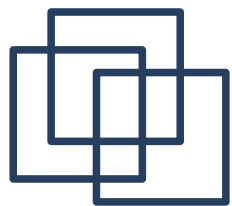


---

# 初期の TeX で書いた Ph.D. 論文の話

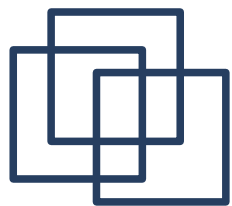
竹村彰通



## 前置き

---

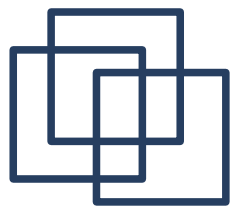
- ・今回は単なる個人的な思い出話をします.
- ・50 分も話すとは思っていませんでした. 50 分も時間が持ちそうもないので, 写真などもお見せします.
- ・1982 年当時せっかく Stanford にいたのに Knuth 先生とは残念ながら面識はないです.



# 個人年表

---

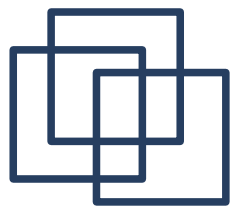
- ・ 1978 年 3 月修士（東大経済）終了。7 月から Stanford 大学統計学部へ留学。
- ・ 1982 年 8 月 Ph.D. 論文 “A statistical approach to zonal polynomials”。
- ・ これを初期の TeX を使って書きました。その後、monograph として出版。
- ・ 1983 年春一時帰国中に NEC PC-8201 を購入。その時に「プロッター」も購入していて、幸いなことに一部の日記を印刷したものが残っている。



# 個人年表

---

- ・ 1982年の秋から教えさせてもらい，ある程度の給料をもらえるようになっていた． 82-83: Stanford, 83-84: Purdue
- ・ 1984年6月に帰国．しばらく TeX が使えない状況が続いていた． WordMARC というワープロソフトをしばらく使っていた． 教育用センターでは cform というソフトも使っていた．
- ・ 1987年 NEC PC-9801 用の日本語 MicroTeX 発売 ( [http://oku.edu.mie-u.ac.jp/~okumura/texwiki/?TeX の歴史](http://oku.edu.mie-u.ac.jp/~okumura/texwiki/?TeX%20%E3%81%A8%E3%81%87%E3%81%97%E3%81%82) )



# TeX を使った理由

---

- ・ Ph.D. 論文のテーマの関係で，ギリシャ文字のみでは足りそうもなかった．スクリプトが使いたかった．  
(次ページ)
- ・ 院生の論文のタイプ打ちは，当時は深刻な問題
- ・ 当時はタイプライター打ち．ギリシャ文字は部品を交換して打つ．
- ・ 偉い先生には有能な秘書さんがいた．

**Theorem 1.** Let  $y_p$  be a zonal polynomial then

$$(26) \quad (\tau_\nu y_p)(A) = \varepsilon_W y_p(AW) = \lambda_{\nu p} y_p(A),$$

where  $W \sim \mathcal{W}(I_k, \nu)$ ,  $A$  is symmetric and  $\lambda_{\nu p}$  is given in (15). Conversely (26) (for all sufficiently large  $\nu$  and for all symmetric  $A$ ) implies that  $y_p$  is a zonal polynomial.

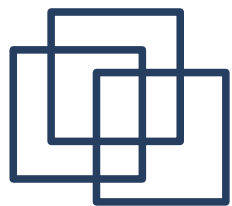
*Proof.*  $y = (y_{(n)}, y_{(n-1,1)}, \dots, y_{(1^n)})' = \mathcal{B}u$ . Hence by Lemma 4

$$(27) \quad \begin{aligned} \varepsilon_W \{y(AW)\} &= \varepsilon_W \{\mathcal{B}u(AW)\} \\ &= \mathcal{B} \varepsilon_W \{u(AW)\} \\ &= \mathcal{B} T_\nu u(A) \\ &= \Lambda_\nu \mathcal{B} u(A) \\ &= \Lambda_\nu y(A). \end{aligned}$$

Therefore (26) holds. Conversely assume (26). Let  $y_p = \sum_{q \in \mathcal{P}_n} a_q u_q$ . Then (26) implies

$$a' T_\nu = \lambda_{\nu p} a',$$

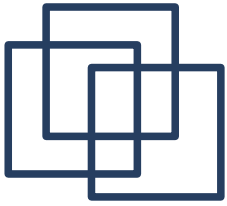
where  $a' = (a_{(n)}, \dots, a_{(1^n)})$ . Now by the uniqueness part of Lemma 4  $a'$  coincides with the " $p$ -th" row of  $\mathcal{B}$  up to a multiplicative constant. Therefore  $y_p$  is a zonal polynomial. ■



# Monograph のソース

---

- ・当時のソースを残してある．ソースだけはおきかたかかった．（経緯は後で）
- ・ただし，現在ではコンパイルに失敗するので，特にマクロのファイルが当時使っていたものそのものであるかは不明
- ・LaTeX 以前．
- ・まず自分のソースを見してみる．



# ソース (一部)

---

We defined zonal polynomials by defining their coefficients.  
From a little bit more abstract viewpoint they are eigenfunctions of the linear operator  $\tau_{\nu}$  and the results in this section can be summarized as follows.

`\smt{Theorem 1.}`

Let  $Y_{\sub p}$  be a zonal polynomial then  
$$(\tau_{\nu} Y_{\sub p})(\mat A) =$$

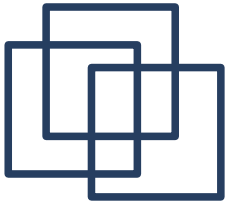
$$E_{\sub W} Y_{\sub p}(\mat A \mat W) =$$

$$\lambda_{\sub{\nu p}} Y_{\sub p}(\mat A), \quad \nu \leq n$$

where  $\mat W \stackrel{\text{dist}}{\sim} W_{\sub k, \nu}$ ,  
 $\mat A$

is symmetric and  $\lambda_{\sub{\nu p}}$  is given in (15). Conversely (26) (for all sufficiently large





# ソース (一部)

$\nu$  and for all symmetric  $A$  implies that  $Y_p$  is a zonal polynomial.

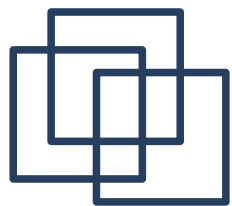
Proof  $Y = (Y_{(n)}, Y_{(n-1,1)}, \dots,$

$Y_{(1 \text{ to } n)}) \pm = \sum X_i \vec{scr} U$ . Hence

by Lemma 4

$$\begin{aligned}
 & \text{\Escr}_{\sub W} \{ \vec{scr} Y(\mat A \mat W) \} \\
 & = \text{\Escr}_{\sub W} \{ \sum X_i \vec{scr} U(\mat A \mat W) \} \\
 & = \sum X_i \text{\Escr}_{\sub W} \{ \vec{scr} U(\mat A \mat W) \} \\
 & = \sum X_i \mat T_{\sub \nu} \vec{scr} U(\mat A) \\
 & = \sum \Lambda_{\sub \nu} X_i \vec{scr} U(\mat A) \\
 & = \sum \Lambda_{\sub \nu} \vec{scr} Y(\mat A).
 \end{aligned}$$

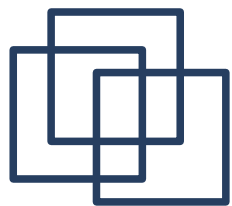
Therefore (26) holds.



# 当時使っていたと思われるマクロ

---

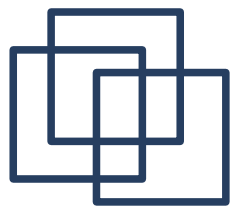
```
{_cat mac.tex
%Here we define the additional fonts which we have to have for the
%format which we have chosen for physics paperes.
%For reference, text is in 11 point fonts. Equations are set in
%twelve point type, superscripts in ten point type and super-
superscripts
%in eight point type
%
\font\thirtyrm = cmr10 at 30truept
\font\twentyfoursy = cmsy10 at 24truept
\font\eighteenrm = cmr18
\font\fifteenrm = cmr10 at 15truept
\font\caps = cmcsc at 12truept
\font\twelverm = cmr12
\font\twelvess = cmss12
\font\twelvefib = cmfib at 12truept
\font\twelvei = cmil10 at 12truept
\font\twelveit = cmti12
\font\twelveb = cmb12
\font\twelvesy = cmsy10 at 12truept
\font\twelves = cmsl10 at 12truept
\font\elevenrm = cmr10 at 11truept
( 中略 )
```



# 当時使っていたと思われるマクロ

---

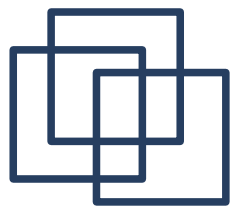
```
\textfont8=\ninesy
\def\hbfnt{\fam9\fivesy}
\textfont9=\fivesy
\def\paperfont{\fam10\elevenrm}
\def\dotfont{\fam11\sixrm}
\textfont11=\sixrm \scriptfont11=\sixrm \scriptscriptfont11=\sixrm
\def\sl{\elevenb}
\def\bf{\elevenb}
\def\it{\elevenit}
\def\prfnt{\ninesy}
\def\hbfnt{\fivesy}
%
%Here we define the fundamental spacing parameters
%
\baselineskip 16pt
\lineskip 1pt
\parskip 5pt plus 1pt
\dispkip 15pt plus 5pt minus 10pt
\dispaskip 13pt plus 8pt
\dispbskip 13pt plus 5pt minus 5pt
(中略)
```



# 当時使っていたと思われるマクロ

---

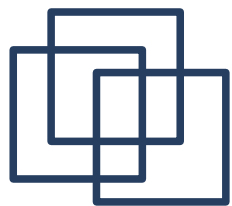
```
%symbols
\font\tensy =cmsy10
\def\to{^}
\def\sub{_{}}
\def\from{_{}}
\def\<={\leq}
\def\>={\geq}
\def\Pf{\rm\par\noindent{\sl Proof.}\qquad}
\def\leadb{\leaders\hbox{\ } \hfill}
\def\QED{\leadb\hbox{\vrule width 4pt height 6pt depth
1.5pt}\par\yyskip}
\newcount\chapnum
\newcount\secnum
\setcount\secnum = 0
\newcount\eqnum
\newcount\subsecnum
\setcount\subsecnum =0
( 中略 )
```



# 当時使っていたと思われるマクロ

---

```
%pagelayout
\def\rhead{} \def\lhead{}
\def\runningleftthead#1{\gdef\lhead{ #1}\rm}
\def\runningrightthead#1{\gdef\rhead{ #1}\rm}
\hsize 5.2 in\vsiz 7.5 in
\gdef\tpage{F}
\def\chapbskip{\vskip .5in}
\def\unchapskip{\vskip -.5in}
\def\chapterbegin#1#2{
  \vfill\eject
  \setcount\chapnum = #1 \setcount\secnum=0
  \gdef\tpage{T}\line{\hfill}\par\vskip .8in
  \line{\eighteenrm CHAPTER #1\hfill} \vskip .5in
  \line{\eighteenrm #2\hfill} \chapbskip
  \noindent}
\def\titcon#1{\unchapskip \line{\eighteenrm
#1\hfill}\penalty 100000
\chapbskip\penalty
100000\par\noindent}
```

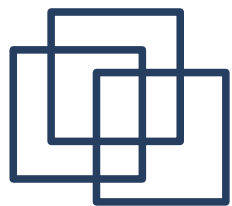


# 当時使っていたと思われるマクロ

---

```
\output{
  \if T\tpage{\gdef\tpage{F}
    \shipout\vbox{\vskip 1.5in
                  \moveright 1.6
in\box255}}
  \else{\shipout\vbox{\vskip 1.2in      \moveright
1.6 in
                  \vbox to .15in{\vfill \hbox to 5.2
in{
                  \ifeven0{\rm\the\count0\hfill\it\lhead
                  \hfill\rm\the\count\chapnum}
                  \else{\rm$\section$
\the\count\chapnum.\the\count\secnum\hfill
\it\rhead      \hfill\rm\the\count0} \fi}}
    \vskip .4in
    \moveright 1.6in \box255}}\fi
  \global \advcount0 by 1}
```

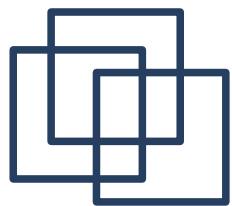
( 中略 )



# 当時使っていたと思われるマクロ

---

```
% My stuff
\def\startpage#1 {\setcount0 = #1}
\def\super{\to}
\font\matbf = cmbi10 %at 12truept
\font\matsb = cmbsy %at 12truept
\def\vecscr#1{\hbox{\matsb #1}}
\def\mat#1{\hbox{\matbf #1}}
\def\vec#1{\hbox{\matbf #1}}
\def\vecsigma{\hbox{\matbf \char'033}}
\def\veceta{\hbox{\matbf \char'021}}
\def\vecbeta{\hbox{\matbf \char'014}}
\def\vecxi{\hbox{\matbf \char'030}}
\def\vecalpha{\hbox{\matbf \char'013}}
\def\veclambda{\hbox{\matbf \char'025}}
\def\matLambda{\hbox{\matbf \char'003}}
\def\matXi{\hbox{\matbf \char'004}}
\def\matGamma{\hbox{\matbf \char'000}}
\def\matSigma{\hbox{\matbf \char'006}}
\def\pme{\to\prime}
\def\smt#1{\par\yyskip\noindent {\bf #1}\qqquad\it}
( 後は略 )
```

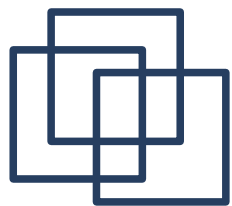


## 当時の統計学部 of 計算機環境

---

- ・ 統計学部は小さい独立した建物だった。（現在も同じ場所だが，建物はきれいになっている．写真）
- ・ 計算機室にキャラクタ端末が数台
- ・ 計算機はおそらく VAX unix
- ・ エディターはラインエディター `/bin/ed` だと思う
- ・ ラインプリンタはあった

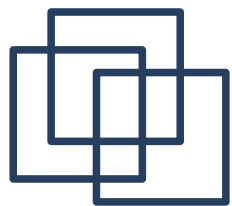




# 当時の統計学部の計算機環境

---

- ・ TeX は博論を書こうと思った頃に Computer Science で使えるようになっていた（少し離れた Quad とよばれる建物のどこか）
- ・ 200dpi で出力できた



# NEC PC-8201 の話

---

- ・ NEC パソコン博物館によると 1983 年、京セラ製。（次ページにパソコン博物館からの情報）
- ・ 1983 年 4 月に一時帰国中に購入
- ・ おそらく「プロッター」も購入
- ・ メモリーは少ないが、通常のカセットテープにアナログで (?) 録音できた。
- ・ 購入してから英語で日記を書いて、プロッターで打ち出していたので、当時の様子が少しわかる。



## PC-8201

CPU ● 80C85(8085のCMOS版)  
 メモリ ● 16Kbyte  
 HD ● -

その他 ● 40桁×8行(240×64ドット)モノクロ液晶、英文カナワープロTEXT／通信ユーティリティTELCOMをROM装備、CRT接続インタフェース、5インチFDD接続インタフェース、バーコードリーダ接続インタフェース、システムスロット、単3乾電池×4本(約18時間の駆動可能)、専用ニッカド電池パックもサポート、アイボリーホワイト／ワインレッド／メタリックシルバーの3カラーモデル、N82-BASIC搭載

価格 ● 138,000円

### ■ 時代背景

核戦争テレビ映画「ザ・デイ・アフター」が放映される。レーガン米大統領が来日。巨人軍が、王貞治監督の就任を発表。

### ■ 製品背景

今でいうノートパソコンの元祖が、ハンドヘルドパソコンPC-8201。いつでもどこでも使えて、A4サイズなのでバッグへもらくらく収納できた。また本体カラーも3色から選べて、当時流行のワインレッドは女性ユーザを意識。ポスターやカタログなどにも、PC-8201を手にするOL風の女性モデルが颯爽と登場していた。また、バーコードリーダ接続インタフェースの標準装備は、生産現場や物流／販売現場でのデータ処理ターミナル機能として、時代をはるかに先取りしていた。

### ■ コメント

外出先や出張先から音響カプラPC-8268を介して、PC-8201のデータを会社のPC-9801に吸い上げる…というシチュエーションが語られた。ただし、当時の音響カプラは雑音をすぐに拾ってしまうため、データの信頼性はイマイチ。システムスロットに、オプションの32KバイトのRAMカートリッジをセットして、メモリを手軽に増やせるのは画期的設計だった。ただし、32Kバイトのメモリカートリッジは49,500円。音響カプラ(48,900円)と合わせると、あと少しでPC-8201をもう1台買えそうな値段になってしまった。

diary.DO

3/21 I started to write diary when I bought this machine. Unfortunately I lost it when I increased my RAM memory to 32K bytes. I should have saved the file onto the cassette tape but I flunked that.... Let me remember what I wrote.

I became so much fond of this machine. This is so much fun to work with. It is almost incredible to have 32K RAM in this little machine, isn't it. I found that typing with Katakana's is difficult (at least for the moment). I have to get used to typing in Kana's. On the other hand writing in English is easy by now. (Besides it will keep up my English.) This might be an important thing, especially after I come back to Japan...

5/27 This evening there will be a dinner honoring Anderson for his 65-th birthday. I brought my camera. I have to send my paper on Hotelling's statistic to Krishnaiah soon. Unfortunately I did not get much out of that. Furthermore I found papers by Dempster which are better than mine! Well I have to get away with my own paper. That's disgusting.

6/13 (Monday) This weekend was something. We bought an acoustic coupler and quite successfully used it to connect to the VAX system Reiko is using. This way Reiko can work at home at night, revising her paper. It is a wonderful feeling. We got that idea about the middle of last week. Another idea I came up with is that if I can connect 8201 to VAX in my statistics department, then I can download all of my TEX files! Where ever I go I can always keep my papers on cassettes. That excited me very much. I started on Thursday. In the morning I went to a Radio Shack store on Geary to buy a coupler. They had only a direct connect modem. I bought that and brought that to Reiko's Lab. Unfortunately there we could not use a direct connect modem ( we need a modular phone for that). This was discouraging. So we went home ( Reiko was grumbling about being interrupted during the day) and tried. It did not work very well

because of noise. So I brought the machine back to the store and got the refund (after, of course, a bit of unpleasant arguments). Then I went to downtown to try several computer stores. None of them had an acoustic coupler. I walked around about two hours...

On Friday in school, I asked Jan if I can try connecting 8201 to UAX. We first tried direct connection. It did not work out. Later it turned out that the signal coming out from 8201 is too weak to reach UAX. I really wanted to try using the acoustic coupler. The coupler was there in our computer room. I needed only the male-male RS-232C cable. I went to downtown Palo Alto to buy a cable. I bought an expensive and long cable (40 dollars!). It did not matter very much at that moment. Back in the department I tried and it worked beautifully! I called Reiko and tried to connect to UNIX in UCSF. It worked fine as well. I was happy. The only thing left is to buy a reasonable acoustic coupler. I called about ten computer stores.

Finally a Radio Shack store in

I called about ten computer stores.

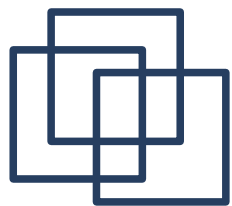
Finally a Radio Shack store in San Mateo had one. On the way back home I dropped in the store. People there were nice and the store was in a beautiful place overlooking the bay. They let me call both Stanford and UCSF. The coupler worked flawlessly with both of them and I bought it. Back home I and Reiko tried to connect to UCSF and Stanford. UCSF is all right. Somehow noise comes in when I try to connect to Stanford. From San Mateo I could connect to both of them. Interesting. Anyway it did not matter very much any more.

On Saturday we went to Berkley to buy a shorter and lighter cable. Also we visited a computer store there and experienced Epson QX-10. I started thinking of buying a printer for Reiko... 300 dollars. Something to think about. According to the new issue of Electronics, new computers are coming out from Commodore and Coleco. Coleco one seems a fantastic value. I am also interested in the Commodore one.

On Sunday Reiko worked with our new machines for two hours to revise her paper. It worked perfectly. I am really happy about that. It will shorten her writing time substantially.

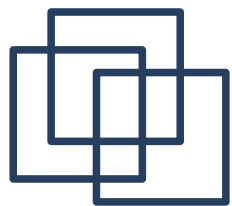
There was an interesting thing about the treatment of TAB mark. For UNIX do "stty tabs" to get tab marks sent.





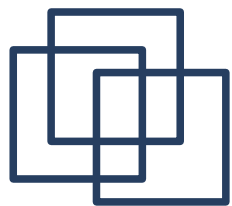
## 写真 (79 夏竹村)





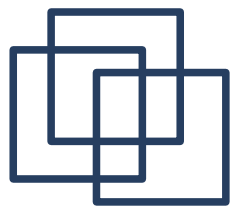
# 79 夏竹内先生





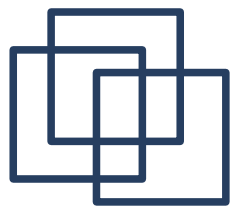
# 79年10月森口先生





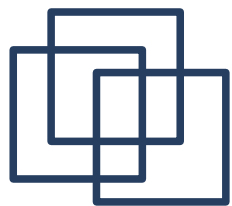
# 79年10月竹内先生





## 82 夏竹村





# 83 年 Prof.Anderson

