

# P-L Hsu's Research and Teaching in China

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Dayue Chen

Peking University, China

# Introduction

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- 1910 Born in Beijing
- 1933 graduate from Tsinghua Univ.
- 1934 hired by Peking University
- 1970 died at Peking University



# Introduction

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  - 1940 Professor
  - 1945-47 visited USA
  - 1970 died at Peking U.
  - 1911 Qing Dynasty ended
  - 1927-1937 Golden 10 years in China
  - 1937-1945 WWII  
36-40 peace in UK
  - 1945-1949 Civil War
  - 1949-1966 years of constructions.  
Good time with USSR
  - 1966-1976 The Great Cultural Revolution
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# Introduction

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- Apart from his published papers and a few remarks given us by an old friend, we are unable to obtain further information about Hsu's life and work in the twenty some years he lived in Peking

--**PAO-LU HSU 1910-1970**, The Annals of Statistics **1979**, Vol. 7, No. 3, 467-470

- T. W. ANDERSON (Stanford)
- K. L. CHUNG (Stanford)
- E. L. LEHMANN (UC Berkeley)



# Introduction

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- The limiting distributions of functions of sample means and application to testing hypotheses. *Proc. Berkeley Symp. Math. Statist. Probability*, 1949, 359-402. Univ. of California Press, Berkeley and Los Angeles.
  - On symmetric, orthogonal, and skew-symmetric matrices. *Proc. Edinburgh Math. Soc. Ser.* 1953, 2, 37-44.
  - A general weak limit theorem for independent distributions, Appendix III in *Limit Distributions of Sums of Independent Random Variables*, by B. V. Gnedenko and A. N. Kolmogorov, translated by K. L. Chung, revised edition, Addison-Wesley, 1968.
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# Introduction

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- Mr. Hsu was essentially a legendary hero, somewhat mysterious to us. --  
Boju Jiang who first met Hsu in 1968 since he came to PKU in 1953.
- 许先生基本上是一位传说中的英雄，  
多少有些神秘 —— 姜伯驹
- Hsu was quite isolated,  
due to his poor health.
- Last public lecture in 1955.



# In Summary

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- ❑ Continued his research after 1947, wrote 1/3 papers.
  - ❑ Run seminars to foster young teachers & graduates.
  - ❑ Supervised a training program. The blueprint designated by Hsu became the national standard.
  - ❑ Introduced and promoted **Probability & Statistics** in China.
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# Research

Years	where	China	Int'l	Topics
1935	Beijing	1	1	topology
1938-1940	London	1	7	statistics
1941-1945	Kunming	1	9	Random matrices Limiting distributions
1946-1947	USA	0	4	Matrices, complete convergence
1949-1964	Beijing	11	2	Characteristic functions, Matrices transf. Markov processes Experimental design Limiting distribution
1968, Post-humously		3	1	Markov chain, Random Mat. Limiting distr., Coding

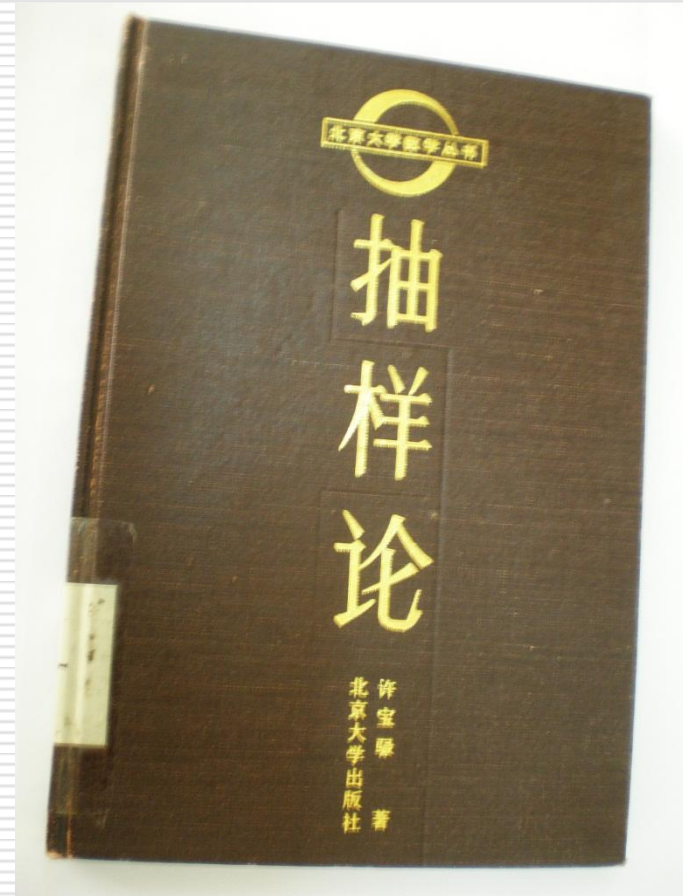
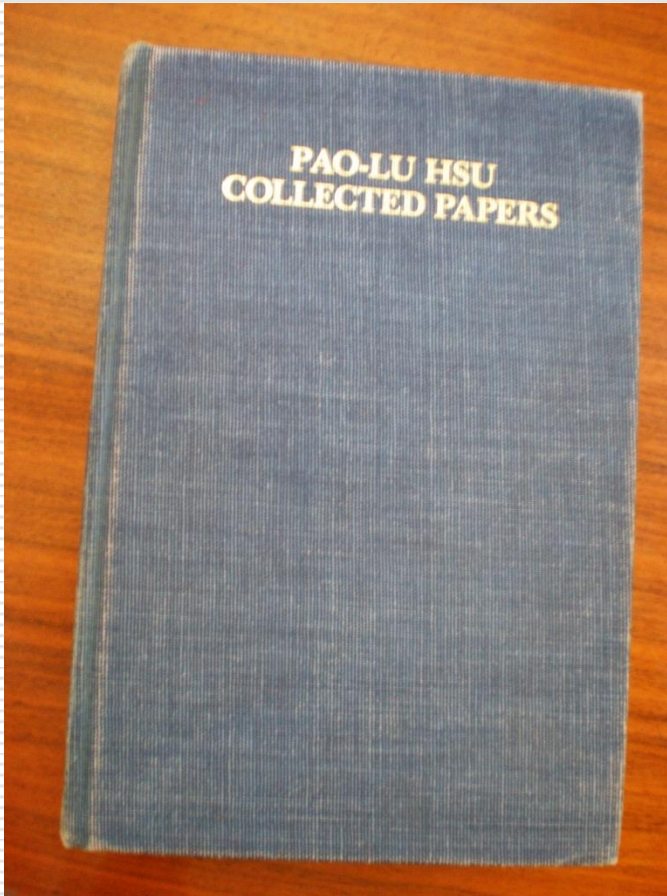
# Research

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- ❑ Published 41 papers, in addition to 3 books.
  - ❑ Peak performance in 1938-1947, 22 papers in 10 years, all in English.
  - ❑ 13 papers in 15 years (1949-1964), 11 papers in Chinese Journals.
  - ❑ Most are single authored. Coauthors: K.L. Chung, Kiang Tsai-han, H.Robbins, Ban-cheng, J.D.Chen, Z.G. Zheng
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# Research

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# Research

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- ☐ Limit Theorems
  - ☐ Random matrices
  - ☐ Markov chains
  - ☐ Experimental designs
  - ☐ Characteristic functions
  - ☐ .....
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# Research

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- **E.L.Lehmann**, Hsu's work on inference, *The Annals of Statistics*, 1979, Vol.7, No.3, 471-473.
  - **T.W.Anderson**, Hsu's work in multivariate analysis, *The Annals of Statistics*, 1979, Vol.7, No.3, 474-478.
  - **K.L.Chung**, Hsu's work in Probability, *The Annals of Statistics*, 1979, Vol.7, No.3, 479-483.
  - **J.D. Chen & Z.G.Zheng**, Academic Achievements of Professor P.L. Hsu, *Frontiers of Mathematics in China*, 2011, Vol. 6,
-

# Research

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- ❑ The merit of a paper is not just to get published, but is realized when it is cited repeatedly by others.
  - ❑ 一篇文章的价值不是在它发表的时候得到了承认，而是在后来不断被人引用的时候才得到证实。
  - ❑ A good author should show the simplicity.
  - ❑ 良工示人以朴。
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# Research

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- I do not want to get famous because my paper appears in a well-established journal. I wish a journal is well established because my paper appears in that journal.
  - 我不希望自己的文章登在有名的杂志上因而出了名；我希望一本杂志因为刊登了我的文章而出名。
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# Teaching

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- ❑ One can feel proud to be the advisor of a Noble laureate. It means nothing just to be a student of a Noble laureate.
  - ❑ 自古以来，只有做状元的老师是光荣的，做状元的学生是没有什么的。
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# Teaching

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- Hsu was the first to offer courses in probability and statistics in China.
  - Kai-Lai Chung, Shou-ren Wang (王寿仁 → Zhi-ming Ma)
  - Zhong-Zhe Zhao(赵仲哲, 1924-1987), first graduate in probability in China
  - Last lecture in 1955.
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# Teaching

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- The most profound action in 1956
  - Probability and Statistics (together with computational mathematics & differential equations) were identified as key subjects of mathematics to be developed with priority in China.
  - Only a few Chinese knew probability and statistics by that time.
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# Teaching

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- ❑ To produce qualified teachers at accelerated pace, a special program was created at Peking Univ.
  - ❑ 34 juniors from PKU, 10 from Nankai Univ. & 10 from Sun Yat-sen Univ.
  - ❑ Many auditors.(进修教师)
  - ❑ Instructors from CAS & Sun Yat-sen Univ. in Guangzhou were summoned.
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# Teaching

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- ❑ Hsu acted as the head coacher of the program. The curriculum set by Hsu became the national standard.
  - ❑ Textbooks were compiled, many based on the notes of his lectures.
  - ❑ Students were dispatched to many universities to teach Prob. & Stat.
  - ❑ the founding father of probability and statistics in China.
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# Teaching

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- Run seminars (=small class) in his home (one bedroom apartment) for 8 years.
  - Tutor students & young teachers, only a few people were lucky enough to be his apprentices (入室弟子).
  - Wide range of Topics: Markov Process, Limit theory, Stationary processes, Mathematical Statistics, experimental designs, Sampling techniques, order statistics, etc.
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# Lecture Notes on Topology, 1963

IV

~~开. 闭. 子空~~

I. T-空间

- $(X, \mathcal{U})$ , 开1.  $0 \in \mathcal{U}$ ,  $X \in \mathcal{U}$   
开2. 无论多少开集之和为开集.  
开3. 有限个开集之积为开集.

II. 开. 闭. 子空间.

定义. 含于  $A$  的最大开集, 即

$$\sum_{G \subset A} G$$

称为  $A$  的内部, 记作  $A^\circ$ .

II.1.  $(A^\circ)^\circ = A^\circ$ .

II.2. 若  $A \subset B$ , 则  $A^\circ \subset B^\circ$ .

II.3. 若  $G \subset A$ , 且  $G$  为开集, 则  $G \subset A^\circ$ .

II.4.  $A^\circ$  为开集.

II.5.  $A$  为开集的充要条件是:  $A = A^\circ$ .

# Teaching

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- ❑ Designated pen-names Ban-cheng(班成), Ban-guo (班果), Ban-ji(班绩) for writing papers collectively.
  - ❑ Researches conducted by members of the seminars were first coordinated efforts in China.
  - ❑ Supervised six graduate students in 1958-1962, including Yongquan Yin (殷涌泉→ Zhi-dong Bai)
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With students of  
queue theory  
group, July of  
1959

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With students  
of statistics  
group, 1959

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北京大学数学力学系1954级数学专业学生毕业时与老师合影（1959年7月）。前排老师（左起）：胡迪  
鹤、张尧庭、吴德佺、聂灵沼、梅向明、程民德、段学复、刘沙、周培源、江泽涵、许宝騄、周毓麟、张芷  
芬、卢崇飞。

# Services

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- Following the Soviet pattern, the faculty of Prob.& Stat. was set up at Peking Univ. in 1956.
  - 概率论与数理统计教研室
  - Teaching and Research Unit of Probab. Theory and Mathematical Statistics
  - The very first unit of the kind in China, evolved into a separated department in 1985.
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# Services

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- ❑ As the founding director of the unit, Hsu took a good care of career progress of young colleagues, since most members only had a bachelor degree.
- ❑ Organized scientific exchanges.  
Fisz, Urbanik visited in 1957  
Dynkin visited PKU in 1958.  
Prokhorov planed in 1960.



# Services

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- Proofread translated books.  
Learned Russian by himself.  
Last assignment in his life: proof-read
  - Wish to create a Chinese journal in prob. & stat., subsidized by his own money.
  - Deputy Director, the Organizing Committee of the Institute of Math.
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# Services

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- ❑ His efforts were discounted, although he was immune from politics.
  - ❑ Graduate students were designated.
  - ❑ Seminars were interrupted.
  - ❑ Annoyed by writing research plan.
- 
- ❑ Submitting papers to Chinese journals was his own choice, in order to promote Chinese journals.

# Services

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- "He was looking forward to being part of the emerging new society in his homeland". --Anderson, Chung & Lehmann
  - Both in 1940 and in 1947 he returned to China during the war.
  - Internal drive to go home.
  - 苟利国家生死以，岂因祸福避趋之？
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# Services

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P.L. Hsu

1910-1970

36-40 UK

45-47 USA



L.K. Hua

1910-1985

36-38 UK

46-50 USA



S.S. Chern

1911-2004

34-35 Germany

43-45, 49-94?  
USA





# Life

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- ❑ fragile health, 5 ft 6 inch, 88 pound
  - ❑ Disqualified for studying abroad.
  - ❑ Hospitalized in 1948 & early 50's.
  - ❑ Recuperated in 1933 & 1957.
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- ❑ Read & write in bed in last 10 years.
  - ❑ Never married.
-

## Letter to Herbert Robbins, 1948

It appears that my system has gone wrong, a stomach ulcer and a lung TB are just serious enough to force upon me a complete rest for one year at least.

--P.L. Hsu

The Municipal Hospital of Peiping  
Peiping

August 12, 1948

Dear Herbert,

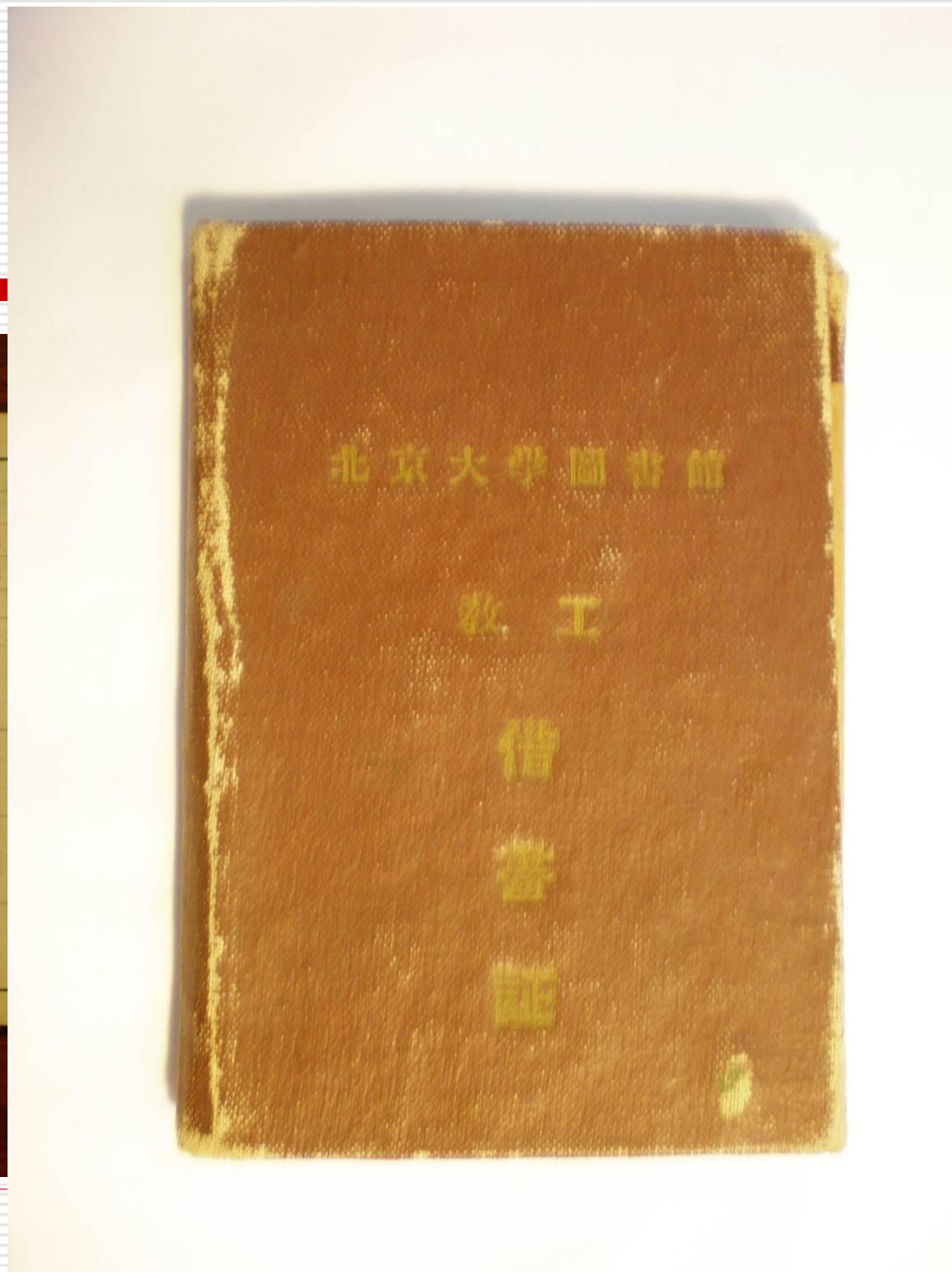
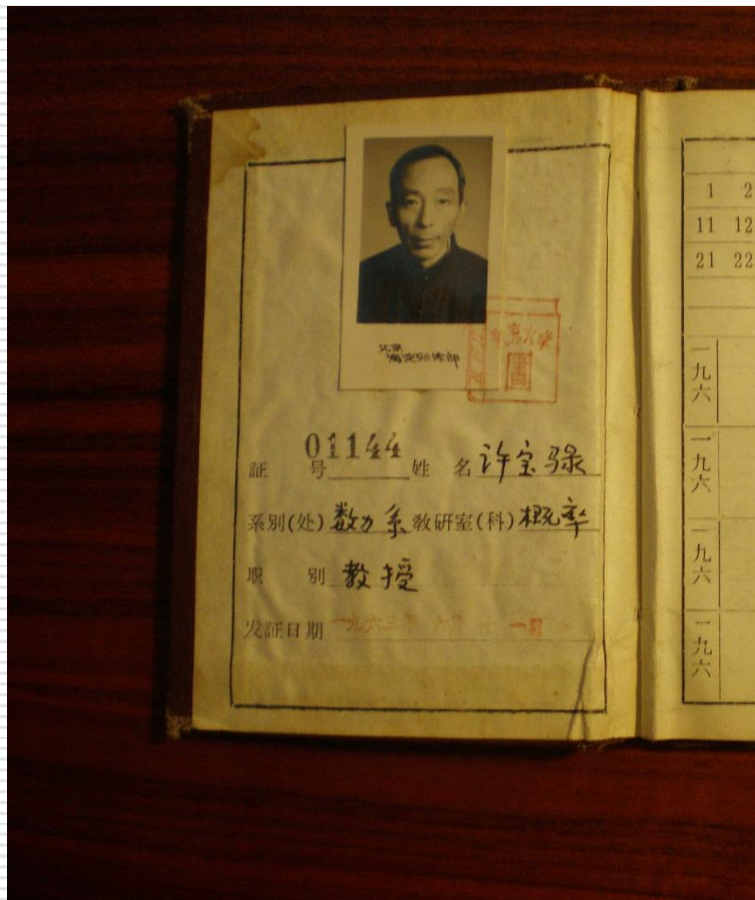
Your letter of July 23 received. I reckon you have by now received the news about me, from Hotelling. It appears that my system has gone wrong: a stomach ulcer and a lung TB are just serious enough to force upon me a complete rest for one year at least.

As my troubles are classical and need only classical treatment, the hospital I am in, staffed only by Chinese, is more than satisfactory. All counted, it costs me an average CNR 30,000,000 a day, which is approximately \$2. I can get along for year and half at this rate of expense, thanks to the savings I made in the U.S. There is nothing to worry about me.

I am touched by your sincerity in planning for your own future and mine. Being so far away and so idle I am not qualified to comment on your plan so far as it affects you. But for my part I feel it is my duty to go first to Hotelling's place if you I do come to U.S. after recovering health and if Hotelling is willing to have me again.

I cannot write long letters as it is bad to my health. Please mail to me (in the cheapest way) any magazines (such as "Life") you have read and do not want to keep, and some occasional bundles of the N.Y. Times.

# Life







Hsu with M. S. BARTLETT (left) and H. CRAMÉR  
in Chapel Hill, December 1946.



# In Hsu's Honor

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- Academician in 1948,  
5 mathematicians were elected
  - National award in 1942
  - Academician again in 1955,  
9 mathematicians were elected
  - IMS Fellow
  - Memorial meetings were held in 1980,  
1990, 2000 & 2010 at PKU.
-

概率与统计——纪念许宝騄先生诞辰一百周年国际学术研讨会

英 杰 交 流 中 心

2010.7.5







许宝琮先生纪念文集编委会 编

Pao-Luo Hsu Memorial Collection

# 道德文章垂范人间

纪念许宝琮先生百年诞辰







# In Hsu's Honor

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- Pao-Lu Hsu Lecture Series held at PKU
- 2009 Shige Peng (Shandong Univ.)
- 2010 Tzu-Leung Lai (Stanford)
- 2011 Howell Tong (LSE)

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# In Hsu's Honor

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- ❑ P.L. Hsu award in 1980's set by Chung
  - ❑ Hsu's portrait appears in a Springer Calendar
  - ❑ P-L Hsu Conference on Statistical Machine Learning, organized by Bin Yu.
  - ❑ Tsinghua Univ. recently inaugurated Pao-Lu Hsu Distinguished Lecture in Statistics and Probability.
  - ❑ A memorial webpage will be built.
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Please join **Peking Univ.**,  
the home of **Pao-Lu Hsu**,  
if you share his point of view.

Visiting <http://www.stat.pku.edu.cn/>, or  
writing to [dayue@pku.edu.cn](mailto:dayue@pku.edu.cn)

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