

INTRODUCING MIGUEL ROLANDO COVIAN: HUMANISM AND SCIENTIFIC TRAINING IN BRAZIL

PRESENTANDO A MIGUEL ROLANDO COVIAN: HUMANISMO Y EDUCACIÓN CIENTÍFICA EN BRASIL

Rodrigo Miranda*, Eneida Damasceno,

Marina Massimi** y Anette Hoffman**

*Universidade Federal de Minas Gerais, Brasil**

*Universidade de São Paulo, Brasil***

Correspondencia: dingoh@gmail.com

Recibido: 30-06-2014

Aceptado: 05-10-2014

Abstract

This paper introduces some aspects of the Argentinian neurophysiologist Miguel Rolando Covian and his laboratory at the *Universidade de São Paulo* (USP), Brazil. Sources were both primary prints and photographic documents from 1955 to 1974. This study shows the following: (a) biographical information about Covian before moving to Brazil; (b) Brazilian agenda on politics, science and university; (c) Covian's ideas on scientific training; and (d) his laboratory as a tool for teaching and researching. Presenting these aspects, a promising character for neurosciences –and psychology– in Brazil is shown. In addition, this paper could contribute for future research on the history of psychology, neurophysiology and neurosciences in the country.

Keywords: History of Psychology; History of Neurosciences; Scientific Laboratory; Miguel Covian

Resumen

Este artículo presenta algunos aspectos del neurofisiólogo argentino Miguel Rolando Cován y su laboratorio de la *Universidad de São Paulo* (USP), Brasil. Este estudio muestra los siguientes puntos: (a) la información biográfica sobre Cován antes de trasladarse a Brasil; (b) el programa político, científico y universitario brasileño en el que se desenvolvió su trabajo; (c) las ideas de Cován con respecto a la formación científica; y (d) el uso del laboratorio como una herramienta para la enseñanza y la investigación. La presentación de estos aspectos, un agente prometedor para las neurociencias –y la psicología– se muestra en Brasil. Además,

este trabajo podría contribuir para futuras investigaciones sobre la historia de la psicología, neurofisiología y neurociencias en el país. Para ello se realizó un estudio y análisis historiográfico sobre fuentes primarias, documentos y fotografías, del periodo que va desde al año 1955 hasta el año 1974. Se espera que este trabajo contribuya a futuras investigaciones sobre la historia de la psicología, la neurofisiología y las neurociencias en el nuestro país.

Palabras clave: Historia de la Psicología; Historia de Neurociencias; Laboratorio Científico; Miguel Covian.

Histories of neuroscience are trying to understand the production and circulation of knowledge related to mind and brain in different contexts. These studies are especially focusing on cultural and social conditions from the 1950s, because this was a period for a systematic institutionalization of neuroscience around the world. A topic of interest of these histories is the *sujet cébral*, i.e., an anthropological and psychological concept that defines the human being based on his brain (Vidal, 2005, 2009). According to Vidal (2005), the motto for that concept is: “*X avec le cerveau Y est Y ...*” (p. 45). This *sujet cébral* has been incorporated into the contemporary western culture with intellectual and practical impacts. The contemporary subject is defined based on his brainhood, which suggests the brain as the *locus* for the modern human. Histories of neuroscience are helping us understand the theoretical and technical knowledge that shaped the human being as defined by his brain activities. These studies also help us see how the brainhood legitimizes the neuroscientific discourses and their incorporation in contemporary Western culture.

Based on this theoretical framework, our goal is to describe and analyze some proposals and laboratory practices of the Argentinian –naturalized Brazilian– neurophysiologist Miguel Rolando Covian. Our sources were both primary prints and photographic documents from 1955 to 1974, period of time when Covian was head of the Physiology Department of the Medicine School at USP (FMRP-USP). Studying his proposals and especially his lab practices contribute for a better comprehension of two aspects. Firstly, how different scientific areas –neurophysiology and psychology– were brought together into the scientific laboratory. Secondly, what were the relations between the experimental scientist and the political and scientific debate on the university in Brazil.

This paper can be categorized as a “contextualized biography” and it fits in the contemporary historiographical literature on this model. Histories with a biographical approach have been relevant for the general historiography because they have helped to comprehend human characteristics among past events (Avelar, 2012). A biographical history requires the localization of different characters in time and space. This allows one to notice aspects of a certain history period on a personified form. This historiographic perspective also has impact on the historiography of science and, especially, the history of psychology. According to Campos (1996), the “contextualized biography” tied to the historiography of science and psychology is influenced by the social and cultural history. Based on this, the author affirmed that the “contextualized biography” is... a research model ...: the biography of an author as a source to understand the relationship between his point of view –as

1 Translation: “X with an Y brain is Y ...”

a consequence, the standpoint of its social class in a certain period of time and place— and his theoretical work (p. 133)

Another example is the research developed by Cruz (2013) about the American psychologist B. F. Skinner. The “contextualized biography” written by Cruz shows how some events of Skinner’s life influenced his work and the establishment of a behavior analyst community in the USA between the 1920s and 1970s. Cruz’s study points out how solutions and mishaps in the history of the scientist influence his dialogues in a scientific community as well as in the creation of his theoretical perspective. Thus, biographical histories could help us understand some aspects of culture and society with which scientists were related and contributed in their constitution.

Our paper embraces four topics. First, we introduce some biographical data about Covian before moving to Brazil, which shows some aspects of his life. Second, some debates on politics, science and university in Brazil are presented, because these were important topics in the country at that time. Third, we show some Covian’s proposals for the scientific training in the university system that contribute establishing some relations between the author and the context. Finally, teaching and researching aspects of his laboratory at the *Universidade de São Paulo*, campus Ribeirão Preto (USP-RP), Brazil were highlighted. As we shall see, Covian appears as a promising character to understanding histories of neuroscience in Brazil once he brought together neurophysiology and psychology.

Miguel Covian: Paths before moving to Brazil

Miguel Rolando Covian was born in Rufino, a city west from Buenos Aires, Argentina, in 1913. He got a Medical degree from the *Facultad de Medicina* of the *Universidad de Buenos Aires* (UBA) in 1942. Covian’s undergraduate period occurred amidst a group of social, political and cultural changes promoted in the first government of Juan Domingo Perón (1946-1955). During Perón’s first government the home market was increased; the industrialization and urbanization were strengthened; and several educational reforms took place, especially related to the higher education system (Buchbinder, 2010). On the cultural and educational spheres, religious topics –Catholicism– were promoted and traditional education methods were established –mainly in the primary and high school systems. According to Hurtado (2010):

...el gobierno peronista se centró en la promoción de áreas vinculadas al desarrollo de la “técnica” y en la profundización del proceso de industrialización. En todo caso, la actividad científica apareció en el discurso oficial como subordinaria del desarrollo *técnico e industrial*² (p. 74)

This context produced a technical and scientific training of liberal professionals, such as physicians.

In the university milieu, there was a strong intervention of the Federal government. This process was stronger at the UBA and impacted on the Argentinian scientific and intellectual elite. According to Medina (1997), “the intellectual milieu in the university ... wants a liberal government

2 Translation: “Peron’s government ... focused on the promotion of development-related ‘technical’ areas and the deepening of industrialization. In any case, the scientific activity appeared in official discourse supporting technical and industrial development”

and they were disappointed with the intervention of the Federal government on the university ...” (n.p.). The creation of the *Instituto de Biología y Medicina Experimental* in Buenos Aires is an example of the controversies between Federal government and intellectual milieu in Argentina during this period (Covian, 1979a). It was created by professors “fired” from UBA because of political and ideological struggles with the government, such as Bernardo Alberto Houssay³. The *Instituto* got funding from the *Fundación Sauberan* as well as from the Braun-Menéndez family (Cândido, 2009). Other important physiologists were professors at the *Instituto*, e.g., Eduardo Braun-Menéndez⁴. Covian was under Houssay’s supervision during his PhD and recognized his professor as “his master for the whole life” (Hoffmann, 2005, p. 39). Following this “master”, Covian was incorporated into the *Instituto* in 1942.

From 1945 to 1948, Covian ran research at the *Instituto* under the supervision of Braun-Menéndez (Damasceno, 2013). In 1948, he moved to the USA for his three-years-postdoctoral studies at the John Hopkins University (Baltimore, Maryland). He got a Rockefeller Foundation scholarship and studied under the supervision of the professors: Curt Richter⁵ and Philip Bard⁶. During this period he got a better training in neurophysiology and could have had contact with psychological aspects, due to the links between Richter and Bard to psychological issues. For example, the scientific research of Richter was important enough to be celebrated in a book “The Psychobiology of Curt Richter”, edited by Elliott Blass in 1976. He also was one of the few students who had the supervision of John B. Watson at the John Hopkins University. Another example is Bard’s research, which interacts directly with the James-Lange formulations for the relationship emotions-behavior. His research were related to the initial development of psychobiology in the USA.

Covian moved back to Argentina in 1952, when became the chairperson of the Neurophysiology laboratory at the *Instituto de Biología y Medicina Experimental*. The 1950s was a decade of strong economical, political and ideological crisis in Argentina, e.g., reduced Federal government money, increasing of inflation, the military opposition to Perón, etc. In 1952, Perón was overthrown from this position as president, what produced a turbulent and instable political condition of

3 Bernardo Alberto Houssay (1887-1971) was an Argentinian neurophysiologist who worked on the metabolism of sugars. He held a Pharmacy degree (1904) and a Medicine one as well (1911). He was professor of Physiology at the Veterinary and Agronomy School and, then, at the Medical School (1919). He was one of the Nobel Prize winners in 1947, with the Austrian-American couple Carle and Gherty Cori.

4 Eduardo Braun-Menéndez (1903-1959) was a Chilean physiologist. He got a Medical degree at UBA, specializing in the cardiovascular medicine and physiology. He got important scientific administrative positions, such as the head of the Physiotherapy Department of the *Instituto Municipal de Radiología e Fisioterapia de Buenos Aires* (Buenos Aires Radiology and Physiotherapy Institute). He helped and coordinated different scientific journals, e.g., *Ciencia y Investigación* and *Acta Physiologica Latinoamericana*.

5 Curt Paul Richter (1894-1988) was a psychobiologist at the John Hopkins University working on the hypothalamic regulation of awaken-sleep process.

6 Philip Bard (1898-1977) developed with Walther B. Cannon the Cannon-Bard theory for the understanding of emotions. This theory stressed the brain activity on the emotion and feeling behaviors.

the country. His ideological propositions were still influent in Argentina, but the opposition was getting stronger. This produced many debates and controversies between pro and con-Perón people.

In 1955, Covian was internationally recognized in the scientific physiology milieu due to his research on the limbic system (Cândido, 2009). However, he was afraid about the political situation in Argentina and, consequently, about the existence of the *Instituto*. He said: “Our future [at *Instituto de Biología y Medicina Experimental*] was not clear, as if there was a wall blocking our way” (Covian, 1979a, p. 615). In this same year, Zeferino Vaz⁷ - Dean of the brand new School of Medicine of USP-RP (FMRP-USP) – invited him become a university professor, researcher and head of the Physiology Department of FMRP-USP.

The previous experience at the *Instituto* and in the USA, as well as the experience of living under Perón’s government in Argentina, impacted Covian’s proposals and conceptions on the university (see Covian, 1979a). Mainly, his beliefs about the freethinking of the researcher and of the university. The Brazilian context at that time was brought together to his personal story to produce an idiosyncratic perspective at the FMRP-USP.

Brazil: Politics, science and university

Many countries produced efforts to promote and accelerate their economical, political and social development after the World War II. Among these countries there were Latin America ones, such as Brazil. In Brazil, this was a period of political and ideological debates related to populism and military politics. The Brazilian president, Getúlio Vargas, killed himself in 1954, what produced an instable political situation. From 1954 to 1956, many politicians became Brazilian presidents, but always for a short period of time. Two examples were Fernandes Campos Café Filho and Carlos Luz. In 1956, Juscelino Kubitschek (JK) and João Goulart were elected, respectively, as president and vice-president. JK’s government had a variety of political and economical problems during its first moments, e.g., political struggles promoted by the Vargas suicide, huge inflation process, etc. However, the charismatic personality of JK in addition to his enthusiastic government propositions (a sort of populism) promoted fast Brazilian development.

Since the first decades of the 20th century, the tripod industrialization, scientific development and educational renewal was an important subject for the intellectual and political elite while debating Brazilian development (Mendonça et al., 2006). Between 1950 and 1960, the modernity that had been desired since the beginning of the 1900s was established in Brazil. This modernity could be seen in the development of industries in the country; the urbanization process; the access to the day-by-day new technologies (e.g., refrigerators, vacuum cleaners); the building of a new capital, Brasília, etc. According to Skidmore (1982): “there is no doubt that Brazil had a real and clear economical development between 1956-1961” (p. 204). This modernization process was also tied to the promotion of education, chosen as one of the main aspects for the progress on

⁷ Zeferino Vaz (1908-1981) got a Medical degree at the School of Medicine of USP, in São Paulo city, in 1932. Later on, he became professor at this university. He supported and coordinated the establishment of universities in the countryside of the São Paulo State. For instance, the FMRP-USP (1940-1950s) and the *Universidade Estadual de Campinas* (UNICAMP), in Campinas city (1960-1970).

the country. This context put in the spotlight the scientists and the intellectual elite as the main people responsible for the social reorganization.

The discourse of modernization for promoting national progress was intensified in Brazilian universities, and the technical aspects of education were strengthened, as was governmental investment in higher education. These efforts linked the university to development of research and science production. Development of both teaching methods and research became a trend in the discourse of the Brazilian university (Cunha, 2007). In line with the ideals of modernization, the need for encouraging the development and organization of the Brazilian scientific community was highlighted in educational policy. For instance, many government agencies that support research with grants and scholarships were created at that time. We can mention: *Fundação de Amparo à Pesquisa do Estado de São Paulo* [São Paulo Research Foundation] (FAPESP) in 1947; *Sociedade Brasileira para o Progresso da Ciência* [Brazilian Society for the Progress of Science] (SBPC) in 1948; and in 1951, the *Conselho Nacional de Desenvolvimento Científico e Tecnológico* [National Council for Scientific and Technological Development] (CNPq) and the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* [Brazilian Federal Agency for Support and Evaluation of Graduate Education] (CAPES).

Gastão Rosenfeld (1963), one of the founders of the SBPC, affirmed:

It is necessary to truly stimulate the collaborative spirit in order to increase the number of scientists and to improve their skills ... this is the only way culture will be strengthened—by having the number of its supporters increased (p. 82).

Similarly, Warnick Kerr, professor at the USP-RP and director of the FAPESP between 1962 and 1964, said: “[the] lack of qualified personnel for research constitutes the major deficiency for the rapid progress of science in the State of São Paulo” (Kerr, 1965, p. 72). According to some authors, these characters advocated

... The necessity to implement a new university culture in Brazil should be guided – among many aspects – by the establishment of relations between professors and between those characters and the students. This new culture should bring meaningful changes into the university core ..., the university should offer in its courses both theoretical and practical training, in which the scientific logic of thinking and researching would be stressed rather than expository classes (Mendonça, 2003, p. 12).

Thus, the creation of a “national science” was prominent in the academic environment, whose objective was to act in the Brazilian social context. However, Brazilian researchers also promoted the invitation of foreigners to contribute to the establishment of a scientific community in the country (Cunha, 2007; Sá, 2006). For instance, the anthropologist Claude Lévi-Strauss gave lectures on Sociology at USP between 1935-1939. Other examples, related to Psychology – Social and Experimental Psychology – at USP, are the courses taught by Otto Klineberg (1945-1947) and Fred Keller (1961-1962). It is interesting to observe that both psychology courses were developed in the Physiology Department of USP, São Paulo city.

Brazilian modernization and economical optimism also impacted the countryside, especially in the Southeast. An example of this is the establishment of universities outside the main cities of the country, such as the creation of FMRP-USP (Mauro & Nogueira, 2004). São Paulo govern-

ment advocated the creation of public universities in the countryside of the State and, in 1947, a Commission was created headed by Zeferino Vaz. From 1947 to 1951, many cities were studied for the establishment of a university and Ribeirão Preto was chosen to get the School of Medicine. Many aspects influenced this choice, such as a bigger student population when compared to other countryside cities (20,000 students) and a well-established network of schools. In 1951 the FMRP-USP was created and it started working in 1952. Zeferino Vaz was its first Dean and its first faculty members were brought from the USP Campus in São Paulo city. The Rockefeller Foundation also contributed to the creation of FMRP-USP (Damasceno, 2013). The partnership between the School and the Foundation promoted the establishment of full-time professors on the university for teaching and researching. It also influenced the raising of buildings and laboratories, the promotion of scholarships for researchers and students, etc.

Upon arriving in Brazil, Covian found favorable conditions for the development of his work and his intellectual proposals. These conditions were consistent with the ideas that emerged from institutions managed by Brazilian intellectual elite. He found a university engaged in the developmental background of the 1950s, led by an innovative design and suited to the needs of a society that was experiencing changes. The FMRP-USP loomed as a center of excellence in research: promoting the work of its scientists; well-equipped laboratories; a well-organized vivarium with a wide availability of animals for research (Mauro & Nogueira, 2004). However, this scenario would change radically, imposing to Covian, once again, the experience of living and teaching under a dictatorial political regime.

In the first months of 1964, a dictatorial government developed by joint civilian and military forces began in Brazil⁸ (Schneeberger, 2003; Skidmore, 1988). This period can be characterized by: a lack of democracy; suppression of constitutional rights; strengthening of censorship; political persecution and repression of those who were against the military government. In April 1964, General Humberto de Alencar Castelo Branco took over the presidency. During his government - considered a "moderate" one - were promoted practices of social control, such as the: the suspension of political rights, the retirement and dismissal of public staff, etc. Laws that were intended to neutralize any anti-government activities were established, e.g., the *Lei de Imprensa* (Press Law) and the *Lei de Segurança Nacional* (National Security Law)⁹. From 1967 onwards, the dictatorship got even more severe, with the leadership of

8 Brazilian Army, in this dictatorship, governed Brazil for twenty years (1964-1984). There is controversy about the beginning of the Brazilian military dictatorship. The coup that put down the civil presidents João Goulart stared at March 31st, 1964. This date highlights the march of military troops from Minas Gerais and São Paulo states to Rio de Janeiro, the federal capital at that time. One can understand this as the milestone for the military regime, whereas there are other possibilities of comprehension. Other possibility is April 1st, when the civil president left the country. It is interesting to remember this second date is celebrated as April fool's Day.

9 The goal of the first Law was to oversee the press using censorship. The second one established new and hard punishments for those who were considered committing crimes or threatening the national security. For further information, we suggest reading the *Atos Institucionais* (AI) [Institutional Acts] -legal documents for social control published during the dictatorship-: <<http://www.planalto.gov.br/legisacao/legislacao-historica/atos-institucionais>>. Access: Apr. 16, 2014.

General Arthur da Costa e Silva. This significantly impacted the Brazilian university with control and censorship on teaching and research activities.

The promotion and organization of science in Brazil between 1950-1970 influenced Covian on his ideological proposals and scientific practices as well. Moreover, these propositions were influenced by the experience of a new dictatorial government with interventions on the university and scientific research.

Humanism and University Education: Training scientists

The Department of Physiology was already working with a group of assistants teaching theoretical-practical courses in physiology when Covian arrived in Brazil (Figure 1). Covian came as a full professor to reorganize the Department for running research, training scientists, supervising undergraduate and graduate students, teaching, etc. (Damasceno, 2013). His work as a researcher and professor contributed for the recognition of the Department of Physiology as a prominent institution for training scientists and researching. For instance, the *Associação Latino-americana de Ciências Fisiológicas* (ALACF) [Latin American Association for Physiological Sciences] and the Organization of American States (OAS) certified the Department of Physiology of FMRP-USP (Mauro & Nogueira, 2004). Covian's activities were in line with what he believed as the goal of the university: a site for research, teaching and social care (Covian, 1979a). His beliefs and activities were also in line with other characters and documents of the period.



Fig. 1. Covian in his office at the Physiology Department of FMRP-USP, about 1960. Source: FMRP-USP Historical Museum.

The medical community in Brazil was also asking for better training on technical and scientific aspects during the university education. The Covian's proposals and practices were in line with these medical demands (see Covian, 1979a). According to Bulcão, El-Kareh and Sayd (2007), health sciences –especially Medicine– had to adapt themselves to many social changes occurred in Brazil in the first decades of the 20th century. These social changes got stronger and faster tied to the modernization process of the 1940-1950s. According to these authors:

The criteria of importance shifted to the experts, to the new and updated physicians with technical skills; the hospital and its equipment and the medical enterprise. Medical professionals have found themselves compelled to reshape their practice towards a technological medicine, i.e., to update themselves on the scientific-technological development. (p. 474)

The creation of the FMRP-USP and the Covian activities can be grounded on this context. Medical education at that School –developing research as well as training professionals and scientist– attended social expectations. These social demands came from civil society and medical and scientific communities as well, being part of the organization of these last two groups.

Another example is the Federal Law No. 5.540 published on December 3, 1968, which regulates the organization and operation of higher education in Brazil. The first two articles of this Law read as follows:

Art. 1 - Higher education aims the research - for the development of sciences, humanities and arts - and the training of professionals at university level.

Art. 2 - The higher education –inseparable from research–, occurs in universities and, exceptionally, in certified isolated institutes, organized as public or private institutions (Federal Congress, 1968, n.p., emphasis added).

Covian's proposal and practices were in line with aspects presented by this Law. His training at the *Instituto de Biología y Medicina Experimental* and at the *John Hopkins University* as well, gave him the credibility and skills to run a lab. These skills and credentials were tied to his technical expertise on experimental work.

At the same time, Covian advocated other important aspects of the scientist training at a lab. According to Covian, the scientist should search for knowledge in the scientific research, but the scientist must study philosophy to achieve the proper awareness of science, i.e., to control techniques and not be controlled by it. He advocated that the technique was in the service of science and not the contraire, since science should use and produce technology for humanity. In his own words:

The technique is born as a defensive response from mankind against the force of nature, to satisfy imperative needs, such as cold, heat, hunger, etc. Humankind produces a second nature, which modifies and subdues the first one. This first step is born by human needs, because the mankind reigns over this nature that it created ... However, in a second step, the technique fails to satisfy basic human needs and it starts creating superfluous needs. When mankind begins to feel the need for expendable things for their welfare, starts its *via crucis* of unhappiness. The dominator becomes dominated by technology and its products. (Covian, 1975/2007a, p. 56)

Covian also pleaded the scientist to keep in mind the relations between philosophy and science. According to him, a scientist should have a religious attitude, based on good moral principles – probably an inheritance from Argentinian context. He believed that science and religion must be together, because scientists should be wise and dedicated to research: “The real man of science has a natural mood for quiet and contemplative work, I will say that his attitude is religious even if he negates God” (p. 63). This emphasis on a humanistic/cultural training of the scientists helps us understand some controversies on both Argentinian and Brazilian higher education contexts. On the one hand, this emphasis on a humanistic education seemed to be a counterpoint of what he had experienced in Argentina under Perón and in Brazil under military dictatorship. These two contexts promoted the bolstering of technical subjects on the university training. Humanistic/cultural training could minimize the impacts of technique over mankind. On the other hand, his promotion of “religious” attitudes could be in line with the increasing of religious (Catholicism) practices and ideas in Argentina and Brazil during the 1960s (Buchbinder, 2010). Thus, Covian fostered a humanistic/cultural training associated to the technical one. This proposal was connected to his beliefs on the university as a freethinking institution.

Covian advocated creativity and freethinking as essentials tools for the scientific practice. These aspects seemed to be in the opposite way of the government opinions in the Argentinian and Brazilian contexts at that time, because of their authoritarian governments. Defending the free-thinking in the university, Covian affirmed:

The University is a community of thought that must teach its students critical thinking. It should teach them how to think by themselves. The university is a center of criticism, training professionals capable of freethinking and criticism. Its students should be able to transmit this freethinking spirit to society. This is the main service that the University should provide to society (Covian, 1979a, p.616).

The humanistic/cultural training of the scientist was a technical and philosophical training at the university (Covian, 1977/2007b). This training was connected to the university as a “center for criticism” and the scientists trained on a humanistic perspective could keep the freethinking alive there. According to him, “humanism” was “...a human tendency to its fullest, activating all its potential” (p. 66). Covian’s proposals on the humanistic education and free thought went against the current of occurrences of the period, with strong government intervention in the directions of the university during Brazilian dictatorship. Moreover, it seemed to go against the pragmatism and utilitarianism proposals practiced in national scientific culture of the country (Mendonça et al., 2006). Between 1960 and 1970, the pragmatism and utilitarianism proposals were remarkable influences in Brazilian educational milieu, especially in higher education. However, for Covian (1979a): “The spirit needs spontaneity to flourish in creativity, but this attitude dies when the utility –pragmatism– becomes the supreme body” (p. 617). In this same text, he continues:

The University is, and always should be, a place for meeting and debates, to express concerns, to propose political and social criticisms, without authoritarianism and free from punishments that minimize man and institutions. (p. 616)

The humanistic training advocated by Covian had influences from his philosophical and human sciences readings. Among these readings, we can find influences of psychological concepts and proposals. According to Cândido (2009), three authors were quite influential in Covian's humanistic thought and had an impact on his performance as a teacher and researcher: Teilhard de Chardin¹⁰, José Ortega y Gasset¹¹ and Thomas Merton¹². These philosophical and human sciences readings contributed for the Covian's proposals on the "humanistic training" based on three axes: (i) truth; (ii) goodness; and (iii) beauty (Cândido, 2009; Cândido & Massimi, 2010). Covian advocated that this tripod should be presented during the scientific training in the university. In his words:

It is duty of the University to promote student's education in all its dimensions, i.e., humanistic training which is another name for cultural education. We need technicians to help the development of a country, but it is naive to believe technocracy will solve all human problems. It is imperative to defend man against technocracy that transforms man into an object. We also need to train in-depth thinkers, who guide the technique to be placed at the service of humankind. The learning of technical expertise requires to be balanced with a guided training for Truth, Good, and Beauty. (Covian, 1979b, p. 14)

The relationship between those three axes guided Covian's proposals and activities at the FMRP-USP

Covian fostered the discussion on the status of "truth" connected to the knowledge. This was due to the fact that, with the development of science, a specialization of knowledge and predominance of experimental science occurred. According to Covian (1975/2007b), the experimental scientific method was introduced as the only method able to achieve the "truth", constituting itself as a misconception. On the one hand, the association between specialization and experimental method enabled the production of increasingly sophisticated knowledge by accessing the lower limits of the real. In his words, the experimental method: "... moving on the surface of the real, verifying, measuring and explaining phenomena and acquiring mastery over a limited aspect of reality" (p. 53). On the other hand, the experimental method could produce a blurred notion that reality was only the sum of small parcels created/discovered through science. This possible misconception produced by the techniques should be minimized by philosophy and humanities.

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- 10 Marie-Joseph-Pierre Teilhard de Chardin (1881-1955) was a priest who had a strong scientific and literary training since junior high studies. When he was eighteen, he entered a novitiate of the *Companhia de Jesus* (Society of Jesus). From 1908 to 1912, he attended his four-years of theology in Hastings. Between 1911-1914 he studied at the *Collège de France* and in 1922, graduated in natural sciences at the *Sorbonne*.
- 11 José Ortega y Gasset (1883-1955), studied philosophy at various universities in Spain (Madrid) and Germany (Leipzig, Berlin and Marburg). Between 1910-1936 he was professor of Metaphysics at the *Universidad de Madrid* (University of Madrid). He was strongly dedicated to promoting literary culture in Spain, with the publication of journals and collections, such as the *Revista de Occidente*. He translated into Spanish several authors, e.g., Bertrand Husserl, Max Scheler, Franz Brentano and Wilhelm Dilthey.
- 12 Thomas Merton (1915-1968) was an American Catholic thinker and writer who published on activism, pacifism and spirituality.

They could articulate the dispersion of knowledge sprayed by the experimental method and by scientific specialization.

The “goodness” emerged as a consequence of the Covian’s ideas on Ethics and on the axes of “truth” (see Covian, 2007c). The researcher should consider Ethics as a set of values and morals virtues, but it should not come just from external and social conditioning. Ethical considerations should come to the researcher based on his thinking about “truth” and knowledge; they should be a consequence of the humanities training. This conception is connected to his proposals on university and scientific training. According to him: “The scientist who closes himself schizophrenic in his lab, oblivious to the whole university, political and social debates, it is a marginalized human being” (Covian, 1979a, p. 617). The scientist’s knowledge should be related to an ethical concern, which was partially determined by the scientific readings and partially related to political and social demands. To promote these training on Ethics, focusing the “goodness”, Covian stated:

... I suggest the university to train small groups of students ... with periodical meetings - inspired by the first days of the University - to freely and respectfully debate important problems, such as: science, social demands, arts, philosophy, etc. (p. 619)

Finally, Covian presented the “beauty”. According to him, people - including scientists - should marvel themselves at the experience of reality. They should be curious and recognize the “beauty” of the world, which could promote freethinking. For the scientist, this could contribute in the development of their scientific activities. The creation of scientific knowledge connected with humanities promotes culture. Quoting the psychoanalyst Carl Jung, Covian said: “Man can leave behind his animal part through the cultural process, towering over his organic condition, creating its own environment (culture)” (Covian, 1979b, p. 14). Guided by the “beauty” of reality, scientists could became

... Thinkers, able to exercise a critical and argumentative role in society, fleeing from conformity and lack of intelligence and spirit. They will be brave enough to fight to change the degrading social, political and economical structures of the human condition. (p. 14)

Thus, the humanistic training at the university advocated by Covian connects technical knowledge of scientific work with cultural subjects. Especially, knowledge originated from the humanities. This would allow the education of people committed to ethical practices and, consequently, social changes.

He affirmed he intended to harmonize Physiology with Philosophy, as an effort to connect Philosophy and Science. An example of this effort was his area of research at the FMRP-USP, which was called by him as “interaction brain-mind” that represented his primal interest on Neurophysiology (Damasceno, 2013).

Scientific Laboratory: Research and scientific training

The humanistic proposals for education advocated by Covian did not clash with his practices as a scientist and professor in the Neurophysiology laboratory. His lab was a tool for teaching and researching that had an important impact on the scientific community of USP as well as on the Brazilian scientific community. According to some reports of the period, his lab “... has been

carrying out high-level research on cortical and cerebellar activity, hypothalamus, reticular formation, and septal area ..." (Mendes, 1975, p. 4). In the lab studies, the behavior of the experimental subject and its relation to specific parts of the brain were in the foreground, especially: amygdala, hypothalamus and septal area. These areas are part of the limbic system in mammals and they are responsible for social behaviors and emotions. The amygdala is related to sexual behavior as well as with feelings (e.g., fear and anxiety). The hypothalamus is a bridge between the nervous system and the endocrine system, mainly regarding the control of body temperature, hunger and thirst. Finally, the septal area, is associated with the cerebral enhancers and punishers processing behavior of the subject.

Based on the study of these areas, the "interaction brain-mind" had three main approaches: (i) the relationship between emotion and behavior; (ii) feeding behavior; and (iii) the neural basis of behavior. The studies on these approaches occurred mainly with albino rats, rabbits, guinea pigs and cats as experimental subjects. Different interventions were performed, especially in the central nervous system, e.g., in the septal area, hypothalamus and amygdala. For instance: (a) electrolytic lesions; (b) electrical or chemical stimulation parameters recorded on neurovegetative and metabolic activity; (c) heart rate; (d) blood pressure; (e) respiratory rhythm; and (f) behavioral parameters, like motor activity and intake of water and sodium. In some experiments manipulation of the endocrine system or systemic injection of different types of drug activity were performed. According to those approaches and experimental designs, we can notice an early institutionalized development of neuroscience in Brazil. This development had relations with themes of psychology, especially experimental psychology (e.g., feeding behavior, operant conditioning, etc.).

Searching for the "Covian" at the *Periódicos CAPES*¹³ (CAPES Journals), we found 13 papers within our time frame (see Table 1).

Table 1 shows us just a single paper that was not an experimental one: a memorial for Houssay in 1971. The other papers were experimental research related to lab work, which represents those three "interaction brain-mind" main approaches: (i) the relationship between emotion and behavior (e.g., Lico, Hoffmann & Covian, 1974); (ii) feeding behavior (e.g., Covian, 1967); and (iii) the neural basis of behavior (e.g., Saad, Antunes-Rodrigues, Gentil & Covian, 1972). These studies used apparatuses for experimental work, in which the stereotaxic apparatus was the most frequent. It was used for stereotaxic surgery in experimental subjects, e.g., inserting cannula, electrodes in the brain. In addition to this, there were kymographs, pneumographs and polygraphs kits, for the measurement of neuronal and behavioral conditions related to experimental estimations of neural system, such as blood pressure, breathing rhythm, body movements, vocalizations, etc. The same sort of apparatuses was also common in papers and propagandas in experimental psychology scientific journals, e.g., the *Journal of the Experimental Analysis of Behavior* (JEAB) (Miranda, Gonçalves, Miranda & Cirino, 2009). Other apparatus used by Covian's lab was related to some experimental psychology theories and concepts, such as the behavior analysis. For instance, in the study of Graeff et al. (1973) they used: a Skinner box (Figure 2), the target behavior was "lever pressing" and it was installed with the differential reinforcement of successive approximations.

13 Periódicos CAPES it is free access virtual library of scientific journals for students and professors tied to Brazilian universities.

Table 1. Publications of the Neurophysiology Laboratory

Year	Title	Author(s)	Publication
1965	Decrease Blood Pressure Due to Brain Septal Stimulation: Parameters of Stimulation, Bradycardia, Baroreceptor Reflex	Miguel Rolando Covian & César Timo-Iaria	Physiology and Behavior
1966	Alterations in Sodium Chloride and Water Intake after Septal Lesions in the Rat	Andrés Negro-Vilar; Cleber G. Gentil & Miguel Rolando Covian	Physiology and Behavior
1967	Studies on the Neurovegetative and Behavioral Functions of the Brain Septal Area	Miguel Rolando Covian	Progress in Brain Research
1968	Role of Amygdaloid Complex in Sodium Chloride and Water Intake in the Rat	Cleber G. Gentil; José Antunes-Rodrigues; Andrés Negro-Vilar & Miguel Rolando Covian	Physiology and Behavior
	Autonomic Conditioning in the Anesthetized Rabbit	Maria Lico; Annette Hoffmann & Miguel Rolando Covian	Physiology and Behavior
1970	Role of Adrenals in the Changes of Sodium Chloride Intake Following Lesions in the Central Nervous System	José Antunes-Rodrigues; Cleber G. Gentil; Andrés Negro-Vilar & Miguel Rolando Covian	Physiology and Behavior
	Mechanism of Decreased Sodium Chloride Intake After Hypothalamic Lesions: Effect of Hydrochlorothiazide	José Antunes-Rodrigues; Wilson A. Saad; Cleber G. Gentil & Miguel Rolando Covian	Physiology and Behavior
1971	Bernardo Alberto Houssay (1887-1971)	Miguel Rolando Covian	Physiology and Behavior
1972	Water and Sodium Chloride Intake Following Microinjections of Angiotensin II into the Septal Area of the Rat Brain	Miguel Rolando Covian; Cleber G. Gentil & José Antunes-Rodrigues	Physiology and Behavior
	Interaction Between Hypothalamus, Amygdala and Septal Area in the Control of Sodium Chloride Intake	Wilson A. Saad; José Antunes-Rodrigues; Cleber G. Gentil & Miguel Rolando Covian	Physiology and Behavior
1973	Lever-Pressing Behavior Caused by Intraseptal Angiotensin II in Water Satiated Rats	Frederico G. Graeff; Cleber G. Gentil; Vera Lúcia Peres & Miguel Rolando Covian	Pharmacology, Biochemistry and Behavior
1974	Influence of Some Limbic Structures Upon Somatic and Autonomic Manifestations of Pain	Maria Lico; Annette Hoffmann & Miguel Rolando Covian	Physiology and Behavior
	Antagonism of the Dipsogenic Action of Intraseptal Angiotensin II in the Rat	Vera Lúcia Peres; Cleber G. Gentil; Frederico G. Graeff & Miguel Rolando Covian	Pharmacology, Biochemistry and Behavior

Another example is the study developed by Covian and Hoffmann (1974). We can notice the use of some concepts like respondent behavior and conditioned stimuli. These concepts were initially developed by I. Pavlov and were reinterpreted by theoretical formulations of American experimental psychology. The presence of these concepts suggests us the circulation of classical concepts on experimental psychology and some possible communication between neurophysiology and psychology. This also helps us understand that scientific instruments can acquire different uses and become independent of the initial theoretical formulation. The presence of behavioral concepts and apparatuses that measure behavior could be analyzed based on the training of Covian in the USA with Richter and Bard.



Fig. 2. Skinner box at USP, about 1960s. Source: Universidade de São Paulo.

A single author, Covian, wrote two of the thirteen texts presented on Table 1. The others texts are signed by multiple authors, which suggests teamwork in the development of activities in the lab. There are ten different authors and, from them, three are women. In the early decades of the 20th century in Brazil, there were some professions that were not considered “appropriate” for women, among those, the one of scientist. The presence of women as scientists can suggest the inclusion of women in Brazilian scientific universe due to the fact that almost one third of the authors were female (see Figure 3). In this figure, we see Anette Hoffmann and Maria Carmela Lico standing right behind Covian. All used coats, clothing typical of the scientist in the laboratory. In the background, we see some laboratory instruments such as oscilloscope, electronic stimulator and electronic time controllers. Covian could be in the foreground because he was a man, but it could also be because he was the head of the department and laboratory. The existence of this record helps us to compose more a counterpoint of laboratory activities in the period: the fact that he promoted and registered female scientific work in that period (Hoffmann, 2008).



Fig. 3. Anette Hoffman, Maria C. Lico and Miguel Rolando Covian, about 1960.

Source: FMRP-USP Historical Museum.

Maria Lico can also help us understand the relationship of the lab with psychology due to her research on the constitution and functioning of the mind related to mechanisms of pain and its perception.

Observing the training of Covian's co-authors, we can point out some aspects. Some of those authors were already professors at the Department of Physiology, but were also under the supervision of Covian. For instance, some names appear with different periods of supervising: César Timo-Iaria (1960-1961), José Antunes-Rodrigues (1960-1962) and Vera Lúcia Peres (1970-1973). According to Eduardo Krieger, who was incorporated into the Department in 1957, Covian's lab was an important site for researching and training other professors of the Physiology Department (Krieger, 1991 cited in Mauro & Nogueira, 2004, p. 118). He affirmed: "... we really researched ... there were not excessive obligations of supervising at that time, it was a period that we [professors] had to be trained ..." (p. 118 - emphasis added). Training people who were already University professors to do research was quite common at that time. The graduate courses began to gain momentum in the transition between the decades of 1960-1970s (Cunha, 2007) in Brazil, i.e., became a researcher was part of the day-by-day training of professors in activity. The Department, with the help of the Rockefeller Foundation, hired two Covian's Argentinians colleagues: Andrés Negro-Vilar (1965) and Maria Carmela Lico (1963) (Franci, 2002). Frederico Graeff was assistant professor at the Department and Anette Hoffmann - who was supervised by Maria Lico (1966-1970) - was hired in 1969. Cleber Gentil and Wilson Saad were professors at Physiology Departments: the first one, at the Pharmacy and Dentistry School of USP-RP, and the second one, at *Universidade Estadual Paulista*, Campus Araraquara, São Paulo¹⁴. Based on that authorship, we observe the laboratory acting like a "truth spot", centralizing characters around those three main approaches on the "interaction brain-mind". The activities of the lab seemed to occur based on partnership between researchers and supervisor-students. These relations contributed for the specialized training for those who would compose the Department of Physiology. We can also notice the lab fulfilling the role of a teaching tool. According to Cândido (2009), the neurophysiology laboratory of Covian, became a "truth spot" for many young researchers in the field, such as Anette Hoffmann, Renato M. Sabbatini and Norberto Garcia-Cairasco. In this direction, Hoffmann (2008) reports:

When I arrived in Ribeirão Preto in 1966, I had the opportunity to start my scientific training participating in projects developed by Maria C. Lico and Michael R. Covian. At that time, acute experiments with anesthesia in animals were commonplace. The laboratory technician, Mr. Osvaldo Del Vecchio, a tailor by training, performed surgeries with accurate performance. Maria C. Lico conducted the experiments. Covian, who was the head of the department, was summoned to the experimental room only when the animals were subject of a special experimental treatment. (p. 25-26)

This report helps us understand the teaching performed in the laboratory, handling the apparatuses and discussing with experienced researchers. The role of teaching tool can also be observed on Figure 4.

¹⁴ In the researched sources, both of them appeared as tied to the Department of Physiology of the FMRP-USP.

Figure 4 shows Covian surrounded by students while operating a cat. The students were in the second year of Medical School at the *Universidade Federal do Ceará* (UFC). This course was related to the investment of the lab - especially advocated by Covian - of training physiologies to work in universities outside of the Southeast. In the Figure, we observed several instruments on the table, and some hanging on Covian. We see a lamp for surgical services, as well as an instrument to immobilize the head of the experimental subjects. By the location of the incision, it seems that it was a procedure of spinal cord section. Students were mostly men and all used coats.

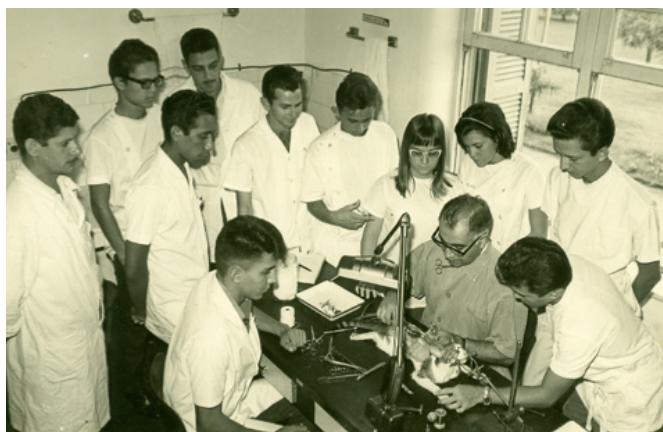


Fig. 4. Covian and students during the First Summer Course of the Physiology Department, about 1965

Source: FMRP-USP Historical Museum.

The use of the laboratory as a teaching tool was an important aspect in professors-students and professor-professors relationships (Mauro & Nogueira, 2004). According to some characters of lab:

Practical classes were assigned to other teachers of the Department. Covian was responsible just for the theoretical courses. He was, however, concerned to attend classes of his Department's fellow and comment on them later. This practice trained a group of professors from the first line. (Antunes-Rodrigues, 1991 cited in Mauro & Nogueira, 2004, p. 118)

Another character continues: "About the practical classes in Physiology, his [Covian] former student Otacílio Lopes da Silva says: since the first year students were experimenting with chickens and rabbits" (p.118). In the same direction: "[Covian] required of professors an experiment per day, as well as frequent reading of scientific papers, discussed on Saturday mornings during meetings with all members of the Department." These accounts help us understand the importance of: (i) ongoing training for professors at the Department and (ii) theory in Covian's proposals. As we noticed, Covian brought together theory and practical aspects on the scientific training performed at his lab. Other professors could teach the practical lectures - that happen really early in the Medical training - meanwhile Covian was interested in the theoretical training of his students. Some of the objects and subjects of those theoretical and practical aspects were related to some areas of psychology.

Final Considerations

Our goal was to describe and analyze aspects related to ideas and practices of Argentine neurophysiologist Miguel Rolando Covian between 1955 and 1974. By addressing this topic we can observe conditions for the development and circulation of scientific knowledge related to neurosciences (e.g., psychology, neurophysiology) in Brazil. Consequently, this helps us to better understand the relations between science, technical innovations and society in the country, such as some aspects of the “brainhood” in Brazil in a period of paradigmatic strengthening of “neuro” discourses around the world.

We noted that Covian's proposals and practices are related to two main axes: humanistic reasoning and scientific training. These two axes defined a humanist ideal of scientist that helps us to understand the practices carried out in the laboratory, especially regarding the scientific training of students/professors. The humanistic education was based on readings in the field of humanities, such as Psychology, Philosophy and Behavioral Sciences. Covian brought those readings together on three main topics: truth, goodness, and beauty. The Covian's ideal of University was grounded of those three topics, defining a humanistic/cultural training of the scientist. This training focuses the development of social and political criticism as well as scientific and technical production. The University advocated by Covian criticized the exaggeratedly technical training at the expense of a larger cultural formation. These ideas seem to be anchored in what he learned in Argentina and the USA before coming to Brazil. In the Brazilian context, its proposals were controversial compared with the mainstream pragmatism and utilitarianism fostered in that period. Moreover, his scientific training proposals defended the university as a freethinking spot and the role of the scientist in social criticism. These aspects can be read as milestones of a position contrary to State interventionism in the University during the Brazilian dictatorship.

Covian described how his studies focused on “brain-mind interaction”, which represented the root of his interest in Neurophysiology. The “brain-mind interaction” was articulated into three main axes: (i) the relationship between emotion and behavior; (ii) feeding and drinking behavior; and (iii) the neural basis of behavior. The research guided by these areas was developed in partnership between professors-professors and professors-students. This contributed for the training of human resources in the country, which was stressed on higher education proposals of the period and contributed to organize a scientific community in Brazil. His research focused on the relationship between organism and environment, highlighting the role of brain mechanisms in behavior and was developed with different apparatuses, e.g., stereotaxic equipment, electrodes, cannulas, pneumographs, polygraphs and Skinner boxes. At this point, three aspects suggest approximations to some sub-disciplines of psychology: (1) a focus on the behavior of experimental subjects; (2) the instruments; and (3) theoretical concepts from some experimental psychology perspectives, e.g., operant behavior, reinforcement and reflex behavior.

Finally, we should also mention the methodological constraints of our study. These are the first results of an approximation of a promising intellectual tie to neurosciences in Brazil. The main part of research on Covian was focusing his theoretical and philosophical proposals, dealing with his readings on humanities. Thus, the existence of psychological concepts and ideas on his theoretical perspective is a field better developed than the relations between his lab research and

psychology. Our paper addresses some of these new aspects of Covian's work in Brazil, and can help us to observe psychological issues in his research and how this research was related to the dispersion of neurosciences in Brazil. Complementary studies need to be conducted to map out the research developed in his lab, stake out more clearly how they are associated with psychology, how they have affected neurosciences, etc. Our paper presented a promising character for the interface between Neurophysiology and Psychology, fields connected to neuroscience in the country. Moreover, we present information that can help future research in related topics, such as the history of psychology, history of neurophysiology and history of neurosciences.

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