rise to opportunities for newer activities. Therefore, what Varela, Thompson and Rosch seem to be suggesting is that the motion influences perception, which in turn influences future motion, which then eventually determines new perception and so on. The role of body is crucial in this process. A difference in the bodies of two individuals would lead to a difference in their respective perceptual systems too which would further lead to difference in their sensorimotor capabilities. And given these differences in the perception of different bodied organisms, there might be differences in their actions too, which in turn leads to further differences in perception, and then action, and so on.

With this basic understanding in place about the concept of embodied cognition given by Valer et al, we are now in a position to reflect a little deeply about this approach. As we know, the perspective of embodied cognition focuses on an idea according to which the act of cognizing includes an interaction between the larger environmental set-up and the individual body which is a part of that environment. This perspective proposes how "understanding cognitive processes involves understanding their close link to the motor surfaces that may produce action and to the sensory surfaces that provide sensory signals about the environment" (Schneegans & Schoner, 2008). In some senses then, "the embodiment standpoint provides a counter to the abstraction inherent in much information processing thinking, in which the interface between cognitive processes and their sensorimotor support is drawn at a level that is quite separate from both the sensory and the motor systems" (Schneegans & Schoner, 2008). In this regard, there is more and more an affirmation towards the

view which demands the investigation of the human mind with respect to the biological body which is in a constant interactive process with its immediate environment. According to Wilson (2002), there are evidences supporting the view that "we have evolved from beings whose neural resources were dedicated chiefly to perceptual and motor processing, and whose cognitive activity consisted largely of immediate, on-line interaction with the environment. Thus, human cognition, rather than being centralized, abstract, and sharply distinct from peripheral input and output modules, might just have deep roots in sensorimotor processing" (Wilson, 2002). With this basic idea about embodied cognition in mind, some basic tenets of embodied cognition can now be discussed to have a more comprehensive understanding.

According to Wilson (2002), there are some basic claims which are to be negotiated in order to gain a holistic and deeper understanding of the concept. Since these are just claims, their absolute correctness is still a negotiable topic and more evidence based work would direct the approach's rigour in the future. However, these claims form the foundation of embodied cognition and gives rise to cognition as a set of tools which is evolved through organisms for coping with their environment.

The first claim is that 'cognition is situated'. That cognition is a situated activity is a claim that has gathered a lot of evidences in support and is considered the foundation of the concept of embodied cognition (for example, Chiel & Beer, 199T7; Clark, 1997; Pfeifer & Scheier, 1999). Situated cognition means that cognition occurs within a particular contextual environment. This implies that when cognitive processing is taking place, the perception based information that affects the process keeps coming in and the motor activity, which has an effect on the environment in task related manners, is also executed. In this sense, every cognitive activity is situated in a context specific scenario. An exploration into situated cognition can be achieved by examining the interaction between cognitive activity and tool use, the embodiment of values and assumptions and how cognitive activity is shaped by social interaction. Nisbett and Norenzayan (2002) have proposed a methodological preference to this approach. For example, "studying knowledge acquisition in its everyday naturalistic setting, like studies of mathematical thinking among candy-

selling Brazilian children (by Saxe, 1991), or arithmetic among tailors in West Africa" (by Lave, 1977).

The second such claim is the idea that 'cognition is time-pressured'. When it is said that cognition is time pressured, it is meant that all living entities perform and act in a real time situation, unlike the laboratory setting where things operate and function in a convenient time boundary. Cognition deals with the here and now of the things and not an idealised conception of time. Wilson makes suggestions regarding how better and sophisticated cognitive structures could be rooted in "successive layers of environmental real-time interactions" (Wilson, 2002). The view that cognition is time pressured creates a representational bottleneck which means when there occurs a situation which demands fast reply, but there is not sufficient time to play out a fully structured mental representation of the environment out of which an immediate action plan could be derived. In such situations, the time pressured cognition allows one to create handy tricks to generate situation appropriate mental models. Therefore, treating time based situated action to be the beginning point for cognitive actions may suggest robust implications for the larger cognitive landscape.

The third claim is the idea that 'cognition is for action'. Embodied cognition makes a case for considering "cognitive mechanisms in terms of their function in serving adaptive capacity" (Franklin, 1995). Research in the areas of perception and memory has accelerated this claim that cognition is for action, especially it is substantiated how 'vision' has its roots in improved motor control, at an evolutionary level (Churchland et al, 1994). In fact, it has been found that some visual stimuli have the ability to prime motor activity. For example, "seeing a rectangle of a particular orientation facilitates performance on subsequent grasping tasks as long as the object to be grasped shares a similar orientation" (Craighero et al, 1996). Similarly, a study done by Tucker and Ellis (1998) depicted that when subjects indicate whether common objects are inverted or upright, the time taken to respond is lesser when using the same hand for both grasping the object and responding. Similarly, Glenberg (1997) makes an identical case for memory as being evolved in aiding the perception and environment in a three-dimensional environment. He further puts forth an argument stating how "the classical approach to memory as 'memorising' should be replaced by the view of memory as the encoding of patterns of possible physical

interaction with a three-dimensional world" (Glenberg, 1997). According to this view, short-term memory also makes use of some specific skills like the ones used while verbally rehearsing something. Similarly, processes like concept formation can be expressed through embodiment of memory patterns. According to Wilson (2002), in essence, cognition is in fact for action and the claim most probably is true but at the same time it demands that in what ways our cognitive architecture subserves action. The claim is promising but more work needs to be done in addressing some of the unresolved issues.

Research on embodied cognition varies a great deal, internally. Some thinkers advocate a mild form of embodied cognition whereas some advocate for a radical approach towards embodied cognition. Theorists making a case for the mild embodied cognition (for example, perceptual symbol theory, Barsalou) affirm that "knowledge is not acquired in a vacuum; rather, all cognitive experiences are essentially grounded in the sensory and motor contexts of their existence" (Barslou, 1999). According to Barslou's perceptual symbol theory (1999), "people register multimodal perceptual, motor, and introspective states, during the time of perception and later, when similar perceptual information is processed, these representations are reactivated through motor simulation, which allows the perceiver to apply the sensorimotor information that was previously encoded. On the other hand, radical embodied cognition theorists believe that mental representations are an empty and misguided notion" (Chemero, 2011). According to this view, cognition does not merely happen in the head but happens through a distributed system that extends to the body and the environment. In this regard, according to Wilson and Golonka (2012), currently a very stimulating idea in cognitive science is the viewpoint that cognition is affected by the virtues of embodiment. "Embodiment is a radical hypothesis which states that the brain is not the only cognitive resource that is available to solve problems. Our bodies and their perceptually guided motions provide many cognitive resources to achieve our goals, replacing the need for complex internal mental representations" (Wilson & Golonka, 2012). According to these radical embodied cognition supporters, this fact entirely alters the existing understanding of cognition and therefore, embodiment should not be seen as a regular aspect operating on an otherwise disembodied cognitive processes.

The concept of embodied cognition emerged against the traditional stances of cognitive science and reacts against more established traditions within cognitive science (people who have reacted to the traditional approaches and presented embodied cognition as an alternative: Clark, 1997; Dawson, 2013; Dawson, Dupuis, and Wilson, 2010; Shapiro, 2011). Shapiro (2011) identified three main themes that separate the embodied approach from the standard computational and connectionist traditions. These three themes are: Conceptualisation, replacement and constitution. Conceptualization is the idea that an agent's understanding of its world depends significantly upon the nature of the agent's body. Replacement is the idea that an agent's interactions with its world replace the need for internal mental representations. And, constitution is the position that an agent's world and body are constituents of an agent's mind instead of being seen in terms of mere causal relationship. Shapiro came up with these themes against the traditional cognitive assumptions, as mentioned above. For instance, according to Shapiro, the stimuli for psychological processes lack the necessary information which is crucial for organisms to interact with its environment. This gives rise to another mainstream assumption that psychological processes must make logical inferences about the surrounding world on the basis of the incomplete information that was talked about in the last assumption. The third assumption which seems inadequate in its appeal is how various inferential processes characterising the discipline of cognitive psychology are mostly conceived as involving algorithmic operations instead of a domain of symbolic representations. Finally, the assumption that psychological inquiry may well be limited just to the brain as the algorithms described by the cognitive operations are represented in the brain. Thus, these are some of the commonly held assumptions by the traditional practice of cognitive psychology in response to which, the concept of embodied cognition emerged, in some parts.

To conclude, the area of embodied cognition as a strong alternative and extension to the standard cognitive psychology is still in the growing phase and thus needs more time to get settled. Due to these reasons, this approach comes under criticism for sounding vague and unclear and is questioned for its scientific utility too. In response to this, Glenberg (2013) has articulated the fundamental idea of embodied cognition and why it is important to make a case for the same. According to Glenberg, "the fundamental belief of embodied cognition research is that thinking is not something

that is isolated from the body. Instead, thinking is an activity which is strongly influenced by the body and the brain interacting with the environment" (Glenberg, 2013). Glenberg further adds that "how we think depends on the sorts of bodies we have. The reason why cognition depends on the body is because cognition exists to guide action. We perceive in order to act; we have emotions to guide action; and understanding even the most abstract cognitive processes is benefited by taking into account how they are grounded in action" (Glenberg, 2013). This apprehension for action stands in contradiction with mainstream cognitive psychology that, for the most part, considers action and the body as secondary to cognition.

4.4 The role of self in cognitive processing

While discussing some of the possible alternative conceptions of the view of cognition, it seemed crucial to talk about the idea of self. The acknowledgement of self in understanding human cognition has not received much attention on a formal academic plane and therefore, exploring the potential of the 'self ' in expanding upon the idea of cognition seemed like a necessary enquiry. But in recent years, the self has started to receive a 'special' status because of the role that it plays in cognitive processing and therefore has been emerging as a robust cognitive capacity (Gilihan & Farah, 2005). In this regard, Kircher et al (2000) stated how "the processing of self relevant information and self-knowledge is considered distinct from the processing of objective information" (Kircher et al, 2000). And that is why the role of self in processing information is considered special and must be inquired into. Recent work has helped in substantiating this distinct-ness of processing information when it comes to the role of self. Some researchers have proposed that there exist specific neural localisations for self-related processing, general. For instance, the left hemisphere has come to be known for playing a critical role in recognization of our own faces along with autobiographical knowledge, personal beliefs and conceptions of self (Turk et al, 2002; Kircher et al, 2000). Similarly, the right hemisphere (right frontal cortex) has come to be associated with self related information processing like autobiographical memory (Platek et al, 2003; Devinsky, 2000). Further, there are also evidences of 'physical and mental self' representation to be associated with the right lateral parietal cortex (Lou, 2004). Also, "the medial prefrontal cortex in both the

hemispheres is now known as the site for self-modelling" (Fossati et al, 2003; Kelly et al, 2002). Now that these evidences are in place, an understanding of the concept of self would be necessary to make a case for the role of self in cognition. The very famous phrase by John Locke – 'I think therefore I am' gives us some of the most basic understanding about the concept of self, that is, an awareness of having thoughts matter. Which implies that the term self includes both the actor who thinks ("I am thinking") and the object of thinking ("about me"). Besides, the actor is able to think and at the same time is also aware of doing the 'thinking'. In this sense, it would not be wrong to say that 'reflexive capacity' forms a crucial part of defining 'self' (Kihlstrom et al, 2003). While theories agree on the idea that this reflexive capacity is essential to having self, they diverge a little on the role of memory in sustaining the self. "On the one hand, the self may be considered essentially a memory structure such that the 'me' aspect (the object of thinking) of self has existence outside of particular contexts and social structures. While on the other hand, the self can also be considered essentially a cognitive capacity in a way that what constitutes the 'me' aspect of self is created inside of and embedded within moment based situations" (Leary& Tangney, 2012).

Self is a difficult construct to define in the first place because of its highly varied understanding and nature across different cultures. But while "some understanding and representation of the private, inner aspects of the self may well be universal, many other aspects of the self may be quite specific to particular cultures" (Markus & Kitayama, 1991). Markus and Kitayama further explain how the exact content and structure of the inner self may differ significantly by culture. Also, the nature of the public self that is derived from one's relations with other people and social institutions may also vary significantly by culture. In this context, according to Triandis (1989), "the significance assigned to the private aspects versus the public aspects in regulating behaviour will also vary accordingly" In some cultures, on certain occasions, the individual, as a set of significant inner attributes of the person, may cease to be the primary unit of consciousness. "And the sense of belongingness to a social relation may sometimes become so strong that it is only reasonable to think of the relationship as the functional unit of conscious reflection" (Triandis, 1989).

According to Markus and Kitayama (1991), there exists two construes of self, independent and interdependent. The independent view of the self derives from a belief in every individual's internal uniqueness and wholeness (Johnson, 1985; Waterman, 1981). This kind of belief in one's uniqueness leads to processes like self-actualization and the person is able to develop and realise his or her 'true' potential. This conception of the self views an individual as completely autonomous and independent and hence this construe is also named the 'independent' construal of the self. As evidently known, this independent construal of self is known to be more prevalent in the western cultures as compared to the non-western cultures, although intra-cultural variations may still prevail. Markus and Kitayama have made certain characteristics of an independent self salient. For example, the independent self must be very responsive to the social environment. And this social responsiveness is a result of the need to strategically determine the best way to express or assert the internal attributes of the self, in the context of the environment. Whereas, the social situation in general, is crucial, but mainly as standards of reflected appraisal, or as sources that can verify and affirm the inner core of the self.

Talking about the interdependent self, it believes in the idea of 'fundamental connectedness of humans'. "Experiencing such interdependence involves seeing oneself as part of an encircling social relationship and acknowledging that one's behaviour is determined, contingent on, and, to a large extent organized by what the actor perceives to be the thoughts, feelings, and actions of 'others' in the relationship" (Kondo, 1982). Within the interdependent construal, the self becomes the most meaningful and complete when it is cast in an appropriate social relationship. According to Lebra, in this sense, "the Japanese are the most 'fully human' in the context of others" (Lebra, 1976). Unlike the independent self, the significant features of the self according to this construal are found in the more public components of the self and therefore it is called the interdependent self (Markus& Kitayama, 1991). Further, an interdependent self is difficult to be completely characterized as a bounded whole, because it changes structure with the nature of the particular social context. Within each social situation, the self can be differently elucidated. The uniqueness of this self is derived from the specific configuration of relationships that each person has developed. "What is focal and objectified in an interdependent self,

then, is not the inner self, but the relationship of the person to other actors" (Hamaguchi, 1985).

Now that we have gained a brief understanding of the concept of self, it is crucial to learn about the possible implications of the same for human cognition and how the self plays an important role in understanding cognition, as a whole. In fact, the kind of self one identifies with would lead a difference in the cognitive activity too. Markus and Kitayama (1991) have identified three major consequences of the two kinds of selves that were discussed above, independent and interdependent on cognition. First, they have found out that "the interdependent selves tend to be more attentive and sensitive to others as compared to the independent selves" (Markus & Kitayama, 1991). This attentiveness and sensitivity towards others in the independent selves leads to a comparatively better cognitive expansion of the other or of the self-in-relation-to-other. Second, "the unit of representation of both the self and the other will include a relatively specific social context in which the self and the other are embedded, in the case of interdependent selves". This implies that the knowledge regarding people, either of the self or others, will not be intangible and universal across contexts, rather will be specific to the central context. Finally, "a consideration of the social context and the reactions of others may also shape some basic, non-social cognitive activities such as categorizing and counterfactual thinking". These differences between different cultural construal of selves are summarised by Kuhnen and Oyserman (2002). According to which, "in the case of independent versus interdependent self-knowledge, developing and maintaining an independent self would involve a different cognitive processing style as compared to developing and maintaining an interdependent self. Particularly, seeing one's self as independent of others, contexts and situations requires a context-independent processing style, that is, aggregating and integrating across situations while ignoring situational variance in one's thoughts, feelings, and responses" (Kuhnen & Oyserman, 2002). On the other hand, "seeing one's self as interdependent with others, contexts, and situations requires a context-dependent processing style, that is, paying attention to specific social contexts" (Kuhnen & Oyserman, 2002).

Research has shown how having a particular self construal would have implications for the way we process memory also. According to Markus and Wurf

(1987), individuals having an interdependent self construal tend to "define themselves in terms of a domain and thus, pay more attention to domain relevant stimuli and develop elaborated knowledge structures for that domain". As a result of which, such individuals generally "have well developed cognitive-associative networks for the domain of relationships" (Collins & Loftus, 1975). These cognitive associations amongst related constructs result in spreading activation which then prime other constructs associated with relationships and promote memory for relational information. This implies that if "individuals having a relational self-construal have constructed a compactly interconnected network of relational concepts that is connected to the self, then they are expected to be more likely to attend to and remember relational information about others" (Cross et al, 2002). Moreover, "an individual's self also helps in directing the organization of information in memory" (Fong & Markus, 1982; Markus, 1977). People instantly "organize information about others in terms of various social categories such like race and age" (Brewer, Dull, & Lui, 1981). According to Sedikides et al (1993), "relationships also act as an important category for implicitly organizing information about others. This tendency to organize information in terms of relationships might be especially strong among individuals having a highly relational self-construal".

The rationale behind including the role of self in cognitive processes as an alternative is to acknowledge and appreciate the mediating role the self plays in bridging the internal psychological processes and the outer world. The self plays an important role in negotiating with the social environment and internalising its processes through the process of self-reflection and then relate it to the internal psychological processes. According to Turner (1994), it is through the dynamic nature of the self that we can internalise the social world around us. He further argues that it is through our positioning relative to others and our understanding of that social position that we are constituted as social beings. There is something guiding and linking whatever happens in our minds and what goes on in the larger social structure and that is how we are able to make sense of things. This 'something' which guides these two processes is the 'self' or the 'self-concept'. The self acts as a micro level variable situated between the larger social structure and the internal psychological processes. In this regard, we can see how the social identity theory is essentially a theory of self and its social nature.

Instead of having identified the role of self in mediating the internal and external processes (for example, Turner, Oakes, Haslam, 1994), the self is still "seen as a relatively fixed, separate mental structure that is activated according to the situation" (Turner at al, 1994). The 'true' self is usually said to be personal, unique and private and is stored as an organized system of interrelated self-concepts. The public self, on the other hand, is what one presents to and is perceived by others. Therefore, in its cognitive aspect, the 'self' is strangely asocial and is only a set of cognitive generalizations built up from one's own experiences (Turner & Oak, 1997). It comprises of the core "schemata reflecting past experience and providing stability of interpretation and resistance to change" (Turner & Oak, 1997). If we continue with the 'asocial' idea of the self, as discussed above, the self then becomes an amalgamation of intra-psychic structures and processes that constitute our perceptions and beliefs about ourselves in relation to a number of features such as personality, abilities, skills, and attributes. This idea of self although prevalent was problematic for some (for example, Turner & Onorato, 1999). For Turner, this notion of self as being defined as personal, stable and fixed is fundamentally wrong. By sticking to this conceptualisation of the self that is so asocial, we are at a risk of ignoring the psychology of various group systems and also denying that human psychology is responsive to the changing nature of our social world. Therefore, the acknowledgement of self is important while understanding the working of cognitive processes and in general how human mind works in relation to the self.

4.5 Conclusion

To conclude, this chapter tried to incorporate some of the promising perspectives on cognition which offer new insights in order to provide a broader understanding of cognition. But there is a need to examine how these three perspectives to cognition create a holistic understanding of cognition and how integration could be carried out amongst these approaches. If these approaches are not in some degree of harmony with each other, they would appear unrelated and a unified understanding of cognition would become difficult to achieve.

The three perspectives namely; embodied cognition, self-referential cognition and the social constructionist approach do manifest some degree of relatedness and, integration amongst them would result in a comprehensive understanding of human cognition. For instance, the idea of self and our bodily experiences feed into each other and somewhere, both help in defining each other. Different bodily experiences may affect the conception of self and how information is perceived and then processed by the body and mind. Similarly, the bodily experiences may shape the concept of self held by an individual. A study done by O'Connor (2017), found out that the bodily experiences and embodiment can have an impact on the degrees to which an individual would engage with a certain stimuli. This would further be affected by the circumstances under which such an engagement takes place. The interaction between an individual's bodily experiences and its immediate social reality helps the individual in knowledge creation as it is occurring in a socially constructed reality of which the individual is a crucial actor playing on an interactive plane. In this regard, according to William James, the way the surrounding world is experienced by an individual, first and foremost, pierces through the body of an individual. In this sense, our bodily experiences are the central piece of action and vision. It is our body which gives rise to everything else that we feel or experience and everything that is around us comes essentially from our bodily point of view.

This importance given to the bodily experiences in understanding human phenomenon and the site of human body as the origin of everything that matters reflected in the writings of the pioneers of the discipline is fundamentally different from the viewpoint held by the mainstream psychology which regard the role of bodily experiences as almost unimportant to understand cognition. Quite similar to what William James said about the bodily experiences, Wilhelm Wundt also spoke about how the human mind-body dualism eventually boils down to one unitary entity and therefore, separating the two while inquiring about human processes would result in an incomplete understanding of the phenomenon itself. According to Wundt (1902), most of the physical processes are related to the human mind or human consciousness and conversely, the human consciousness keeps changing and evolving according to the changes in the physical realm of experiences. Therefore, individuals make sense of their surrounding through their bodily experiences too (and not just

through their brains) and then socially create a reality which is accommodating of their unique idiosyncratic characteristics.

Although there are many other potential alternatives which could further the study of cognition, the alternatives provided here are presented as a marker of beginning towards appreciating an extension of the study of cognition. All these alternatives presented in this section still have a lot of scope to develop into full-fledged ideas but they do leave a promising impact in making the study of cognition more broad and holistic. One very important consideration about the inclusion of these perspectives for the study of cognition is that if these alternatives are able to be evaluated from the stand-point of the philosophy of science. This is crucial because a major loophole in the mainstream approach of studying cognition is its lack of insights from the discipline of philosophy of science. Therefore, while making a case for the adoption of these alternative approaches it is important to understand if these alternatives draw from the philosophy of science or not. Since the field of philosophy of science deals with the questions about nature of reality, nature of mind, nature of brain etc, it is reasonable to understand that some insights would be available regarding these alternative approaches too. For instance, questions of human rationality, free-will, and choice-making are never dealt by the mainstream cognitive psychology. In fact, these areas are not even considered an important part of the ambit of cognition. To address such questions which are hanging on the periphery of the discipline of psychology may better be catered to by the alternative conceptions like a social constructionist approach and these areas could very well be studied by the philosophy of science as well. However, how much these perspectives can be evaluated from the philosophy of science is still a point of contention and more inquiry would be needed to comment anything absolutely in this regard. But these perspectives do act as robust alternatives in broadening our understanding of human cognition from a fundamentally different point of view; alternatives which look beyond the laboratory settings in order to examine something that resides within the larger social plane.

Pedagogical Implications and Concluding Comments

5.1 Pedagogical implications of the present study

One of the major goals of the present work was to locate and reflect on its pedagogical implications, thereby commenting on the practical utility of this research. What are the implications of broadening the understanding of cognition for pedagogy and in what ways the reflections emerged during the course of the present research can be used for better pedagogical practices of cognitive psychology? This work would conclude by reflecting on some of such questions. The manner in which any idea or a particular field is organized decides the survival and impact of that idea on the larger society. The sources and tools that are used to establish and develop a field of inquiry say a lot about the impact of the field and the direction it might take in the future. Similarly, the way the field of cognitive psychology is organized by the discipline of psychology and the way the whole idea of cognition is spread across cultures are sure to have strong implications on the way the knowledge of cognition is received by the larger society. At the end of the day, the core goal of any field of inquiry is either to add on to the existing knowledge systems or to establish a new knowledge system. Similarly, the understanding of the idea of cognition by the field of cognitive psychology also adds to the knowledge structures present within the society. In this context, the goal of the present work is to locate the potential of the field of cognitive psychology to add to the knowledge system of education in the society; both in terms of learning as well as teaching cognition.

The way the field of cognitive psychology has propagated a particular notion of mind and various concepts that are related to mind such as thinking and intelligence has grave implications for the larger social structure. As deeply discussed in the present research, the mainstream cognitive psychology's conception of human cognition and human mind still remains inadequate in understanding cognition owing to some of the key theoretical and methodological issues discussed in the chapters before. Such inadequacies lead to a manipulative, mechanical and most importantly passive identity of the human mind. This larger picture of the human mind shaped by the guiding discipline also shapes the various constructs and concepts associated with the mind, which further creates an ideal collective understanding of these constructs which may not be holistic and inclusive in nature. If we take the construct of intelligence to understand this, not many pieces of evidence are required in asserting and accepting that the concept of intelligence is quite hegemonic and has always been used to justify domination and destruction. "Labeling someone intelligent or not intelligent has never been merely a comment on their mental faculties; it is always also a judgment on what they are permitted to do" (Kinchloe, 1999). Intelligence, in that sense, is political. Throughout western history, those deemed less intelligent have, as a consequence of the judgment of those who are deemed 'intelligent', been colonized and enslaved. Today, maybe the ways of oppression and destruction have changed, but the reality remains the same, intelligence continues to propagate inequality and social injustice through a systematic organization of 'intelligent-violence'. It can be seen how the concept of cognition has been propagated in a unitary and universal manner, it leads to a similar understanding of the concepts under the ambit of cognition too. Expanding on the example of the construct of intelligence, the practice of looking at intelligence in isolation and free from cultural variation is the most important aspect of intelligence which needs re-conceptualization. This is because "an acontextual study of intelligence imposes a western investigator's view of the world on the rest of the world" (Sternberg and Grigorenko, 2004) and provides a biased picture of the construct. Therefore, it is crucial and more importantly, critical to understanding "the term 'intelligence' does not refer to a single construct; rather, it is a generic term that refers to a nomological network of different constructs such as cognitive abilities, competence, cognitive skills, and acculturated knowledge" (Kinchloe et al, 1999). The point being highlighted here is how a narrow conception

of the area of cognition has implications for the larger society which manifest in different forms and realms.

The concept of cognition has special implications for the education system within any society. This importance can be attributed majorly to the very content of the field of cognitive psychology and also its explicit identity as the study of the human mind and its functioning. In the most simple yet precise words, cognition refers to the idea of 'knowing', and it's how's, what's and why's. As discussed above, the subject matter of cognitive psychology involves concepts like intelligence, thinking, memory, creativity, learning, all of which have massive implications for the educational process of creating and sharing knowledge through learning and teaching. In this regard, one of the implications of the present research is to understand and acknowledge this extended impact of organizing and promoting a field of inquiry in a particular manner on various other concepts which play a crucial role in the process of building knowledge. If the understanding of the concept of cognition is directed in a particular direction and is governed by the narrow understanding of the human mind, then consequently the understanding of constructs which have their complete or partial origin and development within the brain becomes narrow and rigid too. For example, the way we understand the idea of intelligence, academic achievement, competence, motivation, and memory are all shaped by our larger understanding of cognition which was catered to by the dissemination of the mainstream cognitive ideas. The very basic assumption that cognition originates and resides specifically within the human brain leads to the understanding that all the related constructs like intelligence, academic achievement, and competence are also born and developed within the realm of purely mental processing and anything that might affect these constructs outside of the brain is either ignored or considered unimportant to study altogether. The implication of such a reductionist approach can be understood by taking the example of the construct of intelligence again. Although alternative views prevail about the origin of intelligence, the widespread assumption is that intelligence is a fixed and relatively stable attribute and is something one is born with. Intelligence, like cognition, resides within the brain according to such an assumption. This understanding of the idea of intelligence provides an inwardly oriented view of human intelligence, ignoring most of the socio-cultural factors that come into play. Such a view promotes the idea that the potential to 'improve' upon the intelligence

one is born with is impossible or highly difficult. This conception of intelligence is highly exclusive and promotes only one kind of intelligence which meets the demands of the mainstream idea of intelligence. Therefore, if somebody is born with relatively less intelligence (according to the universal markers of intelligence), the scope of improvement is negligible and even if there is some scope it is highly inaccessible because the sole responsibility of the perceived lack of intelligence within an individual lies within that individual itself. And since the role of external factors is not taken into account, at least in the mainstream conception of intelligence, the scope of any input from outside of the individual to improve one's intelligence is out of the question. This has huge implications for the various oppressed sections of the society at large. Their lack of resources and training is equated with their 'naturally' less intelligent minds and due to the assumption that intelligence exists only within the mind, any inputs from the surrounding do not help beyond a stage. This only makes the need for having a democratic approach and theorization of the concept of cognition even stronger.

The need for this newer and broader conception of cognition that has been proposed throughout the present work, somewhere, makes a case for knowledge systems which are not universal; instead, they claim their identity from specific contexts and carry particular values with them. This viewpoint comes from a social constructionist approach to reality and hence any idea of an absolute reality is taken with a pinch of salt and is thought about critically and contextually. Taking this theme ahead, the implication of such an approach to education is discussed in the next section in the context of the pedagogy of cognitive psychology.

5.1a. Learning cognition: Implications for teaching

The present research provided with an opportunity to reflect on the way cognition is studied and taught formally; at the school level as well as the higher education level. This reflection seemed essential as engaging with a field and its core components at the level of research and theory are different from the way its knowledge is imparted at the very basic level, like school and college. Further, for the growth of the larger community of cognitive psychology, it is only reasonable to

strengthen the basic foundation of learning cognitive psychology and thus it is crucial to reflect on the pedagogy of cognitive psychology as taking place at the formal graduation level.

To begin with, the language of cognitive psychology plays a huge role in shaping the understanding of the concept of cognition. Owing to the widespread computational metaphor of the human mind, the language of the field of cognitive psychology is by default technical and jargonized in nature. At the most basic level, to use a language that is so technical and mechanical as though the subject matter of the field is a machine or a robot is in itself a reflection worthy topic and needs attention. Cognitive psychology, by the virtue of being a scientific field of inquiry, incorporates a particularly 'scientific' language which is very technical. These technicalities are manifested in the way the academic language of the field is organized in textbooks of cognitive psychology. The common trend is of using heavily computational and technological metaphors for describing the functioning of the human mind. For example, the central processing unit, the breakdown of information etc are all used to describe human cognitive processes which sound like the functioning of a purely mechanical machine. Although, in no way, it is being implied here that such a language should be discarded completely because it has helped to accelerate the growth of the discipline of cognitive science since past many decades and has made enough contributions to respect its linguistic competence. The idea here is to be mindful of such a language as the core goal is to understand human cognition and not computer systems. Therefore, this technical language may well be supplemented with some necessary aids that bring back the human element of cognition to the center stage.

While talking about the language of cognitive psychology, its vocabulary plays an important role in forming its language. If some light is shed on the vocabulary of cognitive psychology, we will be able to see through some of the basic issues regarding its usage. When talking of cognitive sciences or cognitive psychology, a fixed prototypical vocabulary is not hard to imagine. Common vocabulary includes mental, breakdown, representation, processing, data-set, computational, schema, encoding, mapping etc. Clearly, most of the cognitive vocabulary reflects a heavy influence from the computational model and focuses on constant processing and

representation of information. The origin of such a vocabulary resides within the fundamental assumptions which the discipline of cognitive psychology holds about the human mind and its functioning. All these words and phrases manifest a view of the human mind that is self-sufficient, to an extent and hence does not seem to borrow a lot from the social plane of which it is a part of. The vocabulary of cognitive psychology is strangely devoid of words which manifest a social origin and relevance. For example, words like truth, values, and social structure are rarely mentioned in the larger cognitive discourse. In fact, there is a resistance towards incorporating a value-laden vocabulary. What is crucial to notice in such a scenario is the fact that the presence of only value free vocabulary runs the risk of an absence of critical and appreciative sensitivity too. In this regard, reflecting on the well-acclaimed text titled 'Education as a social construction' by Gergen et al (2015), it can be said that the objectification and valorisation any scientific discipline brings on the table ends up silencing the larger discourse of moral good, desires, and spirit. Continuing with this kind of 'idealistic' vocabulary may tend to marginalize various alternative constructions of any phenomenon. The unsaid values and hidden implications of any knowledge system are crucial in creating a holistic understanding of the knowledge system as well as the larger social structure. Therefore, the situation demands an enriched vocabulary which is used to describe human cognition because human cognition spread beyond the computational model and thus a more socially inclusive language of cognition might prove to be stimulating.

Another challenge in the pedagogy of cognitive psychology lies in the seemingly abstract nature of the concepts involved. There are many concepts in the discipline which may sound vague and abstract at first, for example, a phonological buffer. These concepts, although, can be understood after a while, for a beginner, they appear intangible and abstract and might have difficulties in associating with the regular subject matter of the field of psychology. The challenge, therefore, is to make these abstract ideas more accessible to the students of cognitive psychology, at the beginning level of engaging with this field.

Further, the content organization of the formal academic cognitive psychology as reflected in common textbooks runs the risk of appearing well segmented with low priority given to the linkage between different segments. For instance, the chapter on

cognitive psychology in most of the college level textbooks begins with a brief introduction to the cognitive revolution dating back to the 1950's with hardly any reference to the rich historical grounding of the field prior to the so-called cognitive revolution. This kind of introduction of the field of cognitive psychology portrays an image of the discipline which does not borrow from the founding figures of the discipline of psychology and their contribution, thereby presenting a distorted version of the actual trajectory the field of cognitive psychology took before reaching the cognitive revolution. This abruptness in the content of cognitive psychology is further reflected in the crisp division of various sections of cognitive psychology. For example, the link between any two topics is almost always very superficially shown which gives the impression of an inherent segmented view within the field of cognitive psychology. This implies that different cognitive processes are not actually related to each other in a logical manner in order to understand the functioning of the brain and thus cognition but work in isolation to give rise to the process of cognition. Therefore, it might help in improving the overall understanding of cognition if the organization of the content that is used for teaching cognitive psychology becomes more organised in terms of its historical rootedness, logical and necessary linkages between topics of cognition and presenting a larger philosophically sound picture of a particular topic instead of presenting it with only an assemblage of the major theories and diagrams.

What an effective pedagogy of cognitive psychology should be able to do is to change the well established notion of the human mind which has been propagated by the field of mainstream cognitive psychology. Mainstream cognitive Psychology disseminates the idea of the human mind as a passive entity. This passive conception of the human mind is reflected in the way the field of cognitive psychology makes assumptions about the very nature of reality. For mainstream cognitive psychology, there exists an absolute reality out there and the human mind merely represents that reality through various cognitive processes. This view leaves immense scope to question the lack of a view which sees human beings as capable of constructing and shaping their own idiosyncratic reality. A demand for alternatives to various other kinds of cognitive conception would help in establishing the idea of human mind as an active entity rather than a passive one. 'Active' here means that the mind is able to create its own reality and does not merely represent the givens of space and time

without critically reflecting on them. Further, mainstream cognitive psychology's view of social factors and societal context as constraints. An effective pedagogical approach towards cognitive psychology would seek to reframe this conception with the one which sees the same social structure as an opportunity rather than constrain in our goal of understanding human cognition. There is more and more a need to also adopt a social constructionist approach to education which would treat every field of enquiry as constantly evolving and changing according to the larger interactive social plane. This is crucial because the knowledge which the human mind is known to represent is itself in a process of continuous motion and is not fixed from one moment to another. Therefore, it is crucial that such knowledge is seen as something in action and not as a mere representation of a fixed reality and thus the role of the larger socio-cultural factors become all the more important while engaging with human cognition as it is the social-interactive plane which is always evolving and changing; thereby changing the human mind too.

5.2 Concluding Comments

The present work aimed at exploring and understanding the scientific notion of the discipline of psychology by reflecting on the field's emergence as an independent discipline with its newly acquired scientific identity. How psychology emancipated from its philosophical and physiological grounding to acquire this scientific status was one of the major goals of the present work. Although the major point of dissection remained a deeper exploration of this new identity of a scientific discipline which Psychology had acquired, rather swiftly. How the discipline acquired this scientific status and what was the idea of psychology being called a 'science' at the time of the emergence of the new psychology were thoroughly discussed. Although the larger goal of the present work was to examine the scientific notion attached to the entire discipline of psychology as a whole, the specific engagement of the present research objective was focused explicitly on the field of cognitive psychology.

During the course of the present work, the dissertation tried to trace the trajectory of the scientific development of the discipline of psychology right from the very beginning when the first scientific laboratory was set-up in Leipzig by Wilhelm

Wundt to the establishment of the mainstream cognitive psychology that has been in practice since past many decades. This inquiry gave insights into various aspects of this development and how in an attempt to become scientific, the organization, direction and the very objective of the field kept fluctuating. Psychology suffered from an identity crisis and in an anticipation and desire of becoming a scientific discipline may have gotten sidetracked with the core goal of the discipline; to study humans in a complex social plane.

Amidst all this, the discipline of Psychology witnessed a cognitive revolution with the aim of understanding human cognition. Taking insights from the present work, it is evident how despite the strong philosophical influence (along with the strong desire to be scientific as well) in the origin of cognitive psychology, the way it is theorised and practiced today is strangely devoid of the very same philosophical underpinnings which results into an incomplete understanding of cognition. Although it is completely legitimate to acknowledge this liberation of cognitive psychology from its philosophical roots as correct because concerns of cognitive psychological research may not always get reduced to philosophical problems. Nonetheless, the perceived irrelevance of philosophy of science to psychological research is only incomplete and shallow in nature. This has been substantiated by the differences in the conception of cognition by the pioneers of the field and the mainstream cognitive psychology. The implications of the exclusion of the philosophy of science from the theorization of cognitive psychology are reflected in the number of inadequacies the field manifest in its process of understanding cognition. Cognitive psychology's narrow research focus, exclusion of the larger societal context, persisting emotion-cognition dichotomy and the ever-growing definition of the human mind in terms of a computational model are all a manifestation of the kind of science the field of cognitive psychology adopted in their quest of understanding cognition. In the end, what the field understands can be called 'cognition' or not is a different story as due to these very reasons, the understanding of the term 'cognition' itself has been tailored to suit the requirements of the way mainstream psychology works. The question of inquiry is not to get insights into cognition related concerns rather those concerns are called 'cognition' which are able to be studied through the available methodology with cognitive psychology since past many decades. Instead of revising the scientific methodology, the focus of the field of cognitive psychology gets narrower and its

range of areas to enquire becomes smaller resulting into an exclusion of many important areas from the study of cognition like the role of emotions, value systems, beliefs and the larger social structure.

The present research aimed at dissecting this inadequacy of the field of cognitive psychology in understanding cognition by the exclusion of considerations from philosophy of science yet maintaining its desire to become a scientific discipline. However, the point of contention that remains is that if the field of cognitive psychology does want to uphold its scientific status, it must draw from the discipline which enquires into the fundamentals of scientific methodology. Otherwise, what remains is a superficial and incomplete understanding of cognition as a result of the inappropriate and incomplete scientific approach. Taking this point of contention ahead in the research, the present work tried to be successful in addressing the main objectives set out in the beginning phase of the work. The research captured the trajectory of the discipline of psychology from being physiological to a scientific psychological discipline, from the point of view of the philosophy of science. Then the objective of a review of cognition was carried out in order to understand what cognition was for the pioneers of the field and what cognition is for the mainstream psychology today. This information was used to make a commentary upon the scientific status of the discipline of cognitive psychology and how this scientific status changed as the field progressed in its vision of understanding human cognition. The research, up to this level, revealed how mainstream psychology is continuing with a number of loopholes which are inhibiting the growth of the field; to understand human cognition. To address these loopholes and then to further the inquiry into human cognition the research then tried to present some robust alternatives to approach human cognition which would include the inadequacies manifested by the standard cognitive inquiry and eventually a broadened and holistic conception the field of cognitive psychology would begin to spread roots. Therefore, reflecting on the various loopholes and inadequacies in the process of understanding the concept of cognition, what seemed like a potential growth option to solve this dilemma was to find ways which could help broadening the horizon of the field of cognitive psychology so that it caters to these inadequacies and gives primacy to the understanding of cognition rather than accommodating whatever it could by incorporating prototypical asocial scientific methods which have not been revised

since ages. In order to fulfill this gap, the present work tried to present some potential alternative ways of conceptualizing cognition, at the most fundamental level, which could help to broaden the whole understanding of the human mind and its functioning. From the widely spread computational approach of cognition to bringing to center stage the role of social constructionism, bodily experiences and the role of self, an effort has been made to approach human cognition from a broader lens which sees the act of cognizing as an essentially human endeavor rather than a mechanistic activity.

5.2a. Just a beginning: Towards a new cognitive revolution

Although the present research 'ends' with suggesting some alternative views of approaching human cognition, this should not be considered even half the work done as coming up with new and different alternative conceptions of cognition is the very first step towards making the field of cognitive psychology more holistic and broader in appeal. The alternatives are suggested with the idea of changing the fundamental view of the human mind and how it functions. Changing something at the most concrete level demands a great deal of work and ideas. The major alternatives that are suggested in the present work include: the social constructionist approach to cognition, embodied cognition and the role of self in cognition. These approaches, although not completely new, their relevance and prominence in the context of human cognition are yet to hold the center stage. A lot of work is needed to be done for these ideas to be established as firmly as the computational or the connectionist approach to cognition. Then again, taking these newer approaches at their face values is also not what the field of cognitive psychology needs. The alternative approaches have to go through the same tests of time and limitations as they progress in engaging with the issue of cognition. Whether the new approaches are capable of addressing the advancements in the field of cognition, whether these approaches borrow from the philosophy of science and keep up with it in order to produce a robust scientific methodology are some points of contention which the new approaches have to resolve. Most importantly, if the new approaches are able to continue with the advancements which the classical models of cognitive psychology have achieved is also a crucial question to dig deeper into.

Despite these contentions, there is hope in the field of psychology to address the phenomenon of cognition and this hope would lead to motivated attempts to refine the field's theoretical and methodological approaches. The social representation of the human mind would start changing from a superior, mechanical and passive entity to an important, social and active entity. As the cognitive revolution of the 1950's relied upon and imitated the computational model of mind, the 'new' cognitive revolution that is being tried to theorize in the present research would represent a reality which is constantly evolving in the context of specific contexts and unique idiosyncrasies. The new cognitive revolution would be well equipped to deal with all that human cognition has to offer under its vast ambit. The new cognitive revolution would not derive its scientificity from following the computational model; it would derive its scientificity by adding to the knowledge production and broadening the scope of the field. The new cognitive revolution that is being aspired would try to be more sensitive to the role of a value system without which the computational approach is always incomplete. The new revolution needs to look outside of the laboratory and probably set up a different kind of laboratory where more data is collected from outside of the laboratory setting and whose implications would reach far beyond the cognitive sciences.

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