

Exhibit P-35

BUILDING A “CROSS-ROADS DISCIPLINE” AT MCGILL UNIVERSITY: A HISTORY OF
EARLY EXPERIMENTAL PSYCHOLOGY IN POSTWAR CANADA

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academic psychology at McGill prior to World War II as a result of this situation and the psychological landscape going into the war.

4. a. Activities of the new Department of Psychology under William Tait, 1924-1935

The late 1920s and 1930s represent an important but little examined period for the development of psychology in Canada. Histories of Canadian psychology tend to focus on James Mark Baldwin and the development of psychology at the University of Toronto. There are few accounts of the emergence of psychology in what at the time was Canada's largest city: Montreal.

The Department of Psychology at McGill was the first department of its kind at a Canadian university (Wright & Myers, 1982). Despite operating its own *de facto* department decades prior to the establishment of McGill's department, it wasn't until 1926 that the University of Toronto would establish its own (Myers, 1982). The establishment of McGill's department in the early 1920s was early for Canada but not internationally. Canada, compared to the United States, was much slower to develop independent departments of psychology; most of the teaching of psychology in Canada was done in departments of philosophy until the late 1950s with some departments having “suffered a painful birth trauma which effectively retarded their development for several years” (Wright, 1969, p. 239). In these respects, the emergence of academic psychology at McGill was unique. In the years immediately following its establishment, the new department was more active, in terms of courses and graduate research, than it would be at any other time in Tait's long tenure as chairperson.

As Chairman of the new department, one of Tait's first tasks was to appoint an additional professor in psychology. Among the candidates who were considered—including Gordon Allport, Paul Young, and George Humphrey—Chester E. Kellogg (1888-1948) was offered and accepted the position of Associate Professor in 1924, starting at \$3300 (Kellogg, May 1, 1924). Kellogg was an American with a PhD from Harvard where he had worked primarily with Robert Yerkes. He served with Yerkes during WWI as a civilian examiner administering mental tests to recruits (National Academy of Sciences, 1921; Kellogg, 1923). Kellogg later co-authored the controversially-titled McGill University Revision of the U.S. Army Beta Examination with N. W. Morton, his student and the first PhD graduate in Psychology at McGill (Frost, 1984). Morton would go on to play a critical role in the development of academic psychology in Canada after World War II (see Chapter Four).

When Robert B. MacLeod, an undergraduate and one of the first graduates of the new department, was interviewed about his experiences in the mid-1920s, he described it as follows: "... [The Department of Psychology] had one little room about 15 feet x 25 feet that was the combined office, lab and library, of the department. Kellogg had a little table about 2 feet x 4 feet at which he sat and we could come in and talk with him. He was always very cordial. Tait had an office somewhere else but nobody ever went voluntarily to see him" (Myers, 1974, p.106). In 1926, "they reconstructed the Arts Building and Tait got a sizable hunk of space in the Molson Wing of the building. There was a fairly big introductory lab — nobody would design a lab like that now—the tables were all screwed to the floor. Each table had an electrical outlet and compressed air. There was a photographic darkroom and a soundproof room. There were two offices: one for Tait and one for Kellogg, and a shop which was also a storage room, and about four other rooms which could be called research rooms, one of which became a miniature library. But no research was done there" (Myers, 1974, p. 107).

With the establishment of his own department Tait was able to expand its scope and define its direction independent from philosophy. Like most psychologists of the time Tait was driven by the need to demonstrate the independence of his discipline from philosophy. Charged with establishing his own department, Tait was committed to the project of advancing psychology as a scientific discipline. The common theme behind many of the ensuing clashes between Tait, the administration, and other faculty members was his vision of the new science of psychology, how it should be represented, and by whom. For example, Tait scolded other psychologists for involving themselves with local Practical Psychology Clubs (Tait, Oct. 10, 1927). These clubs, typically associated with popular psychology magazines, such as *Golden Rule Magazine: The New Psychology* (1919), *Popular Psychology: The Magazine of Straight Thinking* (1920), *Herald of Psychology* (1921), and *Psychological Review of Reviews* (1923), encouraged public engagement with the early applied psychology and grew in popularity during the 1920s (Benjamin, 2012).

Psychology at McGill in the 1920s turned away from philosophy and towards social service. Patterns of co-supervision (between students in psychology and faculty in sociology, education, and English) as well as choice of research topics indicate clear priority for applied problems suitable to social service (e.g., education, public health, unemployment, personnel selection, and vocational guidance). Given Tait's training at Harvard with Münsterberg (an early

pioneer of applied and industrial psychology), the topics of publications, and postwar work with the National Committee for Mental Hygiene, it is unsurprising Tait would take psychology at McGill in this direction. Indeed, through association with other departments, like the newly established Department of Social Service, Tait would go on to fashion psychology in the interwar period as a 'bridging' discipline between the social sciences and the needs of society: described later by R. B. MacLeod as a "cross-roads discipline" (MacLeod, 1955, p. 43).

One of the early initiatives of the department was the establishment of a School Service Bureau in 1925. Before he had joined the department in 1924, C. E. Kellogg had been Professor of Psychology and Education at Acadia University and had a keen interest in psychological testing and test construction (Ferguson, 1982). Tait facilitated the establishment of this Bureau with the explicit aim of serving "at the disposal of superintendents, principals, teachers, parents, and others interested in education," as far as time and equipment permits (Annual Calendar, 1925, p. 180). The description in the Annual Calendar outlines its purpose: "to furnish aid and advice with regard to intelligence tests and measurements, and other psychological aspects of education" (Annual Calendar, 1925, p. 180). The School Service Bureau was an explicit attempt to extend the kind of work Tait had done for the National Committee with the public school surveys, but under his own roof.

Psychology at McGill brought new tools to address social problems and Tait and Kellogg were enthusiastic about showing what the New Psychology was capable of contributing to Canadian social problems. In addition to the School Service Bureau, Kellogg also became involved with the revision of the U.S. Army Beta Examination that he had administered while working with Yerkes during World War I. Kellogg began work on the revision of this test in the early 1930s with N. W. Morton (n. d.). Morton joined the department in 1932, worked with Kellogg on test development and was the first recipient of a Ph.D. degree in psychology at McGill (1933). The revised test was published in 1935 and was widely used by the Canadian military. It is interesting to note, for what it says about the status and public image of the discipline at the time, that there was considerable resistance to naming these tests after the university, first by the Registrar T. H. Matthews in a letter to Principal Currie (Matthews, Dec 11, 1931) and conveyed again by Principal Currie himself to Tait two years later (Currie, Jul 10, 1933).

Throughout the late 1920s and early 1930s undergraduate demand for psychology continued to increase. In response to this demand, Tait expanded course offerings in the department, introducing Business and Industrial Psychology, Child Psychology, Vocational Psychology, and several psychological measurement courses. Based on their own accounts, Tait and Kellogg were overworked and underpaid in these early years and had little time left outside social work for research and writing. The education of academic psychologists through graduate research and training at McGill, like all sciences, was especially important for a young department (only three Master's degrees were awarded for theses in psychology when it was part of philosophy). In 1928 a Ph.D. program was established and five graduate courses were initially offered. The calendar lists the regulations for attainment of the Ph.D.: students were required to have some knowledge of advanced statistical methods and some ability in 'shopwork' (enough at least to show they were capable of designing and constructing simple laboratory apparatus). Comprehensive examinations were required on the history of psychology, principles of psychology, experimental and physiological psychology, statistical method, and contemporary psychology (Ferguson, 1982).

Between 1924 and 1946, about 40 master's degrees in psychology were granted. The first Ph.D., titled "The industrial quality of the unemployed," was supervised by Kellogg and awarded in 1933 to N. W. Morton. Only four such degrees were granted between 1928 and 1939 (Nelson W. Morton, 1933; Edward C. Webster, 1936; Joseph A. Bois, 1936; Kenneth E. Norris, 1939) -- all of whom would later work in the department. While the rate of Master's degrees being earned was greatest in the late 1920s, between 1924 and 1943 there was a stable rate of about two every year. Throughout the 1920s Tait tended to co-supervise MA students with faculty outside psychology. Throughout the 1930s and early 1940s Tait and Kellogg would alternate supervision of students every couple of years. Tait was involved in the supervision of two-thirds of all degrees awarded and Kellogg a third.

Topics throughout the 1920s and 30s were consistently of an applied nature and involved a review of current thought about a particular subject of social interest rather than empirical experiments. Indeed, MacLeod, as a graduate student in the department from 1926-1929, reported that, "Nobody was doing any experiments except these little exercises in the undergraduate lab" (Myers, 1974, p. 108). MacLeod noted that it wasn't until he studied abroad in Germany in the late 1920s that he 'discovered psychological experimentation' (Myers, 1974,

p. 108). The first thesis which included original research was that of Kenneth W. Spence (1907-1967) in 1930. He conducted experiments on complex maze completion with psychology undergraduates at McGill and would be known for his theoretical and experimental contributions to learning theory and motivation (see Chapter Three; Kendler, 1967). Of all the 42 degrees offered by this department prior to 1943, only seven of them were earned by women.

While abroad in Berlin on a Moyses Traveling Scholarship, MacLeod summarized his impressions of “German methods and our own methods” which he sent to Dean MacKay (MacLeod, Mar 6, 1929). In short, MacLeod held that McGill stood up well to comparison, although he suggests “a greater emphasis on systematic investigation, if necessary, at the expense of some of the teaching” would be a good idea (MacLeod, Mar 6, 1929). Correspondences show MacLeod stayed in contact with Currie and the Department while holding positions at Columbia and Swarthmore (MacLeod, Apr 17, 1933), and applied for an Assistant Professorship at McGill in 1931 (MacLeod, Jan 27, 1931). MacLeod would later return to McGill to play an important role in postwar reconstruction of the Department of Psychology (see Chapter Two).

A report prepared by Tait in 1930 described the typical research interests of the time. The list of topics actively under research varied and included: ‘relation of reaction time to physiognomy, race and sex’; the study of ‘humidity as it affects work’ in cooperation with the Department of Industrial Medicine; correlation between Allport A-S Reaction Test and intelligence; psychological survey of Rushbrook school with ‘special reference to grading, mental hygiene, and curriculum’; ‘psychology of journalism with reference to make-up, headlines, etc.’; the study of ‘the fatigue of school children at three levels of intelligence’; the ‘psychology of applause’; study of rhythm and time; a ‘new type of paper image allowing for visual cues,’ and so on (Tait, Apr 22, 1930).

4. b. Activities of the new Department of Abnormal Psychology under Bridges, 1924-1930

Throughout the 1920s and 30s psychology in the Faculty of Arts maintained a steady amount of teaching and graduate training. At the same time, however, another strand of psychology at McGill emerged in the Faculty of Medicine. The Department of Abnormal Psychology -- though lacking formal graduate training -- maintained a fairly regular schedule of research and teaching of clinically-relevant psychological subjects from 1924-1935. Although little is known about specific activities, it represents one of the first official departments of its

kind at a School of Medicine in North America (Ferguson, 1982). Furthermore, the establishment of two departments during a time in which most Canadian universities had none, is significant for what it says about the tensions of disciplinary formation and the institutionalization of academic psychology during this period.

The establishment of the Department of Abnormal Psychology at McGill was possible due to funds made available by the Rockefeller Foundation under the guidance of the Canadian National Committee for Mental Hygiene. The Canadian and the U.S. National Committees developed different relations with the Rockefeller philanthropies (Fisher, 1993; Kohler, 1991). When the U.S. National Committee was receiving much of its early funding, the guiding policy was the mobilization of existing knowledge related to public health and mental deficiency; as this policy was slowly phased out in the 1920s the U.S. Committee received less funds (Pols, 1999). The agenda of the newly formed Canadian National Committee (est. 1918) organized itself around the emerging priorities of its primary funders. The Laura Spelman Rockefeller Memorial fund (LSRM) played a significant role in the funding of early social science research in North America (Bulmer & Bulmer, 1981). The Canadian Committee was one of the first institutions to receive funding according to the policies of the LSRM. The officers experimented with funding university-based research centers with the aim to create a new generation of elite scientist-teachers (Pols, 1999; Bulmer & Bulmer, 1981). The Department of Abnormal Psychology at McGill was one such research center in Canada.

The Rockefeller Foundation was fundamental to the development of medicine at McGill after 1924 (Brison, 2005; Frost, 1984). Following a survey of Canadian universities by the Foundation's Division of Medical Sciences in 1920, the Rockefeller Foundation decided to support a number of medical schools in Canada. Working together in a national system, the aim was to have these schools address regional and cultural considerations as well as medical ones: It was an example of central management not only for medical education, but also for Canadian culture (Brison, 2005). The Rockefeller Foundation hoped to transform specific institutions in strategic locations across Canada in a way similar to what the Carnegie Foundation had done with Johns Hopkins following the results of the Flexner Report in 1910 (Flexner, 1910). McGill University was among a handful selected to become models for less fortunate universities to emulate and received substantial grants in 1923 and 1932 (in addition to the original endowment). Indeed, the 1932 grant was the Foundation's largest in the medical sciences that

year and went towards the establishment of the Montreal Neurological Institute, the construction of laboratory facilities at McGill's Royal Victoria Hospital, and endowed new departments in clinical neurology, neuropathology, neurophysiology, and neurosurgery (Brison, 2005; Gavrus, 2011). McGill and Montreal were designated centers for American and Canadian investment in brain studies in the 1930s.

The Rockefeller Foundation used the National Committees as intermediaries to coordinate the funding of a wide diversity of initiatives in mental hygiene (Richardson, 1989; Pols, 1999). The decision to use intermediaries was designed both to maintain a position of impartiality and independence as well as to be able to rely upon the experts to judge the quality of applications for funding. Like the mental hygiene program in Toronto, the McGill program was mostly funded by the LSRM. Beardsley Rumel (1894-1960), consummate "man of affairs" and the first director of the LSRM in 1922-29, had received a Ph.D. in psychology from the University of Chicago in 1917. Rumel had hopes of addressing real social problems and bridging the cultural lag between the natural and social sciences through institution building and the support of interdisciplinary, problem-oriented research (Bulmer & Bulmer, 1981; Samelson, 1985; Shore, 1987).

Rockefeller Foundation officers were pleased with the psychological research in Toronto and with the Canadian National Committee in general (Pols, 1999). The role of psychologists and other behavioral scientists was important to the Foundation's plan to increase its emphasis on the support of advanced medical teaching and research in order to properly realize the Flexner plan in Canada. The Rockefeller Foundation was therefore keen to foster the kind of productive relations between academic psychologists and members of the Faculty of Medicine at McGill as had been established at the University of Toronto. The drive for the inclusion of more psychological research and training at medical schools corresponded with the concerns of the president of the Foundation, George E. Vincent (1864-1941), himself a Chicago-trained sociologist, that scientific medicine tended to overlook the whole person and therefore supported investigation into the field of psychosomatic medicine (Pressman, 1998).

The Canadian National Committee received a large grant (\$75,000) from the LSRM fund and the Lady Byng of Vimy Fund for Mental Hygiene was inaugurated in 1924. Thus, by the mid-1920s, the mental hygiene movement in Canada had received a substantial influx of financial support already (Richardson, 1989). Hincks, who had been intimately involved in the

creation of the original National Committee, maintained a warm relationship with officers from the Rockefeller Foundation and was credited for the procurement of these funds (Richardson, 1989). Support for the activities of the National Committee was negotiated by Hincks on the grounds of an explicit separation of research labour: “two strategic mental hygiene centers specializing in two fundamental branches of work [...] Montreal would be concerned primarily with the organic side of psychiatric research, while Toronto work would be concerned chiefly with the psychological approach” (CNCMH, 1924). It was this designation of “two strategic mental hygiene centers” that I argue contributed to the creation of two separate strands of psychology at McGill as the National Committee chose to support the “organic side of psychiatric research” through the Department of Abnormal Psychology in the Faculty of Medicine. Financial support was eventually withdrawn due to a lack of cooperation between two rival departments, and unable to develop ties with the medical community as had been established at the University of Toronto (Pols, 1999).

Much of the Rockefeller funds for mental hygiene supported National Committee activities in Montreal. For example, Baruch Silverman (n. d.) opened the Child Guidance Clinic at the Royal Victoria Hospital in 1925. Here, longitudinal studies focusing on the role of environmental conditions on abnormal behaviour were carried out and the Family Life Education programme was initiated; Silverman gave public lectures on the theme of “Mental Hygiene of Childhood” (Griffin, 1989; Gleason, 1996). Psychologists working at the Faculty of Medicine received salary support from the National Committee (Griffin, 1989; Gleason, 1996): In 1926, the National Committee was granting salaries and honoraria to 22 staff members – 16 of whom were psychiatrists or psychologists (CNCMH, Dec 3, 1926). Silverman was among the first practicing psychiatrists in Montreal (Hutchison, 1973; Cameron & Silverman, 1965).

In 1929, the outpatient clinic at the Royal Victoria Hospital became the Mental Hygiene Institute of Montreal and moved to university buildings adjacent to the medical school and hospital. One of its primary activities was the teaching of psychiatry and mental hygiene to undergraduate medical students, nurses in training, and students in the McGill University School of Social Work. When the Allan Memorial Institute was founded in 1943, the Mental Hygiene Institute reverted to its primary purpose of encouraging mental health in the population at large. B. Silverman guided the activities of the Mental Hygiene Institute as Assistant Director 1929-1941 and succeeded W. T. B. Mitchell (n. d.) as its Director from 1941-1969. The Mental

Hygiene Institute was important for disciplinary expansion; the clinic represents one of the earliest sites for the collaboration of psychologists and psychiatrists at McGill, supported and developed by the National Committee (Hutchison, 1973).

The Rockefeller Foundation grants received by the Canadian National Committee, and overseen by the Dean of Medicine (Martin) allowed for the appointment of a full-time psychologist to the Faculty of Medicine. James W. Bridges (1885-1980) was called in 1924 from the University of Toronto where he had worked with Bott and had met Hincks. Through this connection to Hincks he was selected to head efforts to establish a medically-oriented psychology program in Montreal (Bridges, 1966). Bridges had a background in what would now be considered clinical psychology; he had worked as a psychological intern in the Psychopathic Hospital in Boston in 1913-1917 where he met psychologist Robert Yerkes (1876-1956) with whom he collaborated on test development for the U.S. Army during World War I (Haraway, 1989). In 1924 he was appointed Associate Professor in the Faculty of Medicine and established the Department of Abnormal Psychology. Bridges was among the first psychologists in North America appointed in a Faculty of Medicine (Ferguson, 1982; Bridges, 1966). Bridges' appointment to the McGill Medical School was part of Hincks' aim to extend the work of the National Committee and the New Psychology into Montreal (Bridges, 1966). The teaching of psychological principles to medical students and staff was conducted at the outpatient clinic at the Royal Victoria Hospital in partnership with faculty and staff at the Montreal Mental Hygiene Institute. In 1924 Bridges took over this teaching appointment which had been held by Tait.

In 1929, Bridges was promoted to full professor in the Medical School. By then, Bridges was teaching at least four courses as part of the Department of Abnormal Psychology to medical students: a basic course in both normal and abnormal psychology which was to follow regular courses in anatomy and physiology (Bridges, 1966), a course on mental measurement for students in psychiatry, a course on child psychology for students specializing in pediatrics, and a course on psychology in industry intended for students in industrial medicine (Ferguson, 1982).

Psychology in the Faculty of Medicine was doing quite well under Bridges and was considered an important subject by the Dean of Medicine; the 1920s and 1930s were the most productive in Bridges' career (Ferguson, 1982): In 1930, he wrote a textbook, *Psychology, Normal and Abnormal*, and in 1932 he published *Personality, Many and One*, a book concerned with personality variables, and their integration. In 1935 another book, *The Meaning and*

Varieties of Love, was published. He also wrote a number of articles and monographs on juvenile delinquency and problems of mental health and abnormal psychology based on his work with the National Committee (Bridges, 1966). Bridges accepted short term teaching positions as a visiting professor at Clark University in 1926 and conducted summer courses at University of California Berkeley in 1930 and 1932 (Bridges, 1966).

Early intervention and parent education were viewed as essential elements in any effective preventive mental hygiene program. Encouraged by Hincks, the LSRM funds were used to establish a Child Nursery School and Child Study Centre at both McGill and Toronto, respectively. The objective in establishing such schools in university settings was to achieve, through child development and family relations research, mental health goals. Hincks and the Committee for Mental Hygiene were convinced that mental health had its beginnings in childhood. Bridges' wife, Katherine W. Banham-Bridges (1897-1995), was also an academic psychologist. She completed her degrees at Manchester and the University of Montreal, specializing in the emotional behavior of children (which she published in both English and French), and was the first woman to graduate with a Ph.D. from the University of Montreal in 1934 (Wright, 2002). She came with her husband from Toronto and joined the Nursery school at McGill when it was established under the direction of pediatrician A. B. Chandler (n. d.) in 1925. Banham-Bridges was responsible for research, and Bridges took on an advisory role. She published several studies from this time, worked with her husband on various problems of juvenile delinquency (e.g., Bridges & Banham-Bridges, 1926) and developed a genetic theory of emotions relating early childhood to mental health problems (Banham-Bridges, 1932; Northway, 1973).

Unlike the Child Study Centre established at the University of Toronto, the Nursery ultimately failed to receive adequate support from the Department of Psychology (Wright, 2002): Faculty members and students showed little interest in collaborating or conducting research at the nursery, which meant Banham-Bridges tended to work alone (Banham, 1983). The National Committee withdrew its financial support after five years since a wider research program had not been established during this time -- the nursery had not been used by psychologists or any other department at the university for teaching or research purposes. The Institute for Child Study at Toronto, on the other hand was a striking success (Pols, 2002). Bridges later established himself at Sir George Williams University (today Concordia University) where he remained from 1940-

1963 and Banham continued academic work in the field of child development at Duke University in North Carolina.

When conditions at the Rockefeller Foundation changed and funding for mental hygiene research at McGill was no longer forthcoming in the 1930s, Bridges and Banham-Bridges lost their appointments at the university. Bridges describes the conditions leading to his departure as bureaucratic: “We got a new Dean of Medicine and a new University Principal. The Medical group decided that students should have Psychology in the Arts Course before entering Medicine, and of course, they were backed by the Principal. This put me in a difficult position. So I resigned in 1938” (Bridges, 1966, p. 405). This account, however, neglects to mention the interdepartmental difficulties and the loss of Rockefeller funding, both would have tremendous bearing on the viability of the Department of Abnormal Psychology at McGill. In my research I've discovered evidence of ongoing attempts throughout the 1920s and 1930s by the university administration and National Committee to bring together the two strands of psychology – the department in the Faculty of Arts & Science and the department in the Faculty of Medicine.

These attempts were unsuccessful primarily because Tait refused to work with Bridges. This interpersonal conflict would affect the direction of psychology at McGill throughout the interwar period as Tait was unable (or unwilling) to establish the sorts of networks and alliances that the fledgling discipline of psychology needed for either strand of psychology to truly flourish during this period (as it had at the University of Toronto through partnership with psychiatrists). Indeed, in the following chapters I will demonstrate how much of psychology's early success in establishing itself as an independent discipline (from philosophy) was, counterintuitively, by aligning itself more closely to other disciplines (i.e., those of biomedicine).

The department of psychology at McGill represents an important case study: before and after World War II its relationship to medicine shifted dramatically (from an extension of the helping professions to a laboratory-based scientific field). I am arguing close collaboration between psychology and medicine has been a boon for its development in Montreal and at McGill, one which I will explore in greater depth in later chapters. For now, it is relevant to note some of the ways the interpersonal and professional challenges affected the growth of Canadian psychology. For example, psychology graduate students ceased to be co-supervised by faculty in other departments; faculty were hired internally and thus often failed to bring fresh new ideas or existing academic networks with them (strong ties); and some of the most prominent graduate

students during this period decided to leave McGill for more hospitable and cooperative pastures (e.g., MacLeod, Spence, and Hebb).

4. c. Burning Bridges: Interpersonal conflict between Tait and Bridges

The separation of psychology from Medicine at McGill shaped the development of this discipline in Canada for almost a quarter century. In this section, I examine some of the reasons academic psychology divided so starkly into these two different strands in the 1920s and 1930s. My main argument is interpersonal and best understood in the context of the role of the mental hygiene movement in the promotion of early psychology in Canada: At its core, this plays out in terms of the conflict that arose between Tait and members of the National Committee (such as Bridges, Hincks, and Martin). In correspondence among members of the university administration and the National Committee repeated concerns can be found regarding a disunified psychology at McGill. This section outlines the interpersonal and disciplinary differences that led, on the one hand, to two separate strands of psychology at McGill and on the other, to the gradual loss of support for psychology from the National Committee as the Rockefeller Foundation gradually lost faith in interdisciplinary public health initiatives in the early 1930s.

Although prominent psychologists, like William James (1842-1910), were among its founding members, the role of psychologists in the U.S. National Committee was less pronounced at its inception than its later Canadian counterpart (Pols, 1999). This early participation by psychologists had an important role in the direction mental hygiene would come to take in Canada compared to the United States: it transformed the focus of Canadian activities towards normal child development rather than a strict concern with mental illness or mental deficiency (Pols, 1999). This created space for psychological expertise in the child study program developed at Toronto but which lacked the same kind of support at McGill (designated the site for “the organic side of psychiatric research”). This created a fragmented mental hygiene movement in Montreal as medical men (like Silverman and Bridges) dominated the attention (i.e., allocation of funding for research and teaching) and support of the National Committee.

The relationship between Tait and Bridges begins in 1910, shortly after Tait was appointed to the Department of Philosophy. He taught Bridges' first class in psychology using James' *Briefer Course*. With Tait's help Bridges obtained a scholarship to Harvard the following year and completed a Ph.D. with Münsterberg, as Tait had done (Bridges, 1966; Ferguson,

research at the forefront of neurology coming from collaboration between members of the department of psychology and the MNI (see Prkachin, 2018). Similar to the “Harvard complex” described by Isaac (2012), these connections intimately shaped the institutional milieu in which McGill psychologists constructed their models of scientific practice. These psychological practices linked more to those of neurology than contemporary behaviorism (i.e., Morawski, 1986) and eschewed therapeutic expertise (e.g., Collins, 2006), placing McGill psychology more closely aligned with the biological sciences.

Canadian psychologists in the 1950s, such as Hebb, felt considerable pressure to compete with applied psychologists in order to define the discipline, both within academia and in society. This pressure contributed to the development of a particularly biological-oriented psychology at McGill, and created a psychological tradition specific to the period. This was possible in no small part to the wartime connections that Hebb and others fostered after the war and contributed to a disproportionate allocation of defense-related spending at universities such as McGill University. After Hebb stepped down, the 1960s came to reject the narrative of meaningful separation between applied and basic psychology, especially in the field of clinical research and practice. Research in the 1950s was characterized by the desire to establish psychology on the firm footing of a biological science, in the 1960s (post-Opinicon) Hebb's vision for psychology as an integrative field (Hebb, 1949) was made to reconcile with the realities of the challenges faced (Hebb, 1960).

After the Couchiching conference the argument about “premature professionalism” was gradually replaced with a different set of concerns. The post-Hebb 1960s saw a flourishing of clinical research and training at McGill. To what degree then should we take serious worries about 'over-selling' psychological expertise to the public? Were they simply worried about losing control of an emerging discipline? Given the integration of experimentally-trained psychologists into academia after World War II, it is not surprising that conflicting interests emerged between them and the new classes of professional psychologists that were being created to address the new realities of a increasingly managed postwar psychological society.

Chapter Five: Between Brain and Body - The Legacy of Hebbian Neuropsychology

This chapter explores the unique styles of psychological research that emerged at McGill after World War II under the chairmanship of experimental psychologist Donald O. Hebb (1904-1985). By unique style of psychology, I refer to something less sweeping than A. C. Crombie's (1994) but aligned closely to Hacking's notion of 'styles of reasoning' (Hacking, 1992): a laboratory style that is mostly public, not entirely impersonal, but restricted in scope, in time and in space. This period, which spanned 1948 to 1958, marked the emergence of a psychology comprised mainly of blending the laboratory style of neurophysiology (in the traditions familiar to the Yerkes Laboratories and the Montreal Neurological Institute; see Chapter Three) with unique Canadian postwar professional and academic concerns (such as the patterns of funding and the promissory nature of biological science; see Chapter Four). It was in the reconstruction of the "frustrating" fifties that Canadian psychology had "come of age" (Wright, 1969; Wright & Myers, 1982). Yet, little historical research has yet few have examined the conditions giving rise to this remarkable period of discovery and innovation in Canadian history. Rather, the shifts and struggles characteristic of psychology at this point in its disciplinary history are incorporated into broader histories of the neurosciences, downplaying continuities with behaviorist thought and obscuring the specific, local conditions that shaped the kind of neuro-psychology that was made possible in Canada and at McGill at this time.

Hebb has been described as having "helped clear the way for the cognitive revolution" and to have "rejuvenated interest in physiological psychology" after World War II (e.g., Klein, 1999, p. 1). Indeed, he did so in a way that reflected a set of historical concerns and priorities that should be closely examined. The research conducted by Hebb, his colleagues, and their students during the 1950s put Canadian psychology on the map (MacLeod, 1955; Brown & Milner, 2003) and contributed importantly to the resurgence of the localizationist paradigm that undergirds much of our modern understanding of the human brain (Prkachin, 2018). While Lashley and the early psychobiologists displaced the localization theory dominant in the 19th century (e.g., phrenology; Harrington, 1987), Hebb and his colleagues contributed importantly to the revival of localizationist thinking in psychology. Importantly, while this thinking is often tied to the rise of computational reasoning (the systems approach of the

cybernetic moment; Kline, 2015; Heyck, 2015) and the cognitive revolution in psychology (Gardner, 1985), Hebb's neuro-psychology is surprisingly "lively" (biological) in its approach to understanding thinking, or cognition (Hebb, 1949). The discoveries highlighted in this chapter (i.e., the psychology of isolation, rewards, and pain) are notably located in the bodies as much as the brains of rats, dogs, and humans; this chapter therefore draws on the history of emotions (Dror, 1999; 2001; Leys, 2010), cerebralization (Vidal, 2009; Vidal & Ortega, 2017) and subjectivity (Rose, 1998; 2003) to make an argument for the particular kind of psychology that emerge at McGill in the 1950s: a neuro-psychology of mind.

Following the momentum established by Wilder Penfield (1891-1976) and the pioneering efforts of the Montreal Neurological Institute (Guenther, 2016; Gavrus, 2011), Montreal and McGill were designated sites of national research priority in neurology and neurosurgery. The MNI and the Department of Psychology were supported by increases in postwar spending by the Canadian government in health sciences and higher education (Frost, 1984). McGill in the 1950s was becoming a hub for innovations in neurology, neurosurgery, psychiatry, and neuropsychology (Prkachin, 2018; Parent, 2017). This was the "golden age" of the MNI (Feindel & Leblanc, 2016). Among neuroscientific medical luminaries active in Montreal in the 1950s were William Cone (1897-1959), Herbert Jasper (1906-1999), David Hubel (1926-2013), and countless others (Preul et al., 1993). Even today, Montreal markets itself as a "city of neuroscience" (Tourisme Montreal, 2017).

The postwar surge of immigration to Montreal was accompanied by considerable investment in health services and medical research. For example, the Montreal General Hospital transformed from a community hospital serving anglophone Montreal to an internationally recognized academic centre during the 1950s and '60s (Hanaway & Burgess, 2016). New professionals such as economists, labour relations specialists, social workers, and psychologists constituted a growing share of Montreal's elite (Linteau, 2013). Academics were quick to leverage this newfound visibility and Montreal enjoyed scientific prestige as the site for international conferences (e.g., the International Symposium for Psychology in 1954), major scientific conferences, and significant infrastructural investments throughout the postwar period (Frost, 1984; Linteau, 2013).

To understand the conditions of Canadian research psychology in the 1950s, it is important to consider broadly the implications of Hebb's ideas on the thinking and work of

fellow psychologists at McGill. The department of psychology received, trained, and inspired numerous student and post-doctoral researchers both in Canada and abroad. The sensory deprivation studies conducted by Woodburn Heron, B. K. Doane and T. H. Scott involved “opening up new ground” while his other graduate students, including Peter Milner, Seth Sharpless, Mortimer Mishkin, were more involved with “cleaning up and systematizing the areas opened up earlier” (Hebb, 1952). Many simultaneous lines of research were being pursued in the department throughout the 1950s. In a report to the CPA in 1955 the department reported no less than fifteen concurrent areas of research activity associated with McGill University (CPA, 1955), significantly more than other Canadian universities at the time. McGill was among the most productive and influential departments of psychology in postwar Canada. In a 1957 survey, McGill contributed more articles by institution than any other. Hebb was (by far) the most referenced psychologist, followed by Americans L. L. Thurstone (a psychometrician) and Kenneth Spence (Hullian behaviorist) (McCormack, 1958). To be sure, McGill was not the only major hub for academic psychology after the war; Toronto and Ottawa each had well-established departments by the early 1950s (Wright & Myers, 1982), though the orientation remained dominated by applied concerns until the 1960s. At McGill, during the same period, the direction of academic psychology took a decidedly different direction.

Compared to the history of psychology in the United States and Europe, comparatively little has been written about the history of psychology in Canada. That which has been written consists primarily of “insider” histories. Administrative and departmental records prior to the 1970s are few and far between. The challenge of piecing together this period is made more challenging by both the scarcity of historical records from this period and the fact Hebb often chose *not* to include his name on projects to which he contributed, as a means to heighten the visibility of his students (Fentress, 1999). Furthermore, the kind of face-to-face influence that comes about through professional interaction (e.g., having a conversation or eating lunch together because the Department of Psychology and the Department of Experimental Medicine at McGill are physically located in the same building) tends to be more difficult to reconstruct through archival traces than collaborations based around written correspondence.

This chapter tells the story of how a handful of postwar psychologists at McGill—including Donald O. Hebb, Dalbir Bindra, Peter Milner, Seth Sharpless, and Ronald Melzack, and others—(re-)built their department and in doing so pioneered a different kind of psychology

in Canada. A series of case studies will illustrate how research and innovation affected, and were affected by, multifaceted concerns and priorities from this period. These cases include experiments into sensory isolation, explorations of reward mechanisms in the brain, and pioneering studies of pain psychology. I will examine some of the scientific and institutional contexts to which psychology at McGill during this period belongs, going beyond a disciplinary account of the achievements of Hebb and his ideas. This examination involves a close consideration of the factors that shaped the conditions of discovery and in doing so hopes to provide a more accurate understanding of the position of Hebb and McGill within the historiography of Canadian psychology.

1. Taking Shape: Hebb's Postwar Research Agenda, 1948-1958

Similar to many Canadian departments of psychology after the war, McGill underwent a period of unprecedented growth (Wright & Myers, 1982). When Hebb and Ferguson joined the department in 1947 the only other full-time faculty members had been MacLeod and Kellogg, with Webster and Alexander as part-time staff (Ferguson, 1982). Morton was still serving as part of the Defense Research Board in Ottawa (an important liaison to the department) and Murray de Jersey was on leave (MacLeod, Sept, 1946). Together with MacLeod, Hebb was given a mandate to modernize psychology at McGill, to bring it to the forefront of scientific excellence. The disciplinary changes induced by the war had created an identity crisis in Canadian academic psychology, one that had existed but had been largely dormant until this time (see Chapter Four). Hebb's appointment to McGill and subsequent leadership of its department of psychology symbolized an important commitment from the university and research community to establish Montreal as a hub for experimental and biological psychology in Canada. Hebb's first move, therefore, was to firmly establish the department's position. This involved the establishment of animal laboratories, the call for particular kinds of psychological (and non-psychological) expertise, and the mobilization of scientific research efforts across disciplines.

1. a. New students, new expertise

After Hebb assumed chairmanship of the department in 1948, his first hire was another Harvard-trained comparative psychologist interested in the biological underpinnings of behavior, Dalbir Bindra (1922-1980). In 1948 Bindra completed his Ph.D. at Harvard under the supervision of Joseph C. R. Licklider (1915-1990) on motivation and hoarding behavior of rats.

Licklider, who would become one of the most important figures in the history of computer science and general computing history (e.g., Licklider, 1960), was at that time a research fellow and lecturer in the Psycho-Acoustic Laboratory at Harvard. Bindra's study of behavior and motivation was deeply influenced by the work of E. G. Boring, Gordon Allport, S. S. Stevens, and others (Hebb & Ferguson, 1981); these Harvard psychologists contributed importantly to the shaping of postwar American psychology (Isaac, 2012) and a psychological form of Bridgman's operationalism (Green, 1992). Bindra, sharing Hebb's wide range of research interests in the neurophysiology of emotion and the neural correlates of intelligence, was among his closest collaborators in the 1950s. Though interestingly they only published once together, on scientific communication (Hebb & Bindra, 1952). Bindra was elected President of the CPA in 1958 (the third from McGill in five years) and Chair of the Associate Committee on Experimental Psychology of the NRC. In 1975, he was appointed Chair of the Psychology Department of McGill. Bindra published *A Theory of Intelligent Behavior* in 1976; this book extended Hebb's concept of the "cell assembly" and proposed an integrative system to explain adaptive behavior.

A number of Canadian psychologists who spent time at McGill in the early 1950s would go on to establish experimental practices elsewhere. John Zubek (1925-1974) and William Thompson (n. d.), two recent graduates, rural Canadians trained in the United States (like Hebb) with hopes to pioneer the new scientific discipline at Canada's major research universities. Zubek was a Czech-Canadian immigrant who completed a Master's degree in social psychology at the University of Toronto and a Ph.D. from Johns Hopkins University in 1950. Zubek spent three years as an assistant professor at McGill (1950-1953). Zubek was enthralled by the sensory deprivation research carried out by Hebb, although he was not directly involved with this work (Raz, 2013). Zubek and Hebb were close, he was among those Hebb depended to run the department during the early years (Hebb, 1980). Zubek accepted a position as Chair of the Psychology Department at the University of Manitoba in 1953. He continued and extended the studies Hebb and his group at McGill were in the process of conducting and maintained liaison between the two (Rosner, 2016). Zubek was "interested primarily in establishing psychology at the University of Manitoba as a distinct academic discipline [...] the driving spirit of the department [...] John made psychology at Manitoba known internationally" (Wright, 1982, p. 173). He established the Manitoba Sensory Isolation Laboratory and became an international authority on the subject (see Raz, 2013b and Harper & Bross, 1978).

William R. Thompson completed a Master's at Queen's University and a Ph.D. from the University of Chicago in 1951. Thompson spent his postgraduate years (1951-1954) working with Hebb in the Department of Psychology at McGill. Thompson was trained as a physiological psychologist in Lashley's long-shadow; his dissertation was titled, "Discrimination behavior of the cat after selective ablation of visual cortical area" and much of his work explored the heritability of intelligence and emotionality in rats and dogs (e.g., Bindra & Thompson, 1953; Thompson & Heron, 1954a; Thompson & Melzack, 1956; Thompson, 1957). Thompson returned to Queen's in 1954 for a couple years before accepting a position at Wesleyan University in Connecticut. In 1966, Thompson again returned to Queen's, this time as Head of the Department of Psychology (Inglis, 1982).

Haldor Enger Rosvold (1916-1997) was hired soon after Hebb's arrival to teach a course on personality and to supplement the supervision of students. Rosvold had just finished his Ph.D. at Stanford, where he had worked with Calvin Stone (Mishkin, 2001), a pioneer of early psychobiology and one of Lashley's early physiological psychology graduates (Rosvold, 1955; Pickren, 2006). Among Rosvold's first students were Sam Rabinovitch and Mortimer Mishkin (Rabinovitch & Rosvold, 1951; Mishkin, 2001). Rabinovitch, trained as a psychologist, was involved in the in the early development of child psychiatry in Canada; through his clinical expertise and work on learning disabilities, he established the Learning Clinic at the Montreal Children's Hospital (MacDermot, 1961; Ferguson, 1982), which has since been re-organized as the Child Development Program. Rosvold supervised Mishkin's Ph.D. research, which was being conducted in partnership with the Yerkes Primate Laboratory and neurosurgeon Karl Pribram (1919-2015), who had been one of Hebb's colleagues at Orange Park with Lashley in the 1930s (M. Mishkin, transcribed interview, 2001, p. 15).

Mishkin went on to conduct groundbreaking studies in the areas of memory and cognition; his work contributed to the discovery of two separate brain processes for encoding memories (Mishkin et al., 1983). He later became the National Institutes of Mental Health's chief scientist and was awarded the National Medal of Science in 2009. Mishkin would later note that, "Hebb was perhaps my most influential mentor ever, not because I had a lot of direct interaction with him, but because I was a student in his lab" (Mishkin, 2001, p. 5). In addition to teaching and supervising at McGill, both Mishkin and Rosvold were early neuro-psychologists and Hebb's allies, instrumental to the establishment of the animal laboratories in Canada and

abroad. Mishkin and Rosvold both departed Montreal only a few years later to work with Carlyle Jacobsen as part of the Lobotomy Project at Yale (M. Mishkin, transcribed interview, 2001, p. 9; Morawski, 1986).

Hebb ran the dominant experimental division of the Department of Psychology with the close help of Bindra, Thompson and Zubeck (Hebb, 1980). Both Woodburn Heron and Peter Milner were “*de facto* instructors before they graduated” (Hebb, 1980, p. 300). This small group worked tirelessly to create an environment ideal for scientific training; in many ways Hebb aspired to model the pedagogical practices characteristic of the intellectual dynamics he had experienced in the interdisciplinary laboratories of Lashley (Dewsbury, 2002) and Penfield (Prkachin, 2018; Feindel & Leblanc, 2016). Accounts by graduate students from this time frequently reflect on the freedom they were provided to pursue their own interests and to experiment without restriction on subject matter or method (e.g., Mishkin, 2001; Fentress, 1999). Among the first graduate students to be formally supervised by Hebb were Bernard Hymovitch (PhD, 1949), Woodburn Heron (MA, 1949), Thelma Gordon (MA, 1949), and Donald Forgays (PhD, 1950).

The relations Hebb had established with the Montreal Neurological Institute (as well as other hospitals) meant that psychological research had access to clinical and experimental data that, for psychologists, was rarely available. With the range of experience and expertise Hebb had gathered at McGill, new experimental possibilities emerged (Prkachin, 2018). For example, Mishkin recounts how, as a researcher in Hebb’s department, changes in intelligence after surgery could be explored by comparing the intelligence tests of war veterans who had become schizophrenic and were ‘treated with lobotomy’ at St. Anne’s Hospital. Ties to neighbouring hospitals were supported by the university and the MNI. This facilitated collaboration and access. Mishkin reflected, “This had never been possible before” (M. Mishkin, transcribed interview, 2001, p. 8).

Hebb’s department established numerous ties with other McGill-affiliated institutes such as the Allan Memorial Institute and the Mental Hygiene Institute (both a few blocks away from each other). Psychiatrists and clinical psychologists from these institutions regularly supervised graduate students in Hebb’s department. From outside the department Robert Malmo and Abraham Luchins supervised the most students. Malmo was a Yale graduate (1940) who had also worked at Yerkes Laboratory in the late 1930s and was appointed Director of the Laboratory

of Psychological Studies at the Allan Memorial Institute in 1948. He was known at the time for his electrophysiological research, contributions to experimental psychopathology (Bernhardt, 1958), and advocacy of psychosomatic approaches to medicine (Malmo, 1952). Luchins was a Gestalt psychologist who had been a student and close collaborator of Max Wertheimer's after the latter fled Germany to the United States in the late 1930s. MacLeod, who had studied psychology in the 1920s in Berlin, invited Luchins to serve as Lecturer in the late 1940s (Luchins, 1993). He conducted research on the role of mental set (*Einstellung effect*) and group psychotherapy. While Luchins was not formally appointed to the psychology department, he nevertheless provided an important perspective and later remarked how he was often called upon to 'defend the Gestalt position' in the department (Luchins, 1993).

Key to attracting high quality faculty and students was the opportunity to conduct innovative research. The connections that Hebb fostered with associated departments and institutions provided some opportunities for research but most importantly the department's own laboratories were in desperate need of improvement. The highest among Hebb's priorities was the creation of an experimental animal laboratory.

1. b. Establishing the animal laboratory

The psychological laboratory is often central to histories of psychology as a scientific discipline (Caphew, 1992), the importance of the laboratory underscores its capacity to provide insight about the cultures of modern psychology (Danziger, 1990). In Hebb's first year at McGill, he worked closely with MacLeod to establish a modern psychological laboratory, unlike any that had existed in Canada at the time (Wright & Myers, 1982). Hebb oversaw the creation of facilities for experimental animals (rats at first, then later dogs), similar to those he had attempted to establish at Queen's in the late 1930s (Murray, 2012; Inglis, 1982). The acquisition of laboratory animals, paired with the comparative psychological expertise of Hebb and Rosvold (the Yerkes-Lashley connections), kicked off a new era of experimental work at McGill and the MNI (Prkachin, 2018).

Both MacLeod and Hebb were convinced that the basis of academic psychology in so far as it was recognized as a well-established scientific discipline (see Chapter Four). If Canadian psychology was going to break its dependence on American funding and become capable of attracting the highest-calibre students, the department at McGill would need to become world-class, able to offer excellent opportunities to practice and develop practical research skills. The

attitude embraced by Penfield and the MNI throughout the 1940s supported the work of psychologists in clinical settings (see Chapter Three), though Penfield remained aloof to the world of academic psychology generally (Prkachin, 2018) Both Hebb's connections to the neurological community in Montreal and the development of the animal laboratories created more opportunities for his colleagues and students to conduct research with unique clinical and experimental data. Psychologists at McGill used these new data to conduct experiments in order to, in part, show the value of investment to the Canadian government, bolster the international standing of the university, and to train new graduate students in the principles of the biological psychology Hebb had outlined (1949) and MacLeod advocated (1947a).

The animal laboratories, originally housed in the Donner Building, opened in the fall of 1948 (Ferguson, 1982). Little is known about the specifics of the laboratories during this period outside the descriptions of research provided in graduate theses. Throughout the 1950s parts of the department were housed in about five different locations on or near the McGill campus.

While Ferguson (1982) suggests that distributed nature of the department detracted from a sense of departmental unity, it is possible that this extended base helped foster connections with adjacent departments (weak ties). Little is known about the specifics of the physical department during much of the 1950s. In 1964 all branches of the Department were brought together, and integrated as a unified department in the Stewart Biological Sciences Building.

According to Hebb's publication records and the topics of students he supervised in these first few years, Hebb engaged deliberately in building bridges between psychology and the Faculty of Medicine at McGill -- bridges in need of serious repair -- and refining his theoretical vision for the role of psychology within it. Hebb published position pieces in the *Annual Review of Psychology* (1950), the *Journal of Personality* (1951), and the *British Journal of Animal Behavior* (1953) that emphasized and extended the vision for a biological psychology informed by recent advances in neurophysiology. This biological orientation in McGill psychology was unique in Canada at the time. Early Canadian psychology departments simply did not have the kind of resources, expertise, or university support to properly leverage an experimental laboratory able to conduct the kind of research McGill became famous for during this period.

1. c. Lines of (neuro-psychological) attack: building up and building out

Hebb's background and biological approach to psychology led him to conclude that cognitive determinants of behavior such as adult intelligence and emotional responses were the

function of a complex interplay of both evolutionary heritage and early experiences. Hebb's theory (1949) proposed that thought processes (and therefore the operations of intelligence) consisted of an activity of cell assemblies, and that these assemblies are organized by way of the sensory stimulation from the early experiences of an animal. With the laboratory established, Hebb's department became "devoted to getting evidence that would show that the theoretical approach would pay off in new experimental results" (Hebb, Mar 14, 1951).

Hebb's main research objective in returning to McGill in the late 1940s was to better understand how this interplay contributed to the organization of behavior in animals. Building upon his work on perception and instincts, Hebb's research throughout the 1950s dealt primarily with topics related to motivation and learning. He wanted to figure out how motivation and learning affected the behavior of animals and in turn how early experiences affected the capacities of animals to learn and adapt. The research Hebb and his colleagues conducted at McGill in the 1950s contributed to a fundamental rework of our understanding of the relationship between organisms and their environments, especially the importance of early environments for adult development. Neobehaviorists of the postwar decade turned increasingly to theories of information processing to explain human behavior related to learning, memory, and perception. In doing so they abstracted the cognitive apparatus from its embodied (neuropsychological) experience. Hebb (1949) had demonstrated, through his physiological approach to psychology, that connections between higher-order cognitive functions (such as pleasure, pain, and emotion) could themselves be described in terms of neurophysiological processes without reducing one to the other. This focus made Hebb unique among many of his contemporaries (Gardner, 1985; Baar, 1986). In the early 1960s, Ulric Neisser (1928-2012), the "father of cognitive psychology" (Hyman, 2012; Neisser, 1967), lamented a "misunderstanding of the nature of human thought" in current debates (Neisser, 1963). This, he argued, was reflected by the neglect of a number of uniquely human processes, namely the growth and development of thinking, the intimate association between thoughts and emotions, and the multiplicity of motives that exist simultaneously in any given situation. He claimed that, "the focus of difficulty will no longer be pattern recognition, learning, and memory, but in an area which has no better name than 'motivation'" (Neisser, 1963, p. 195). While behaviorists and early cognitivists had tended to avoid much consideration of higher-order processes, Hebb and his department at McGill sought an explicit integration of human experience through existing neurophysiological theory. It was

an interest in ‘motivation’ broadly that drove his research agenda throughout the postwar period (e.g., Hebb, 1955). In the remainder of this chapter I will describe how this integrationist perspective contributed to multiple lines of original, groundbreaking research which has shaped psychology at McGill and in Canada ever since.

Hebb's theories, as outlined in the *Organization of Behavior* (1949), led him to believe that intellectual and problem-solving ability (as measured primarily by IQ tests in humans) was much more a product of early experience than had been recognized. Hebb's research agenda throughout the 1950s can be described as an investigation of this basic tenet. Upon arrival at McGill, Hebb established two broad lines of research, “one opening up new ground, the other cleaning up and systematizing the areas opened up earlier” (Hebb, Sept 22, 1952). Hebb's initial research funding came from the Canadian Defense Research Board (DRB), and later the Rockefeller Foundation (Hebb, Sept 22, 1952) and Department of Health and Welfare. Hebb was a member of the DRB's Psychological Research Panel, which was overseen by N. W. Morton (Turner, 2012), a graduate of McGill and member of the department before the war. Compared to the United States, investment by the Canadian military in psychological research was proportionally smaller (Turner, 2012; Capshew, 1999); Hebb capitalized on these sources of research funding.

The research of the department of psychology at McGill during the 1950s can be roughly divided into several phases: the first are the early years (1947-1951) when Hebb was establishing the department, testing some initial theories (with rats), then the early 1950s (1951-1955) when DRB-funded research into deprivation into both man and dogs is developed alongside studies on addiction and motivation (Zubek, Beach, P. Milner) and temporal lobe function (B. Milner), and late 1950s (1956-1958) in which Hebb developed his introductory textbook that integrated much of psychology using the framework provided by his 1949 theory, applying his network theory to heritability, learning and memory, motivation, perception, thought, and development (1958). He later extended his textbook to emotions in their social contexts and individual differences in intelligence, and abnormal psychology.

The “cleaning and systematizing” work, done by Hebb and his students, involved primarily the refinement of animal intelligence testing techniques (e.g., Rabinovitch, 1949, PhD; Heron, 1949, MA) and standardizing emotional behavior among their experimental animals (e.g., for rats, see Thompson, 1953; for dogs, see Mahut, 1955). By the early 1950s, the activities at

McGill covered a wide range of topics and reflected a mature department, “healthy and full of life” (Hebb, Sept 22, 1952), and on the cutting edge of biological and behavioral research (e.g., CPA, 1955). Hebb described it to his funders at the Rockefeller Foundation: “Our research ranges from microelectrode work with single cells, through studies of specific nuclear structures in the brain, to human perception and the thought processes underlying language. [...] We are still fundamentally concerned with the nature of human thought and emotion and with the nature of complex learning processes” (Hebb, 1958; #6194-6195). The fundamental concern with the nature of emotion is interesting for this particular period and will be explored more later.

In the early 1950s much of the work focused on an “extensive study of human motivation done under contract with the Defence Research Board” as well as the research Zubek and Beach were conducting on “the mechanism of addiction” (Hebb, Sept 22, 1952). The department tackled a number of interrelated issues and Hebb understood his research program in the early 1950s to have been effective in large part due to a “combined attack at different levels of abstraction” (Hebb, Jan 20, 1958).

Hebb's students explicitly sought to extend his earlier findings (i.e., Hebb, 1947) by using a larger number of experimental animals under more carefully controlled conditions in order to further analyze and investigate the factors underlying the effects observed regarding the relationship of early learning to maturational processes (e.g., Hymovitch, 1949, PhD). A number of Hebb's students, such as Forgays and Lansdell, completed their doctoral research on the effects of brain damage on higher cognitive functions in rats. For example, Ruth Hoyt-Cameron—who was among Hebb's initial students—first examined the effects of electroconvulsive shock in rats (Hoyt & Rosvold, 1951) before completing her Ph.D. on the effects of lobotomy on adult intelligence (Hoyt, 1952).

2. Experiments on Sensory Restriction, 1949-1954

Hebb's research interests, from his time as a McGill graduate to his experiences with Lashley and Penfield, revolved around an investigation of the effect of developmental experience (e.g., through the ablation of specific parts of the brain or through sensory restriction) to later functioning of the adult brain, particularly in relation to factors presumed to have been inherited such as intelligence (e.g., maze solving ability) and instincts (e.g., emotional responses such as fear). Hebb had established himself an expert in the comparative measurement of both human

and animal intelligence (i.e., cognitive abilities before and after some intervention or procedure). Hebb developed both theoretical approaches in which experimental animals raised in radically different environments could be compared with normal animals and the ways in which the results of these comparisons could be explained using the latest understandings in neurophysiology.

The role of early environment on the later development of cognitive abilities had been the main focus of the mental hygiene movement of the 1920s and 1930s. According to Hebb (1949), their failure was due primarily to a fundamental lack of scientific rigor in understanding the causes of mental disturbance (i.e., premature application of tentative findings). After the war there was renewed interest in the links between environments and mental states, though notably absent the imperative towards community health. This renewed interest was due partly to opportunities for systematic psychological investigation created as a byproduct of processes related to the mobilization for war (e.g., mental testing; Capshew, 1999). Similar to the previous World War, the psychological data generated by the military between 1939-1945 was unprecedented. After the war, the interest in treating its psychological casualties and to leverage the psychological insight that had been derived from these new data drove government and military investment in new scientific (i.e., neurobiological) understandings of the human brain (Capshew, 1999). Hebb was in a position at McGill, having identified the need to address the shortcomings of existing psychological models, to take advantage of this shift in attitudes towards increasingly biological approaches to mind (Pressman, 1998).

Interested in demonstrating the influence of the environment on cognitive ability Hebb recruited the help of his two daughters in rearing rats at their home in Florida in 1947 (Hebb, 1980). These “enriched” rats (i.e., pet rats) were compared on a series of learning tasks to rats that had been raised exclusively in cages. As part of the same study Hebb compared rats blinded at birth with those blinded at maturity. Both the laboratory group and the pets were tested with a rat intelligence test that had been developed with Kenneth Williams at Queen’s (Hebb & Williams, 1946) and later revised by Rabinovitch and Rosvold (1952). Later that year, at the meeting of the American Psychological Association at Cornell University, Hebb presented these findings, which he said showed “a lasting effect of infant experience on the problem-solving of the adult rat” (Hebb, 1947). At this same meeting psychologist Austin H. Riesen (1913-1996), with whom Hebb was then working at Yerkes Laboratory, presented findings of chimpanzees that had been raised in darkness. Riesen would later go on to become a leading researcher in

deprivation experiments in animals (Rumbaugh, 1998). These experiments, the outcome of a critical period of Hebb's intellectual development during which he was writing the bulk of his famous manuscript (Hebb, 1949), would shape his research agenda for the next decade.

Hebb encouraged one of his first graduate students to pursue more formal investigations and in similar experiments Hymovitch showed that the environmental effect occurs only during the period of growth (i.e., childhood) and that a favourable environment thereafter cannot reverse the damage that has been produced by an unfavourable environment earlier (Hymovitch, 1952). Similar to the results Tolman (1948) had demonstrated with "cognitive maps," Hymovitch had also demonstrated the surprising extent to which visual-perceptual learning was possible with the rat (Hymovitch, 1952; Forgays & Forgays, 1952).

Indeed, there was rising interest within comparative psychology circles (e.g., Karl Lashley's group at Orange Park and Harry Harlow's Primate Laboratory at University of Wisconsin-Madison) that restricted early environments would produce behavior that was difficult to explain with existing behaviorist models. Members of these circles, such as Hebb and Riesen, became fascinated by reports of the strange and awkward experiences of individuals following the removal of congenital cataracts (e.g., von Senden, 1932). These individuals commonly reported great difficulty recognizing and interacting with forms such as circles, squares, and triangles when removal of the cataracts enabled them to see for the first time. These reports motivated Riesen's sensory deprivation experiments in animals (Warren, 1996) and Hebb's theory applied to perception (1949), which relies heavily on Riesen's chimpanzee study (1947) and von Senden's (1932) account of restored vision, despite methodological limitations (Wertheimer, 1951).

Studies in which the early environment was manipulated in a particular way to examine the effects on later cognitive development were not new. But then, why did sensory deprivation studies not emerge prior to World War II? It seems that while Hebb and his colleagues in Lashley's laboratories were interested in various ablative techniques for localizing various brain functions, it was not until the late 1940s that a systematic investigation of the psychological effects of these kinds of experiments were seriously explored. This highlights the novelty and influence of what Hebb was to soon propose, he had established a framework for understanding behavioral changes strictly within the context of biological models that cohered to existing neurobiological understandings. Prior to the publication of *The Organization of Behavior* there

was no satisfying or scientifically coherent way (and therefore no reason) to explain the effects in animals and no rationale to study human subjects. That was soon to change.

2. a. Contract X-38: Hebb and the Sensory Deprivation Experiments, 1951-1955

Within the context of the Cold War, the study of psychological methods that could be used to modify human behavior resonated both with intelligence officials and the Canadian public. Communist trials, prisoners' false confessions, and the fear of secretly turning citizens against their own country had established concerns regarding "mind control" and the capacity to "brainwash" American soldiers in the late 1940s (see for example, Weiner, 2008; Raz, 2013b; Jacobson & Gonzalez, 2006; Otterman, 2007; Rejali, 2007). Physicians and researchers were called to weigh in on this debate. In June 1951, military representatives from the U. K. and the U. S. met with members of the Defense Research Board (Omond M. Solandt and N. W. Morton) at the Montreal Ritz-Carlton Hotel to discuss the brainwashing techniques of Communists during the Korean War (1950-1953). Closely tied to academia, the DRB regularly funded research programs associated with Canadian universities and relied on the consultancy of university professors (Turner, 2012). Hebb and two Montreal psychiatrists (James Tyhurst and T. E. Dancey from the Allan Memorial Institute) were invited to participate in the meeting (Cooper, 1986).

At this meeting Hebb suggested that they might learn about how captured soldiers came to expound Communist propaganda by studying the effects of perceptual isolation (Hebb, 1961). This proposition was inextricably linked to contemporary debates on the psychological methods of behavioral modification and control (McCoy, 2007; Raz, 2013b). Indeed, Hebb later recalled that the work at McGill itself began "with the problem of brainwashing" and that the "chief impetus [...] was the dismay at the kind of 'confessions' being produced at the Russian Communist trials" (Hebb, 1961, p. 6-7).

In September 1951 Hebb was awarded "contract X-38" by the Defense Research Board to study the effects of restricted environmental experience. The human subject studies were conducted at McGill by Woodburn Heron, W. H. Bexton, T. H. Scott, and Benjamin K. Doane between 1951 and 1955 (Brown, 2007). These studies examined 1) tolerance of subjects for perceptual isolation, 2) willingness to listen to distasteful dull materials, 3) change of attitude, 4) impairment of intellectual function, 5) hallucinations and other effects of sensory deprivation (Cooper, 1986).