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The Intellectual Journey of Hua Loo-keng from China to the Institute for Advanced Study: His Correspondence with Hermann Weyl

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"The scientific knowledge grows by the thinking of the individual solitary scientist and the communication of ideas from man to man Hua has been of great value in this respect to our whole group, especially to the younger members, by the stimulus which he has provided." (Hermann Weyl in a letter about Hua Loo-keng, 1948).[†]

Abstract: This paper explores the intellectual journey of the self-taught Chinese mathematician Hua Loo-keng (1910–1985) from Southwest Associated University (Kunming, Yunnan, China)[‡] to the Institute for Advanced Study at Princeton. The paper seeks to show how during the Sino C Japanese war, a genuine cross-continental mentorship grew between the prolific German mathematician Hermann Weyl (1885–1955) and the gifted mathematician Hua Loo-keng. Their correspondence offers a profound understanding of a solidarity-building effort that can exist in the scientific community. Hermann Weyl had a profound influence on Hua Loo-keng and facilitated his coming to the Institute for Advanced Study at Princeton. Hua Loo-keng who left school at the age of fifteen was able to produce considerable work in number theory, algebra, geometry, and complex analysis. Hermann Weyl had interests that covered wide subfields of mathematics and was also involved in the development of general theory of relativity alongside Albert Einstein.

[†]Historical Studies-Social Science Library of the Institute for Advanced Study at Princeton, School of Mathematics—Member Series, 1978–1983, Box: Harris–Kurihara.

[‡]Southwest Associated University was a merger of three universities during the Sino-Japanese war.

Key words: Hua Loo-keng; Hermann Weyl; Scientific exchange between China and the United States of America; The Institute for Advanced Study at Princeton; Southwest Associated University

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1. INTRODUCTION

This paper aims to show an unlikely friendship that had developed between Hermann Weyl (1885–1955), one of the most prolific mathematicians of the twentieth century, and the self-taught Chinese mathematician Hua Loo-keng (1910–1985). Hermann Weyl was not only responsible for helping to bring Hua Loo-keng to the Institute for Advanced Study, but was instrumental in helping him publish several papers in leading international mathematics journals. Their correspondence[1] and work together in the nineteen-forties, a time of war for both America and China, tell a valuable story of scientific courage and solidarity, and shows that culture, nation, and identity are no obstacle to the furthering of intellectual knowledge.

Hua Loo-keng, born in Jintan in the Jiangsu province of China, left school due to his parents' financial difficulties and did not complete high school. While helping his parents managing a small grocery store, Hua Loo-keng taught himself mathematics and published two papers in a Shanghai science periodical. One of the papers was a critique (On the incorrectness of Su Jia Ju's paper) of an article published by a Chinese mathematician who claimed to have a solution for the quintic equation. Those papers brought Hua Loo-keng to the attention of Xiong Qinglai[2], the chairman of the mathematics department at Tsing Hua University in Beijing. In 1931 Xiong Qinglai invited Hua Loo-keng to work as "a special Assistant" [1] in the mathematics department.

Hermann Weyl as a mathematician had interests that covered wide subfields of mathematics and was also involved in the development of general theory of relativity alongside Albert Einstein. He was the first mathematician to formulate the concept of "gauge invariance" [2] which would revolutionize physics during the second part of the twentieth century and was a major contributor in the field of Lie Algebra. Accordingly "gauge invariance" means that only invariant relations under transformations are geometrically significant.

A concise history of the development of mathematics in China offers a key to appreciating the genuine solidarity and support that Hermann Weyl manifested

[1] Around the mid-1940's, Hua Loo-keng, while teaching at the Southwest Associated University began a correspondence with Hermann Weyl. Their correspondence ranged from Weyl helping Hua Loo-keng publishing several articles in international mathematical journals to Weyl seeking to bring Hua as a researcher to the Institute for Advanced Study at Princeton. While Hua Loo-keng was at the Institute, Weyl sent an open letter to different universities to secure him a teaching position.

[2] Xiong Qinglai who visited France in 1931 followed Jacques Hadamard's lectures at that time [9]. Jacques Hadamard (1865–1963) was a French mathematician who did considerable works in "function theory, calculus of variations, number theory, analytical mechanics, algebra, geometry, probability theory, elasticity, hydrodynamics, partial differential equations, topology, logic, education, psychology, and the history of mathematics" [6].

towards Hua Loo-keng. The development of mathematics in China and its participation among the international mathematics community followed different paths based on three historical periods: (a) The period of foreign missionaries, when certain mathematical texts were translated into Chinese, (b) The period when Chinese students who expressed interest to study went abroad to Japan, (c) The period where using the funds of the China Foundation for the Promotion of Education and Culture, Chinese students started to travel to Europe and the United States of America [3]. It was also during this period that European and American professors were invited to lecture at Chinese Universities. Among the professors who visited China to lecture, where notable mathematicians such as George Birkhoff, Paul Painleve, Jacques Hadamard, Emmanuel Sperner, Norbert Wiener, Emile Borel.

During this period, there was a prevalence of Chinese students or mathematicians who went abroad to further pursue their mathematical interests. One of the mathematicians who had the most impact on the field of mathematics in China as well as its overall scientific development is Hua Loo-keng. The correspondence between Hua Loo-keng and Hermann Weyl demonstrates the collaboration, support and genuine solidarity that can exist between mathematicians or scientists. This correspondence is also a proof of the mathematical exchanges that took place between the United States of America and China. In the history of mathematics, Hermann Weyl was special. He was not only a great mathematician but according to Michael Atiyah: "Weyl was always keen to identify talent and provide encouragement for the younger generation" [4].

Weyl spent many years trying to bring Hua Loo-keng as a Fellow at the Institute for Advanced Study at Princeton, the environment in which he found himself amidst scientists like Robert Oppenheimer a physicist considered by many to be the father of the atomic program in the United States of America, Albert Einstein, James Waddell Alexander, Marston Morse who created Morse theory, Atle Selberg, Carl Ludwig Siegel, Solomon Lefschetz.

2. HUA LOO-KENG: JOURNEY FROM SOUTHWEST ASSOCIATED UNIVERSITY (KUNMING, YUNNAN, CHINA) TO THE INSTITUTE FOR ADVANCED STUDY AT PRINCETON

Hua Loo-keng a renowned self-taught mathematician left school at the age of fifteen, so he could help his father manage the family grocery store. Early in his career he was invited to Tsing Hua University to work as a clerk in the mathematics department and in the library. Hua Loo-keng produced mathematical papers that brought him to the attention of Norbert Wiener [5], the American mathematician, who had accepted an invitation to lecture at Tsing Hua University. With Wiener's help, Hua Loo-keng spent one year at Cambridge University under the guidance of the famous mathematician Godfrey Harold Hardy. Later, Hua Loo-keng returned as a full professor at Southwest Associated University. While at Kunming, Hua Loo-keng initiated research on what he called the "geometry of matrices" and established correspondence with the mathematician Hermann Weyl, who at the time was at the Institute for Advanced Study at Princeton. What transpired through this correspondence is a relationship of mentor, support and guidance from the renowned and established mathematician Hermann Weyl, to the gifted Hua loo-keng. This corre-

spondence also offers a deeper understanding of a solidarity-building effort among the scientific community.

A student of David Hilbert, the founder of the Göttingen school of mathematics, Hermann Weyl (1885–1955), had developed interests in various areas of mathematics as well as the theory of relativity [6]. Weyl's interests in mathematics range from the foundations of mathematics to geometry, analysis, Riemann surfaces, and topology. He borrowed concepts from philosophy, converted them into mathematical concepts that became influential in the development of mathematics and physics [7].

From his collaboration with Albert Einstein, Hermann Weyl published his book Raum–Zeit–Materie (Space–Time–Matter) in 1918. This book "gave Weyl his first opportunity to combine discussion of the philosophical questions in which he was so deeply interested with technical mathematics" [2]. It was during the period of Weyl's collaboration with Einstein that he brought major contributions to differential geometry. Weyl later published The Classical Groups (first edition in 1939), Group Theory and Quantum Mechanics (1929, in German). He also became interested in the theory of Lie group, as a result of his attempt to understand Einstein's general theory of relativity and contributed tremendously to quantum mechanics, non-Abelian gauge theory, and differential geometry.

One cannot establish with certainty when and how the correspondence started between Hermann Weyl and Hua loo-keng, considering the precarious conditions that the latter was living at Southwest Associated University. Around 1939–1940, Hua Loo-keng sent two papers to Hermann Weyl who presented them at the summer meeting of the American Mathematical Society (A. M. S) in Washington, D. C. In April 1940, Temple R. Hollcroft, Associate Secretary of the American Mathematical Society, forwarded the following letter to Hua Loo-keng[3]:

> Dear Dr. Hua,
>
> It is a great pleasure to receive two papers from you for the program of the Washington Meeting. It is encouraging to all mathematicians to know that you are carrying on research in mathematics in the face of great difficulties...
>
> With kindest regards and best wishes.
> Yours sincerely,
> T. R. Hollcroft.

Hollcroft also sent a letter to Hermann Weyl to thank him for sending the two abstracts. In the letter, Hollcroft also referred to the adverse conditions under which Hua Loo-keng had produced these works. It was during the period of the Sino—Japanese war, when China was under intense bombardments. Later, in a letter to Hermann Weyl dated March 15, 1943, Hua Loo keng expressed interest to study with Weyl and Carl Ludwig Siegel, where he revealed that his interests to come to the Institute for Advanced Study were more patriotic than personal:

> The old country [China] is on the way for [to] recovery, science is extremely needed. Thus any help to the young scientists would mean a great help of the reconstruction of the country; and any influence to the young scientists would mean an influence to the history of science in China. The aim for my intension [intention] to come to Princeton is not for the personnel [personal]

[3] L. K. Hua, School of Mathematics File, Member Series, 1978–1983; Box Harris-Kurihara, Historical Studies-Social Sciences Library, Institute for Advanced Study, Princeton. (IAS, SM Mem, 78–83).

> sake, but for my country. On the country's name, I wish to have a thorough training in mathematics and then to develop mathematical science in China along a right way, which seems to be a part of reconstruction.
>
> With best wishes
> Yours very sincerely
> L. K. Hua.[4]

A week later, on March 24, 1943, Hermann Weyl sent a letter to the following professors at the Institute for Advanced Study: James W. Alexander, Albert Einstein, Marston Morse, Oswald Veblen.

> Professor Alexander
> Einstein
> Morse
> Veblen
> March 24, 1943
>
> In my opinion, the two outstanding Chinese mathematicians are Chern[5] and Loo-keng Hua (National Tsing Hua University, Kunming). The latter has made a number of profound contributions to the Hardy–Littlewood–Vinogradoff line of analytic number theory, and in a manuscript which he recently sent me duplicated a considerable part of Siegel's results in his big paper on sympletic geometry. It would be of the greatest value to him to get into closer contact with Siegel; ...
>
> Hermann Weyl[6]

Here, Weyl was referring to Hua Loo-keng's works on automorphism of groups, a concept related to the real symplectic group. Perhaps Hua Loo-keng's eagerness to learn and his creativity motivated Hermann Weyl to convince the Institute's administration to grant him an invitation to the Institutes School of Mathematics. On April 14, 1943, Weyl would send an invitation to Hua Loo-keng:

> I am authorized by our School of Mathematics and the Director of our Institute, Dr. Aydelotte, to invite you to join us as a temporary member of the School of Mathematics during the academic year 1943–44, and to offer you a stipend of $1000 for the year...
>
> Our whole group of mathematicians will be delighted to welcome in our midst a Chinese scholar of your distinction.
>
> I take this opportunity to acknowledge receipt of your recent letter containing corrections to your paper "On the theory of automorphic functions of the nth order, I. Geometrical base." I hope that in the meantime you have received my earlier letter in which I told you that the main body of your results had been anticipated by Siegel...

[4] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).
[5] Shiing Shen Chern was a Chinese mathematician, contemporary of Hua Loo-keng, who made significant contributions to differential geometry.
[6] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).

Yours sincerely,
Hermann Weyl

The following month, Hua Loo-keng sent a reply to Hermann Weyl in which he expressed his interest to study all aspects of mathematics, its philosophy as well its applications. In comparing his mathematical discoveries with those of Siegel, Hua Loo-keng argued that his approach was quite different from Siegel's. He further explained how he made his mathematical discoveries:

> The main difference between our results is that after we arrived at our common object, he went into the possibility of construction of all automorphic (or better Fuchsian) functions and I remain there to determine all the possible symmetric spaces (not necessary bounded under the sympletic group). (I just learn this terminology from Prof. Siegel's quotation of Cartan's paper)...
>
> With best wishes
> Yours very sincerely,
> L. K. Hua[7]

At the time, Hua Loo-keng had no access to research materials since this was the time that China was fighting the Japanese invasion. Hua Loo-keng was living under harsh conditions, and yet he managed to create independently from C. L. Siegel (see Hua's letter above) who was at the time at the Institute for Advanced Study at Princeton. To facilitate Hua Loo-keng's coming to the Institute, his stipend was increased from $1,000 to $1,500 a year, as shown in a letter dated July 30, 1943. Other mathematicians like Harris Hancock, ex chairperson of the Department of Mathematics and Professor Emeritus of the University of Cincinnati liked the idea of Hua Loo-keng traveling to the Institute. Harris Hancock who was a student of Henri Poincaré, wrote the following letter to O. Veblen:[8]

> Prof. L. K. Hua of the National University of Tsing Hua, Kunming, China, has written to me about going to Princeton, and I have strongly advised him to go. Besides, You, Einstein, Weyl, etc., he will come in contact with many great mathematicians there,... He may be in the same class of Hardy's Indian friend...

Here, Hancock was referring to Srinivasa Iyengar Ramanujan, the Indian mathematician. Hua Loo-keng failed to come to the Institute because the Chinese government did not release him from his teaching obligations at Tsing Hua University. In a letter dated November 29, 1944, that he wrote to Weyl, Hua Loo-keng had the following request to facilitate his research in such harsh conditions:

> Owing to the present condition, I determined a plan to stay in China for a longer time. Please do help me. Please ask Prof. Siegel to give me a list of important references in the theory of automorphic functions. It will be a great help to me, if some reprints or lecture notes, as you indicated in one of your letters, can arrive at me. Please tell me a way for learning continuous groups.[9]

This shows that Hua Loo-keng was unable to even keep abreast with the new

[7] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).
[8] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).
[9] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).

discoveries that were taking place in mathematics. Weyl had been supportive in the publication of Hua's research papers while he was at Southwest Associated University, and Weyl would advise him of any editing of his mathematical papers. The following agreement was reached. Due to problems in mail delivery, Hua Loo-keng had agreed that Weyl and C. L. Siegel could improve his research papers and his friend Hsio- Fu Tuan would proofread them.[10]

Though there were several difficulties related to Hua Loo-keng's trip to the Institute, such as stipends and delay from the Chinese government, the main reason perhaps for Hua Loo-keng staying in China at the time was patriotic. Having received the invitation to visit the Institute for Advanced Study, Hua Loo-keng compared his research results with those of Siegel. Since his mathematical work on Geometry on Matrices was related to Siegel's work, Hua Loo-keng declined an invitation to the Institute for Advanced Study at Princeton that year because Siegel was already there. Hua Loo-keng wanted to obtain credit: "If the results do receive due recognition, then it will show that our country can still be productive during the war period"[1].

Besides teaching and carrying research under adverse conditions while at Southwest Associated University, Hua Loo-keng had written his book Additive Prime Number Theory, that he would send to Hermann Weyl around May 1943 to be published in English. Weyl sent him the following reply:

> The English manuscript of your treatise on "Additive prime number theory" arrived. I have looked into it, though only somewhat perfunctorily, and find it very interesting indeed. But before making any inquiries about having it published in this country, I ought to know whether the USSR Academy, after having accepted it for publication in Russian, does not have copyright for it. I should hesitate to do anything about it without Vinogradow's knowledge and consent. In the meantime I am holding the manuscript here in safekeeping...[11]

The book would not be published in English until 1965. Regarding Hua Loo-keng not coming as a Fellow to the Institute, Hermann Weyl was disappointed and could not understand Hua Loo-keng's decision. Weyl would express his disappointment in a letter to Professor A. Adrian Albert at the Mathematics Department at the University of Chicago. "Three times we agreed to defer the invitation. Finally I had to write Hua (September/October, 1944) that for budgetary reasons we were forced to terminate the appointment, which now was for the year 1944-45,..."[12]

The following collection of articles published with the help of Hermann Weyl constituted the essence of his research work while at Southwest Associated University: (a) *On the Theory of Automorphic Functions of a Matrix Variable I*,[13] *Geometrical Basis*, (b) *The Classification of Hypercircles under the Symplectic Group, Geometry of Matrices I*,[14] (c) *Generalization of Von Staudt's Theorem, I, Arithmetical Construction*,[15] (d) *Geometry of Matrices, II, Study of Involutions in the Geometry of Symmetric Matrices*,[16] (e) *Geometries of Matrices, III, Fundamental Theorems*

[10] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).
[11] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).
[12] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).
[13] See the American Journal of Mathematics, 66 (1944), 470–488.
[14] See the American Journal of Mathematics, 66 (1944), 531–563.
[15] See Transactions of the American Mathematical Society, 57 (1945), 441–481, 482–490.
[16] See Transactions of the American Mathematical Society, 61 (1947), 193–228.

in the Geometries of Symmetric Matrices,[17] (f) *Geometry of Symmetric over Any Field with Characteristic Other than Two*,[18] and (g) *A Theorem on Matrices over a Sfield [Skewfield] and its Applications*.[19]

On Sepember 1, 1946, Hua Loo-keng sent the following letter to Hermann Weyl informing that he was released by the Chinese government to travel to the Institute:

> It is beyond of my ability to describe my happiness as my long time dream came to be realized. Now I finished all necessary process to come to the U.S.A., my ship will set forth on Sept. 2. If everything [goes] according to plan, I shall arrive at Princeton before the end of Sept., and at that time I shall meet you, the world greatest mathematician, honourable [honorable] teacher of our age.[20]

3. HUA LOO-KENG AT THE INSTITUTE FOR ADVANCED STUDY AT PRINCETON

The underlying philosophy of the Institute for Advanced Study at Princeton was based on the character and personality of its first director Abraham Flexner who believed that creativity in research cannot be intertwined with administrative duties.[21] Therefore Hua Loo-keng was in the right environment to be productive. He was appointed member in the Institute for the academic year 1946–1947. Hermann Weyl would praise Hua Loo-keng in a letter to S. S. Cairns, Professor of the Mathematics Department at Syracuse University, on March 12, 1947:

> Dear Cairns,
>
> [Hua Loo-keng] works at enormous speed and is prolific writer... His papers are certainly full of original, even brilliant, ideas... It makes him a very stimulating man to have around. He is cooperative and communicative and has a pleasant personality. We are all fond of him here and consider him a member of our group.
>
> Sincerely yours,
> Hermann Weyl.[22]

The group of mathematicians and scientists that Hermann Weyl was referring to was: Albert Einstein, Robert Oppeinheimer, himself, Oswald Veblen, Marston Morse, Solomom Lefschetz and many others. The following academic year, the mathematician Solomon Lefschetz (1884–1972) raised the possibility of Hua Loo-keng teaching at Princeton. Regarding Hua Loo-keng's appointment as a lecturer, the director of the Institute for Advanced Study sent the following memorandum to Oswald Veblen and Marston Morse:

> June 4, 1947
>
> Memorandum for Professors Veblen and Morse,

[17] See Transactions of the American Mathematical Society, 61 (1947), 229–255.
[18] See Annals of Mathematics, (1950), 8–31.
[19] See Acta Mathematica Sinica, 1 (1951), 109–163.
[20] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).
[21] Institute for Advanced Study, Princeton, (Fac 24a, Morse 48–68).
[22] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).

> Lefschetz is very anxious to appoint Hua as lecturer in mathematics next year with a stipend of $2,000 and raises the question whether we would allow Hua at the same time to receive his full stipend at the Institute. This seems to me very questionable but I should be glad to have your advice...
>
> Frank Aydelotte[23]

Oswald Veblen had probably suggested to reduce Hua's stipend at the Institute to $2,000, allowing him to teach at Princeton. The decision was probably approved by Marston Morse as the following note shows:

> June 5, 1947
> Dear Loo-keng Hua
> Ward Thayer 2
> Johns Hopkins Hospital Baltimore 5, Maryland
>
> Dear Dr. Hua,
>
> I am very pleased to hear from Professor Lefschetz of your appointment as part-time lecturer in Princeton for the year 1947–1948 at a stipend of $2,000 per year...
>
> With warmest good wishes, I am
> Yours sincerely,
> Frank Aydelotte[24]

A copy of this letter was sent to Professor A. W. Tucker, Professor Marston Morse, and Professor Oswald Veblen. Perhaps this rule was waived to alleviate Hua Loo-keng's financial situation, since his family was still in China. Meanwhile, Hua Loo-keng was involved in his research with Irving Reiner, a graduate of Cornell University and a fellow at the Institute for Advanced Study. The following year, Hua Loo-keng also received offer for teaching positions from Stanford University, Syracuse University, the University of Wisconsin, and the University of Chicago. The mathematician Marshall Stone had written to Oswald Veblen inquiring about both Hua and Chern:

> Dear Professor Veblen:
>
> There is a possibility, still in the nebulous stage, that we may be able to invite someone to Chicago on an arrangement similar to that we made (very successfully, I believe) with Marcel Riesz. My thoughts turn at once to L. K. Hua and Chern, either of whom could contribute a great deal to our graduate progtam [program]. Can you throw light on the immediate plans of either Hua or Chern?...

Hermann Weyl was interested in obtaining for Hua Loo-keng the best possible offer. In a letter dated February 12, 1948, perhaps sent to different universities, Weyl had this to say about Hua Loo-keng:

> This is to let you know that Professor Loo-keng Hua would be available for a position in this country next year... I think he could be of considerable service to American mathematics and to our mathematicians.

[23]Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).
[24]Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).

> ... He is a man simply brimming with ideas. He has done a number of excellent things in analytic number theory; most of this work is along Vinogradoff's lines. Right after the war he was invited to Moscow. During the closing years of the war he duplicated some of Siegel's research on automorphic functions of several variables (symplectic geometry). He has published 70 papers on a great variety of subjects;....
>
> Among his papers there is a high percentage of first-rate contributions to mathematics... Moreover he has improved a number of Vinogradoff's results...
>
> Sincerely yours,
> Herman Weyl[25]

It was at the University of Illinois at Urbana-Champaign that both Hua Loo-keng and Irving Reiner were hired. They had agreed to teach at the same university in order to continue their research. According to the records of the University of Illinois at Urbana-Champaign, Hua Loo-keng was there as a Visiting Professor of Mathematics for the academic year 1949–1950. Besides teaching duties at the University of Illinois, Hua Loo-keng sponsored a doctoral student, Raymond George Ayoub. The title of the dissertation was: Extensions of the Waring-Siegel Theorem in Algebraic Fields. Hua Loo-keng did not spend enough time at the university to see Ayoub's thesis completed because of his departure for the People's Republic of China in 1950.

4. CONCLUSION

In this paper, we have explored the intellectual journey of Hua Loo-keng from Southwest Associated University (Kunming, Yunnan, China) to the Institute for Advanced Study at Princeton. Hua Loo-keng's fellowship at the Institute was the result of his mathematical creativity under harsh conditions during the Sino-Japanese war and Weyl's support. Weyl initiated support to Hua Loo-keng by first accepting his mathematical papers starting from the year 1939, advising him on changes in the papers if necessary, as well sending them for publications. Later, as the correspondence between them deepened, Hermann Weyl insisted that Hua travel to the Institute, the same environment where Albert Einstein, Robert Oppeinheimer, James Waddell Alexander, Marston Morse and many other scientists were. Maybe what Hermann Weyl discovered in Hua Loo-keng was his own abilities. According to the French mathematician Armand Borel [8], Hermann Weyl would "get into a new subject and bring an important contribution to it within a few months." Hua Loo-keng had the same skills and he developed them to the utmost, not only for himself, but for his country. Upon his return to the People's Republic of China, Hua Loo-keng became involved in the reorganization of the Chinese Academy of Sciences, and the creation of research groups in different areas of mathematics. Later in his life, in 1958, Hua Loo-keng created the movement of popularizing mathematics with the objectives of teaching optimization methods among the Chinese industrial workers and farmers. Despite all his sacrifices to return to China and all his contributions to the development of his country, Hua Loo-keng endured the humiliation of the Chinese political class. In 1966, China endured the "Great

[25] Institute for Advanced Study, Princeton, (IAS, SM Mem, 78–83).

Proletarian Cultural Revolution". During that time, Hua Loo-keng was subjected to criticism by the Red Guards. "After more than one hour of criticism, Hua Loo-keng was asked to clean the Institute as if he was merely the janitor." [1]. During that period he was saved by Zhou Enlai the Prime Minister and Mao Tse-tung the General Secretary of the Central Committee of the Chinese Communist Party. Hua Loo-keng died from a heart attack on June 12, 1985, in Japan during a presentation.

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