



IEEE PROFESSIONAL COMMUNICATION SOCIETY NEWSLETTER

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Ad Com Meeting

PC's Advisory Committee met on February 23, 1979, at IEEE Headquarters in New York City. Highlights of deliberations and reports are as follows:

Those present were

Lou Cole	Neil Pundit
Joe Chapline	Dan Rosich
Richard Emberson	Bill Ternent
Craig Harkins	Della Whittaker
Tom Patterson	John Wilhelm
Bert Pearlman	

Membership

PC membership increased 23% in 1978--the best showing of all IEEE units.

A new PC membership leaflet has been printed; ten copies have been sent to AdCom members and other distribution is being arranged for.

Meetings

PC is planning to sponsor several sessions and workshops at national conferences in 1979:

26th International Technical Communication Conference, May 16-19--workshops on language and on in-house writing courses.

International Conference on Communications, June 14-15--workshop on technical writing.

Frontiers in Education '79, Oct. 15-18--session on "Practical Problems of Communicating Technical Information to a Diverse Audience."

Engineering Management Conference, Nov. 5-7--2-hour seminar and 2-day workshop on oral presentation.

Chapters

Morton Cohen is organizing a PC group in Boston and Horst Gerlach is investigating the usefulness of forming a PC/Engineering Management group in the Washington/Northern Virginia area.

Education

Two audiotapes have been recorded and incorporated in PC's home-study course, "Technically--Write!" Plans are being made to raise the price of the course and set up a cost differential so that non-IEEE members who sign up for lessons will thereby join both the Institute and PC.

Workshops in Report Writing will be held in Rapid City, SD, June 7-8, and in Waltham, MA, June 14-15. Another is being planned for Baton Rouge, LA.

Della Whittaker will prepare a detailed proposal for awarding an annual PC scholarship.

Dave Dobson will be asked to reprint and probably reprice Mary Fran Buehler's Report Construction, one of PC's best-sellers. The other PC-sponsored publication, Bob Woelfle's Guide for Better Technical Presentations, an IEEE Press Book, has earned more than \$2000 for the Society.

PC Transactions

A Transactions issue on patents is about to be released; one on oral communication and one on organizational communication are being planned. Suggestions, contributions, etc., from PC members will be welcome.

IEEE Committees

There are opportunities for PC-ers to advance themselves professionally by representing the Society on IEEE Membership, Public Relations, and Energy Committees. Communicate with PC's President Bert Pearlman.

Liaison

Relationships and cooperation between PC and other organizations are being handled as follows:

IEEE's U.S. Activities Board--Dave Dobson suggests that PC-ers might prepare articles or slide presentations on technical activities within their sphere of expertise. These communications could become the PC-sponsored contributions of individuals to USAB's campaign to make aspects and details of technology better understood in homes, business offices, and government bureaus.

Society for Technical Communication--Della Whittaker is PC's new representative to this organization of nearly 5000 writers, editors, artists, speakers, and audiovisual experts.

Society for Scholarly Publishing--Emily Schlesinger is PC's representative to this new organization which is continuing the work begun in the three PC-inspired Conferences on Scientific Journals held in 1973, 1975 and 1977.

Council of Communication Societies--Bill Wells, who represents PC in this consortium of 25 U.S. organizations concerned with communication, is the Council's Secretary-Treasurer.

INTECOM--Consideration is being given to the possibilities and advantages of PC's becoming a member of this international organization of technical communication societies; further report will be forthcoming.

Committees

New appointments make Joe Chapline responsible for PC's Awards Committee and Dan Rosich responsible for Meetings.

AdCom Meetings

The next AdCom meeting will be held Wednesday, April 25, at IEEE Headquarters, 345 E. 47th Street, New York City, beginning 10 AM.

Tentatively, other meetings in 1979 are scheduled for three Fridays--June 29, September 7, and December 7--also at IEEE Headquarters.

All members and friends of PC will be welcome.

Letter from New President

I feel quite fortunate in taking on the Presidency of the Professional Communication Society. Our membership is growing, our publications and courses are doing well, and our Administrative Committee is both active and effective. Past President Tom Patterson reviews our growth and position in a separate article in this issue of the Newsletter.

As engineers and technical communicators, we are today in a unique and responsible position. We are witnessing as well as participating in an era of constantly expanding technology, but at the same time a lack of trust is developing between the technical community and the general citizenry.

The social problems which have arisen because of energy shortages, pollution, health care, food shortages, etc., are technologically related, and technology will play a major part in their solution. Being part of the technology and facing the widespread suspicion which is directed toward the technological community, we must assume the responsibility of increasing our efforts and improving our abilities to communicate about technology.

We must try to bridge the gap of distrust, so that not only we but also our neighbors can better understand and be better understood. We must also follow a standard of ethics that can be appreciated. Through these actions, we can promulgate a sense of confidence which will enable all of us to work more cooperatively and productively.

It will be the constant and continuing mission of the PC Society to promote better communication techniques and communication ethics, not only for engineers and the general technical community but also, through interfacing with other communication groups and academia, for the general public. Mutual understanding leads to mutual trust.

To all PC members: we need your advice and assistance. Help us to help PC grow in numbers and increase in usefulness.

Bertrand Pearlman
President, IEEE/PCS

Letter from Past President

It is quite easy to write all of the things I did as President of PC during 1978, but so many people contributed to this work that it is they who accomplished so much--I merely happened to be President.

I can't say that 1978 was our finest year. That might have been the year PC was founded, in 1959; or the year our membership went over 2000 in the early 1960's; or the year we had two simultaneous National Conferences, one in Boston and one in Los Angeles. But I think our finest year so far was 1977! And that made it a lot easier for me to be President in 1978.

In the few years before 1977 our group was in the doldrums; membership, publications, and meetings were slumping. But in 1976 the Administrative Committee met in Baltimore to determine what to do. A statement of our purpose was drawn up and even that simple task caused a long and heated discussion. But out of the heat came light. Briefly, we found that the group had two aims: to serve all engineers of IEEE by

helping them write and speak better, and to serve as a forum in which professional communicators could exchange ideas.

By 1977 we had a quarterly full-size Newsletter edited by Emily Schlesinger (also President of PC) and a paid editor of the Transactions, Rudy Joenk, who published four issues on schedule. Our Education Chairman, Ron Blicq, began to offer correspondence and local writing courses. Bob Woelfle's IEEE Press Book on presentations was publicized. A book on Report Writing by Mary Fran Buehler was re-printed and advertised. PC took an active part in the Society of Technical Communications' national meeting in Chicago and sponsored the Third Conference on Scientific Journals. We developed an awards program under Francis Leib, updated our Constitution and By-laws to reflect PC's newly formulated purpose, published job descriptions for all PC administrative positions, and named Area Representatives to promote local communication.

Thus, when I became President, PC was buzzing with activity from the vintage year of 1977. That momentum, which began during Emily Schlesinger's two-year term as President carried over into my term in 1978. Fortunately we still seem to be moving forward.

One of our most significant gains during 1978 was the increase in PC membership. Apparently IEEE members are beginning to recognize the importance of quality in communication. As of December 31, 1978, PC had 1,748 active members--a 23% increase over the year-earlier figure of 1,421. This is the highest membership increase which occurred in any IEEE Group, Society, Division, or Region during 1978. The growth is gratifying because it suggests that we are accomplishing one of our two purposes--to serve members of IEEE. Interesting also is the fact that many new members are from outside the U.S. For them, English is a second language; they want to improve their communicating skills in English, and they hope, with us, that we can help them.

The second major gain pertained to conferences. Jim Lufkin was initiator and General Chairman of the IEEE Conferences on Scientific Journals held in 1973, 1975, and 1977, but so many people worked with him that I hesitate to list any lest I leave someone out. Many other societies joined in this work, however, and the Journal Conference grew beyond the scope of IEEE/PC. Therefore we suggested that a consortium of societies should replace us, and that is just what happened. In 1978 an organization called the "Society for Scholarly Publishing" was formed and began to plan its First Annual Conference. This will be held June 4-6, 1979, in Boston to carry on the series started by PC eight years ago.

Another gain in 1978 was our educational activity. PC now presents a correspondence course, a practicum, and one- and two-day writing courses for companies and IEEE Sections, and as part of IEEE conferences. Ron Blicq has done a splendid job of organizing, training instructors, setting up, and running the many courses described in these Newsletter pages.

I have enjoyed being President of PC because of the tremendous support I have received from its officers and members alike. Also, this position has taken me into parts of IEEE that I had not worked with before: Technical Activities, Professional Activities and Educational Activities. Although I have not always agreed with some of the stands taken, I found these and other organizations alive, well, and filled with dedicated people. IEEE is in good hands.

Thank all of you for the support you have given me! I know that you will support our new President, Bert Pearlman, equally well.

Tom Patterson
Junior Past President
IEEE/PC



New PC Chapter

PC-ers of Boston, unite! You have nothing to lose but your isolation!

The following paragraphs appeared in The Reflector, newsletter of IEEE's Boston Section, for February 1, 1979:

A Boston Chapter of the IEEE Professional Communication Society is now being formed. The Society serves writing and publishing interests, its members being concerned not only with messages but also with how messages are transmitted.

As the Boston area has more high-technology companies in graphic communications than any other area in the world, it is expected that chapter meetings will provide a unique opportunity to exchange information leading to the development of electronic products whose end-product is the printed page.

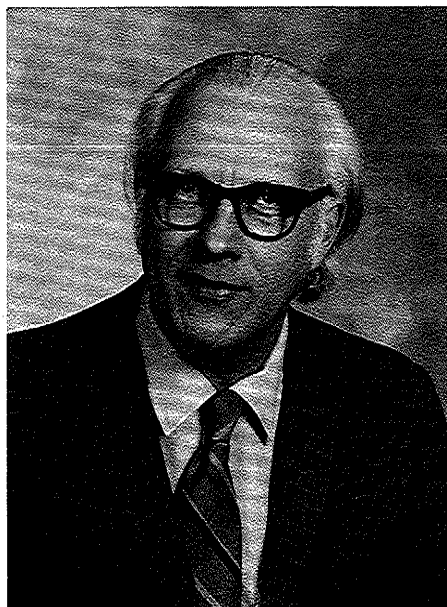
Such interests as text editing, phototypesetting, data processing, and data communications will play an important role in the technical presentations to be held; journalism interests will be served by presentations in that field.

Those who would like further information, or a role in the chapter's creation, should call Mort Cohen Electronic Engineering Manager, or Alain Hanover, Typesetter Software Manager, at Dymo Graphic Systems, Wilmington, Mass. Telephone: 617-933-7000.

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Persons and organizations receiving this Newsletter are welcome to circulate and reprint material from it. Please acknowledge the IEEE Professional Communication Society and the original sources cited.

New AdCom Member



JOSEPH CHAPLINE

Joe Chapline, one of PC's Founding Fathers, has returned to AdCom after a 15-year absence from Society activities. He was President for 2 years and Program Chairman for the group's National Symposia in 1961 and 1962.

Since 1964, Joe has been a free-lance consultant and editor to industry--RCA, Auerback Associates, Philadelphia Electric Company, and others--and given courses in writing at Scott Paper Company, Aberdeen Proving Ground, Drexel and Rutgers Universities, and the University of Delaware, among others. At Philadelphia Electric Company alone, during the 15 years, he has taught a total of 900 "students" in 36 25-member classes. Before 1964, he wrote and edited technical literature for Remington Rand Univac and Philco Corporation. He has published a number of papers on writing and dictating.

Joe took undergraduate work at Drexel Institute and Ursinus College; he was both a graduate student and a research associate in mathematics at the University of Pennsylvania. A lifetime member of the Franklin Institute, he is a member of the American Guild of Organists and a charter member of the American Guild of Organ-builders.

Competence is the ability to manage one's own symbolic environment--both the internal environment of thinking and conceptualizing, and the external environment of receiving verbal and non-verbal messages from others and directing them to others.

--James H. Block

PC-er at Work

PC-er E. D. Maloney sends the following account of life as a professional communicator in Viroflay, France:

I am in charge of a bi-lingual writing staff within the Public Relations Department of the Electron Tube Division of Thomson-CSF. There are four writers--an Englishman, a naturalized Frenchman born and educated in VietNam, a Frenchwoman, and I, an American. To date, we have worked only in English and French, but we are planning to add a German-language writer soon, so we will become tri-lingual.

Although Thomson-CSF is Number 1 in professional (as opposed to consumer-oriented) electronics in France, includes many large, autonomous divisions, and sells everywhere in the world, as far as I know I am the only American working for them in France and our little cell is the only Technical Writing Group working directly in English within the whole corporation.

Every year we turn out numerous technico-commercial documents, including 20- to 40-page "technical notes," "application notes," and operating instructions, as well as nearly 200 "data sheets" about individual products; a single "data sheet" may have from 4 to 20 pages. Because my British colleague and I are the only native English speakers here, we are also called upon for many, many other tasks, as you can imagine, from conceiving ads and preparing copy to translating important letters, reports, articles, and proposals. It keeps us hopping!

As for how I ended up in this job after taking a Masters in Electrical Engineering from Purdue U. and spending over 12 years in the U.S. Navy, chiefly as a missile and fire-control officer, the story is pretty long. Suffice it to say that a series of fortuitous happenstances, plus having a French wife, had a lot to do with it. At any rate, the job is fascinating, with never a dull moment, and the personal contacts are highly satisfying. The multilingual and cross-cultural aspects are particularly challenging.

I would like to take a more active role in the PC Society, time permitting, but being so far afield makes participating difficult. Perhaps you have some suggestions. Anyway, I follow the Newsletter and the Transactions avidly, and I am grateful to the U.S. PC-ers who devote so much of their time and energies to keeping things going and improving.

A PC-er Meditates

When Joe Chapline provided his picture and biography for this Newsletter, he sent the following "letter of transmittal":

"The [AdCom] meeting in New York [November 10, 1978] was a moving experience for me. My memories of the old group and our concerns seemed to be so remote and untimely. I could not make much of a contribution that day because I was only beginning to sense what the group is now doing. My single most interesting observation was that you seem to be rendering a service, which is what I believed we always should have been doing. But now, you seem to be realizing that dream in a practical way whereas earlier we were still wondering how to do it. That you have given up the idea of local chapters is a great step forward. They never worked and were always a concern. I think we've solved that one!

"PC's 'customers' are filled with reluctance and only come like the guy with a toothache to the dentist. They are also like the guy who went for violin lessons, as one would go to a member of our group about giving a speech or delivering a paper. He asked how long it would take. "Why?" asked the teacher. "Well," said the student, "I'm giving a recital in Carnegie Hall next week."

I always assure my classes at their last session that, if they are less satisfied with their writing than when they entered the course, I have accomplished something. Dissatisfaction is the greatest goad to achievement."

Customer Comments

Engineers who took Ron Blicq's workshop, "Communication and Report Writing" several months ago in New Haven (Connecticut) made the following comments:

"Best presented course ever. Material extremely useful on daily basis."

"Greatest Lecturer!! Wish I had him in all my college and post graduate courses."

"I learned much through a most interesting method of presentation."

Attention All Members

The Toastmaster for February 1979 contains a long and very sensible reprint from the January 1973 issue of Association Management (copyright 1973 by the American Society of Association Executives). In this article, "How to Put New Life into Any Organization," Father James Keller points out that groups and associations need constant revitalizing from within. If you think a group is worth joining, he says, give it your personal, intelligent, active, and continuing support.

Specifications for such support may be called rules or duties for membership. As Father Keller lists 23 and elaborates on them, much that he advocates involves attention to various aspects of communication--readiness to receive, understand, transmit, correct, and take thoughtful action on messages of all kinds from whatever sources.

In particular, the 23 precepts for organizational members may be condensed to three, suitably detailed:

1. Attend meetings regularly and contribute perseveringly--show personal interest, speak and listen carefully, take responsibility ("do your own thing"), perform promptly and sensibly, cultivate your sense of humor.
2. Promote teamwork--encourage and work with other members, cooperate with officers, keep meetings moving, give credit where it's due, be a peacemaker.
3. Work to serve the overall purpose of the group and to attain its long-range goals--keep the goals and purpose in mind, keep expenses under control, keep officers within their authority.

Now, how about it, PC-ers? Why not work today on some PC-related phase of one of these precepts? All PC members are welcome to attend the meetings of PC's AdCom, all PC members are invited to write to PC's editors, all PC members are urged to serve on one of PC's committees.

PC now has about 1700 members. Of the 1300 in the United States, only about 20 are regularly active in the Society's organization. Twelve or so English PC-ers meet and "report" several times yearly. Individual members send occasional letters from the continent of Europe.

The activities and responsiveness of these few are keeping PC alive but not as robust as it might be. More PC faces should be visible, more PC voices resounding, more PC communications in evidence, and more PC members recognizable. Where are you, PC-ers? Make yourselves evident!

PC's Transactions

Rudy Joenk reminds us that PC's Transactions for June 1979 will be devoted to patents--tell non-PC-ers about it.

The issue for March, 1980, will concern public speaking. Begin to think now about sending an article to Dr. R. J. Joenk, IBM Corporation, P.O. box 1900, Boulder, CO. 80302 (303-447-5384). He wants material on ways and means of communicating technical information to technical or non-technical audiences of any size. Send a meaty abstract or letter of intent by July 6, 1979, or a complete paper by September 14.

Job for an Editor

EDN--the initials stand for Electric Design News--is a state-of-the-art-of-applied-technology trade publication with a world-wide circulation of 100,000. Just now, it urgently needs an Associate (or Senior) Editor in its Boston Office. The position is a new one, created by the continuing growth of this bi-weekly magazine.

Applicants should have an EE degree, a minimum of two years' design experience, and the ability to communicate technical messages in writing. As the leading electronics publication, EDN offers the successful candidate the tremendous satisfaction of seeing his (or her) work in print and of knowing that the material serves the needs of a vast audience of professional peers. An EDN editor also gains industry-wide recognition and has an unequalled opportunity to operate at the leading edge of technology.

Here is good news, PC-ers. Who would like to apply? For more information, write or call Walt Patstone, EDN, 221 Columbus Avenue, Boston, MA 02116; telephone, 617-536-7780.

Disinvolvement

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--Adapted from The Communicator (News Supplement, Aug./Sept. 1978)

Welcome to PC!

Welcome, new PC-ers! A full 201 of you--150 from 38 of the United States (including Puerto Rico and the District of Columbia) and 51 from other countries--joined us in December 1978 and the first two months of 1979:

<u>Belgium</u> J. M. Jeanty	<u>Canada</u> <u>Alberta</u> K. J. Couprie E. Doroniuk J. M. Fenton R. J. Maginley	L. L. Mooney M. D. Parker W. F. Phillips G. C. Phipps M. A. Pugh P. E. Rivera M. D. Skinas S. H. Sommer T. F. Smith B. R. Springer J. D. Stone W. Tai H. P. Vellandi B. E. Wilson T. W. Wong	<u>Michigan</u> M. K. Enns D. H. Fronick J. F. Martin F. J. Samaha W. J. Seitz D. H. Stone	<u>Oklahoma</u> L. J. Paden
<u>Brazil</u> A. M. Neto R. V. Rezende J. A. Zuffo	<u>British Columbia</u> D. B. Lem M. R. E. Petersson E. W. Prior C. B. Sivertz	<u>Colorado</u> S. W. Plate E. W. Sumida H. L. Tyson	<u>Minnesota</u> R. W. Johnson G. A. Kelly M. J. Monusko	<u>Oregon</u> L. C. Smith
<u>Chile</u> F. C. a Casilla	<u>Manitoba</u> C. S. Cantlie D. N. Iwankow K. D. Russell	<u>Connecticut</u> W. D. Guilarte L. M. Johnson B. E. Lowe D. R. Maycock L. C. Morris W. P. Roumanos D. Shanly	<u>Missouri</u> K. M. Aly K. A. Jutzi E. J. Marchant D. E. Mehl	<u>Pennsylvania</u> S. Z. Beck W. D. Billowitch A. J. Gibbons D. R. Maccarelli F. M. Matlovich R. W. McIntyre D. L. McKown D. J. Signore
<u>England</u> R. W. M. Isbister E. Wong	<u>New Brunswick</u> R. N. Easu	<u>Delaware</u> J. O. Olinchak	<u>Nebraska</u> R. L. Kahle	<u>Puerto Rico</u> J. E. Colon
<u>India</u> P. G. Muraleedharen M. C. Rao	<u>Ontario</u> M. A. Dagenais D. C. Hogg J. S. Micek D. W. Prendergast S. G. Robb P. J. Turk H. W. Wong	<u>District of Columbia</u> A. K. Park	<u>Nevada</u> L. R. Rathbun	<u>South Carolina</u> J. A. Stinson, Jr.
<u>Iran</u> B. Parhami	<u>Quebec</u> D. M. Beaupre P. H. Parmentier K. F. Wong	<u>Florida</u> J. P. Keuper J. Stern	<u>New Jersey</u> B. Franz T. A. Villaverde	<u>South Dakota</u> S. M. Jorgensen
<u>Japan</u> D. Y. Montuno	<u>United States</u> <u>Alabama</u> M. J. Hillyer R. J. Spavins R. S. Wingo	<u>Georgia</u> M. R. Greenwood V. J. Jester	<u>New Mexico</u> D. J. Gibson	<u>Tennessee</u> F. B. Blackwell, Jr. R. W. Johnson
<u>Korea</u> Y. H. Lee	<u>Arizona</u> L. S. Cook S. C. Cooper R. H. Milligan	<u>Idaho</u> L. E. Baker	<u>New York</u> T. N. Bulkowski G. Edora R. G. Eisenstark C. George S. L. Goldstein D. E. Hamilton D. C. Kennedy, III E. Kuhn W. L. Lasher G. W. Maldonado J. D. Oliver, Jr. F. H. Schlereth A. U. Sommer H. F. Storm	<u>Texas</u> J. P. Bartelme R. L. Hanson J. A. Hawkins R. A. Kusnetz M. K. McCullough T. A. Reifsteck D. C. Rethemeyer A. I. Rylander J. E. Starnes E. A. Urbanik
<u>Mexico</u> H. I. Tornell	<u>Arkansas</u> J. E. McAlister	<u>Illinois</u> R. A. McIntyre D. C. Pixler	<u>North Carolina</u> G. J. Carmichael, Jr. W. H. Franklin, Jr.	<u>Utah</u> L. Vogel
<u>The Netherlands</u> D. C. Schering	<u>California</u> T. L. Bartley C. W. Cleveland, Jr. G. N. Crissman M. Delson R. L. Ehrlich M. J. Gentile S. W. Gordon S. J. Hayes J. L. Heim C. J. Howley E. B. Hunter P. Katzaroff T. E. Kirsch L. O. Lane, Jr. R. A. Leclerc M. T. Maher R. H. Masaoka	<u>Indiana</u> V. E. Searer	<u>Ohio</u> V. E. Jerez S. J. Kurtzman G. L. Reese R. Thayer I. L. Volakis	<u>Virginia</u> C. R. Batteau C. S. Chase R. J. Crockett T. W. Gerhardt M. D. Petefish H-P. Schaefer
<u>Portugal</u> M. M. Silva		<u>Louisiana</u> J. W. Griffith, Jr.		<u>Washington</u> H. C. W. Anderson A. E. Hui C. G. Reid T. A. Ryan
<u>Romania</u> M. C. Dragoman		<u>Maryland</u> D. C. Friedmann D. L. Post A. T. Swann, Jr.		<u>Wisconsin</u> D. E. Amby H. J. Nechvatal L. E. Thiele D. J. Utech
<u>Saudi Arabia</u> S. K. Ahmad D. K. Sherry		<u>Massachusetts</u> H. Alam J. M. Brandt M. Cohen M. A. Costa A. J. Hanover A. R. Lewis J. P. Sklintas W. M. Smith		
<u>Scotland</u> D. C. Menzies				
<u>Singapore</u> E. K. Goh T. W. Lee				
<u>Spain</u> J. L. Esteban				
<u>Sweden</u> S. K. Smedsfelt				
<u>Switzerland</u> F. Kover H. R. Steinger				
<u>Venezuela</u> C. R. Noble C. J. Ortiz P. O. Parra				
<u>West Germany</u> A. H. Klimann				

Objection

PC-er Greg Ruffner, Project Writer at the Sundstrand Corporation, sends the following letter from Rockford, Illinois:

In the January, 1979 IEEE Professional Communication Society Newsletter, a short piece entitled "Reading Problems" attacked reading professionals in the public schools for proliferating counterproductive and self-service teaching methods. I would like to object to this article in both content and purpose.

With the exception of the foundation's address, the entire two paragraphs are void of any factual information. Is there any published data to support the contention that "public schools often teach reading in such a way to ensure continued employment of the swarms of reading specialists, diagnosticians, and therapists who conned them into teaching it that way"? What is this traditional teaching that causes reading problems to mysteriously disappear after a year of implementation? How were those concerned people with all the correct answers informed?

Explain how a publication committed to communicating facts could print such an article? Also, please explain how this article has anything to do with professional communication, engineering, or electronics? What I find disquieting and suspicious (using their phrase) is not how professionals are teaching children to read, but how professionals (PCS) can advocate disregarding the trained and heeding the untrained. If such an article is allowed in the Newsletter, why not include testimonials for hair tonics and bust developers? They would certainly have as much relevance.

As a member of the Professional Communication Society, I think an apology is owed the reading professionals unfairly attacked in the article and the PC members, who have provided a forum for discussion of professional communication only to have someone's personal prejudices aired. I expect this apology to come in the form of a reprint of my letter and an explanation of the real circumstances surrounding the printing of "Reading Problems."

Perhaps other PC-ers will comment on the objections raised in these paragraphs.

There seems very little need to apologize for pointing out that a method of teaching has proved unsatisfactory.

The "real circumstances" of the printing of "Reading Problems" were those that have surrounded the printing of every other item in PC's Newsletter since September, 1976: when the Editor finds some news, article, or bit of information interesting and related to communication, she "writes it up" to challenge, stimulate, inform, inspire, amuse, or encourage Newsletter readers--that is, she endeavors to share it with fellow professionals.

IEEE Headquarters

The recently-prepared brochure, "A Guide to IEEE Technical Activities," describes the work of headquarters staff members who support the Institute's Technical Activities Board (TAB) and serve the thirty-two Societies, Groups, and Councils (S/G/C) which together form the Institute.

Neil Fundit directs staff operations and Es-mi Bidstrup manages them. Services provided by their assistants include administrative help for TAB and TAB Committees and for S/G/C AdComs, coordination of S/G/C budgets, and support for international and interorganizational technical activities.

The Guide explains this work in some detail and briefly describes the organization of the Power Engineering Society (only Society with a permanent staff at IEEE's New York headquarters) and the Computer Society (IEEE's largest, with Administrative Office in Silver Spring, Maryland, and Publications Office in Long Beach, California).

The Guide includes photographs and office telephone numbers of the chief Technical Activities supervisors. It is a handy, quickly-read, and easily consulted introduction and directory to IEEE's technical activities and Headquarters operation. PC-ers new and old will find it most enlightening. For a free copy, write to Ms. Audrey Bickel, IEEE, 345 E. 47th Street, New York, NY, 10017, or call her on 212-644-2123.

Technological Policy

Two important organizational entities of IEEE--the Technical Activities Board (TAB) and the United States Activities Board (USAB)--are jointly sponsoring a conference on technological policy. Meetings will be held May 1-3, 1979 at the Sheraton National Motor Hotel in Arlington, Virginia.

In relation to the general subject, "Stimulating Innovation through U.S. Policy," the purpose of the Conference is three-fold:

1. To demonstrate the Institute's technical expertise on specific legislation to appropriate Congressional Committees.
2. To promote and enhance the visibility of the IEEE before the U.S. Congress.
3. To enable Conference attendees to meet with their Congressional Representatives.

Representatives of industry, members of the U.S. Congress, chairmen of IEEE Committees, and Federal Administrators will address plenary lecture and meal-time sessions on the legislative process, government influence on innovation, regulatory incentives, fiscal support, and IEEE positions and policies.

Conference participants will form groups in two categories, select spokesmen, and plan visitation schedules, topics for discussion, and strategy. On the last morning of the Conference,

- A. Groups of individual constituents will meet with their three Legislators (2 Senators, 1 Representative)
- B. Teams of technical representatives will meet with the members and staff of Congressional Committees

to discuss technological policy issues important to IEEE.

General subjects to be discussed are energy, telecommunications, and health care. Subcommittees to be visited are those concerned with commerce, science and technology, space, energy and power, health, natural resources, and the environment.

For more information, write or call Ms. Jill Gerstenzang, IEEE, 2029 K Street, NW, Washington, DC, 20006; telephone 202-785-0017.

Non-technical Benefits

According to Dr. Leo Young, Executive Vice President, IEEE offers nine kinds of non-technical benefits to its members. These, with start-up dates and number of participants are listed below:

Start-up Date	IEEE Benefit	Participants (1978)
Oct. 1961	Disability Income	5095
Oct. 1961	Major Hospital	2772
Sept. 1962	Life Insurance	
	IEEE Members	36799
	Family Members	37071
June 1963	Accidental Death and Disability	6964
Oct. 1966	In-hospital	4236
Feb. 1972	Excess Major Medical	5707
Sept. 1974	Auto/Homeowners	158
Oct. 1974	Group Annuity	43
Nov. 1978	Major Medical	102
	Total IEEE Members	61876
	IEEE Family	37071
	Total Participation	98949

The benefit subscribed to by the largest number of participants is the life insurance program. Once listed in a survey as the best of about one hundred group insurance plans, it is still, probably, by far the best program of its kind available to engineers. If you haven't looked into it, you should.

A new benefit, a system for car-rental from AVIS, which began in September 1978 with a 15% discount, was increased to 25% in February 1979 because of larger-than-expected participation.

A program now being investigated is a health test program. It will be offered to IEEE members possibly as early as this calendar year, but only if it meets a number of stringent criteria.

There has been speculation that some engineers join IEEE only or mainly because of its good insurance programs, and many people say that they recover their IEEE membership dues and more when they compare costs with next-best insurances.

To lay the question to rest, a computer run was made to see how many group insurance policy holders also belong to an IEEE Group, Society, or Council, specific membership being a reasonable criterion of technical interest. Results for non-student members showed that 48.5% hold group insurance policies and 54.5% hold G/S/C memberships. The closeness of the two numbers seems to indicate that IEEE group insurance policy holders as a whole are typical of IEEE members as a whole.

IEEE prefers not to hire a staff or make any

profit on these programs, as do some other organizations, but instead deals with an independent administrator (the Smith-Sternau organization). A disclaimer on offerings makes clear that the Institute is simply an "honest broker." It selects or monitors the programs carefully, but ultimately business is transacted directly between the client (the IEEE member) and the agent, and is their responsibility. The principal advantages to the IEEE member are lower cost, independent monitoring, and convenience.

IEEE Gives CEAs

Short courses of study in professional and industrial subjects are often evaluated in terms of academic credits called Continuing Education Units. In general, one CEU represents ten hours of participation by an individual--that is, ten "instructional contact hours." The CEU, therefore, is usually time-oriented rather than achievement-oriented; it indicates that Kilroy was there but not that Kilroy learned anything.

IEEE's Educational Activities Board (EAB) has been sponsoring courses for some time but has given no CEUs, only Certificates of Completion. Since January 1, 1979, however, in addition to this Certificate, IEEE has offered a new kind of credit, called the Continuing Education Achievement Unit, or CEAU, to distinguish it from the popular CEU.

The policy is to award CEAs for any IEEE-sponsored continuing education program approved by the EAB. CEAs are given only to individuals whose achievement in such a program has been formally evaluated.

The granting of CEAs will not restrict the presentation of any IEEE courses or make Certificates of Completion obsolete. There is often no need for specific evaluation of individual performance. A Certificate of Achievement has been designed, however, and instructors are planning how to measure the accomplishment of participants in various short courses.

Submitting answers to test questions or presenting other evidence of achievement will of course be strictly voluntary, but the awarding of CEAs will benefit all concerned. Those who elect to be evaluated will review course material and "get it all together." Managers and organizations who support the courses will obtain assurance of having received value for their investment. IEEE will be recognizing accomplishment rather than attendance.

CEAU awards will be assigned as follows:

Course	CEAU Units
One-day (6 hours)	0.6
Two-day (12 hours)	1.2
Three-day (18 hours)	1.8
Microprocessor Programming (30 hours)	3.0
Home-Study (according to number of hours)	Various

Speech is civilization itself. The word--even the most contradictory word--preserves contact. It is silence which isolates.

--Thomas Mann

Microprocessor Programming

IEEE is now offering an intensive three-day Microprocessor Programming Workshop, developed by Dr. William Eccles of the University of South Carolina. It not only features a take-home microprocessor and power supply but also carries 3.0 Continuing Education Achievement Units.

The Workshop is for mid-career engineers who are familiar with the design of logic circuits. It will teach them how to use microprocessors to replace wired logic and controllers. By "total immersion," participants acquire much knowledge about microprocessor technology in a short time.

As of March 1, 1979, the Workshop has been scheduled for presentation as follows:

Portland, OR	March 19-21, 1979
Binghamton, NY	April 5-7, 1979
Fort Wayne, IN	May 3-5, 1979
Rapid City, SD	June 4-6, 1979
Poughkeepsie, NY	October 4-6, 1979

Registration fees for this Workshop are \$475 for members of IEEE and \$525 for non-members. Get more information from Vincent Giardina, 445 Hoes Lane, Piscataway, NJ, 08854; telephone 201-981-0060, Ext. 174.

EM Conference

As the Joint Engineering Management Conference series has been discontinued, IEEE will hold its own Engineering Management Conference this year. There are four sponsors: the IEEE Engineering Management Society and its Washington Chapter, and the IEEE Washington and Northern Virginia Sections. The time and place: Stouffer's National Center Hotel in Arlington, Virginia; November 5-7, 1979.

PC-ers may want to submit facts-and-figures papers on topics of interest to managers, such as

- communication
- continuing education
- creativity
- human relations
- leadership
- planning
- professionalism
- training

Papers will be accepted or rejected on the basis of extensive summaries (no more than four pages, including text, figures, photographs, and references), which must be received by May 31, 1979. Accepted summaries will be printed in a Conference Digest (free to all Conference registrants). Full papers may be submitted for possible publication in the EMS Transactions.

Obtain further information about the Conference and directions for preparing summaries and papers from Dr. Edward A. Wolff, 1021 Cresthaven Drive, Silver Spring, MD 20903; office, 301-344-7496; home, 301-439-1152.

26th ITCC

PC-ers, especially those who live in California and most especially those who live in or near Los Angeles, are urged to attend the 26th International Technical Communication Conference which will be held by the Society for Technical Communication, May 16-19, 1979, in the Los Angeles Marriott Hotel. Until April 30, registration will cost \$95 for STC members, \$140 for non-STC members; registration in May will cost \$10 more. These prices cover two luncheons, one banquet, and one copy of the Conference Proceedings; the non-member price covers membership in STC if an application is signed at the Conference. The Proceedings alone cost \$15 (STC-ers), \$25 (others).

Between 40 and 50 workshops, discussions, and panel presentations will be held concurrently in the course of 2½ days. Some of the subjects to be treated in the four stems are

- Education and Research
 - Using Technology to Teach
 - Integrating Technical Education and Technical Communication
 - Oral Presentation of Technical Reports (workshop)
 - Presenting an In-House Course (session + workshop)

- Management and Development
 - Word and Text Processing
 - Newsletters
 - People in Publications Management
 - Effective Software, Its Planning and Development

- Visual and Audiovisual Techniques
 - Mechanized Graphics
 - The World of Multi-Image
 - Oral Presentations
 - Voice Production (workshop)

- Writing and Editing
 - Style Guides (workshop)
 - Hidden Values and Biases in Writing (workshop)
 - Quality and Variety in Technical Writing
 - Indexing, Translation, Ethics, Medicine, and Literature in Relation to Technical Writing

A PC-er is chairman of one of the Stems and other PC-ers will present papers, chair sessions, and conduct workshops. Plan to come to the Conference, look for their IEEE/PC badges, and tell them that you are a PC-er also. Get more information from STC, 1010 Vermont Avenue, NW, Washington, DC, 20005.

CCS Conference and Board Meeting

The Council of Communication Societies held its 1978 Communication Conference in Washington, DC, December 7-9, 1978. "Working breakfasts" were a scheduled, informal, informative, and enjoyable feature: on two mornings, presidents of member societies met to discuss policies and problems in one room, while directors/secretaries and newsletter editors met similarly in another.

The formal program consisted of three consecutive two-hour sessions devoted to the current communication-related activities of government, research, and teaching organizations, respectively. In these "updates," two or three panelists presented particular points of view and a moderator coordinated audience interaction.

The CCS Board of Directors met before and after

the Conference. Its most important actions were to plan the establishment of administrative committees and to discuss programs for promoting interdisciplinary communication.

PC members are eligible for appointment to CCS working committees, and are invited to attend CCS Conferences whenever possible. They will find these meetings small, elite, inexpensive, intellectually challenging, and professionally valuable.

CCS Report

Elsewhere in this Newsletter is a notice of the Conference and annual Board of Directors Meeting held last December 7-9 in Washington, D.C., by the Council of Communication Societies.

The December 1978 issue of the Council's newsletter, Communication Notes, contains a full and masterly redaction of all speeches made at the Conference. Included are not only the arguments and information presented by individual program speakers but also points developed in general discussion and those made by the two luncheon speakers.

This 10-page issue is to all intents and purposes a Conference Proceedings. Produced by Vernon Root, Editor of Communication Notes and Executive Director of the Council, it deserves careful reading by everyone honestly and seriously interested in communication.

Root reports on the Conference under three headlines. "CCS Conference Blankets Communication Waterfront" details the messages of persons who spoke in the program sessions called "Federal Update," "Education Update," and "Research Update."

In "Snepp Reviews His Case, Urges Government Reform," Root reports in full the luncheon talk given by Frank Snepp, the former CIA agent who is being sued by the U.S. government for publishing the book, Decent Interval, without prior review by the CIA (i.e., for breaking his secrecy contract).

In "Hubbard Offers Worldview that Shows Communicators in Key Evolutionary Role," Root gives full particulars of the "inspirational windup" provided for the Conference by Barbara Marx Hubbard, editor of The Futurist magazine and self-styled missionary for the future. She discussed

1. The need for a unified cultural view of history as an evolutionary spiral with successive loops characterized by the condensation of the earth (through synthesis of the elements), the organization of single-cell life (through the genetic code), the development of multi-cellular life (through photosynthesis), and the growth of human life (through language and symbols).
2. The concept of "conscious evolution" to produce the next loop in the evolutionary spiral, a loop characterized by the development of "universal humanity."
3. The role of communicators as formulators of this concept of self-controlled evolution and disseminators of ideas which cultivate a cosmic consciousness and lead to planning and action in terms of human beings' inter-relatedness not only with earth and other earth-dwellers but also with the universe and perhaps other civilizations.

Annual subscription rates for four issues of Communication Notes are as follows:

	To Members of CCS Member Organizations	To Others
Within US	\$ 6.00	\$12.00
Canada, Mexico	\$10.00	\$16.00
Elsewhere (air mail)	\$18.00	\$24.00

Send money to Communication Notes, P.O. Box 1074 Silver Spring, MD, 20910. Identify yourself as a member of IEEE/PC and ask to begin with the issue for December, 1978.

SSP

The newly-formed Society for Scholarly Publishing will hold its First Annual Conference on the theme "Scholarly Publishing Today: Taking Stock." Sessions will be held in Boston at the 57 Park Plaza Motor Hotel, June 4-6, 1979.

This Conference is a continuation of the series of Conferences on Scientific Journals held biennially since 1973 under IEEE/PC sponsorship. Subjects to be discussed are present characteristics and problems of scholarly publishing, costing in the major components of the scholarly communication system, alternatives to conventional typesetting, the library marketplace, the review process, publication design, and the future of scholarly communication.

Speakers and discussion leaders will represent the humanities as well as the sciences and various branches of engineering. There will be no conference publication, but tentative plans call for making tape cassettes of the sessions.

Obtain further information from E. K. Gannett, IEEE Headquarters, 345 E. 47 Street, New York, NY, 10017 (212-644-7546).

Conference of Scientific Editors

The Second International Conference of Scientific Editors will be held in Amsterdam, October 13-17, 1980. Sponsors are the Elsevier Scientific Publishing Company and the International Federation of Scientific Editors' Associations. The first general assembly of the Federation will take place during the Conference, and arrangements can be made for separate meetings of participating groups or societies.

The conference week will consist of four meeting days and a mid-week excursion day. The official language will be English, and the number of plenary lectures will be limited. Proposals for lecture presentations and questions or problems (with brief explanation of background or context) for discussion should be submitted as soon as possible. Exhibits and demonstrations will also be welcome, as will copies of style or standards manuals for a special display.

The organizing committee asks to be notified no later than May 1, 1979 of interest in participating in the Conference, and promises to arrange a special program if sufficient accompanying persons register. The fee for participation will probably be about Dfl. 350 (US \$175).

The provisional theme of the Conference is "Scientific Information Transfer: People, Methods, and Means." Topics that may be dealt with include, among others, editorial policies, training of editors, user

attitudes, refereeing, standards, conferences and conference publications, copyright, and economic and procedural aspects of publishing books, journals, monographs, etc., and alternates to traditional forms of publication.

For further information, write to Helena Tombal, Elsevier Scientific Publishing Company, P.O. Box 330, 1000 AH Amsterdam, The Netherlands.

Hands Across the Sea

A call for papers has been issued for a Conference on Submarine Telecommunications Systems, to be held in London, February 26-29, 1980. The four sponsoring groups are the

Electronics Division of the Institution of Electrical Engineers

Institute of Mathematics and Its Applications

Institute of Physics

Institution of Electronic and Radio Engineers

Contributions are invited on such aspects of submarine systems as their place in the planning of national and international telecommunication networks, their reliability and present state of development, future possibilities, operation and economy vis à vis satellites, constraints imposed by marine environment, and equipment and techniques for planning, installation and maintenance.

Send one-page synopses for consideration before April 23, 1979 to IEE Conference Department, Savoy Place, London WC2R 0BL.

JIR Exposed

A PC-er recently wrote from England to ask if such a periodical as the Journal of Irreproducible Results really exists.

Yes, PC-ers, there is a JIR. First published in 1955, it has been issued quarterly since 1973; the annual subscription rates are \$3.70 (US) and \$4.45 (other), payable to JIR, Inc., P.O. Box 234, Chicago Heights, Illinois, USA, 60411.

Dr. George Scherr of Chicago is listed as JIR's publisher, Dr. Alexander Kohn of Ness Ziona, Israel, as editor-in-chief. Its associate editor for physics lives in Israel; the other 21 associate editors (for astronomy, several branches of medicine, engineering, economics, computer and information science, etc.) have addresses in the US from Massachusetts to California.

Outstanding articles from current issues of JIR are frequently summarized in this Newsletter.

A few years ago, an independent research agency studied chronic adult fears and wide-spread phobias. The fear that disturbs the most people is not death, or sickness, or high places, or inflation, or Republican administrations—but fear of speaking before a group.

Audiovisual Competition

The Society for Technical Communication has announced the winning entries in its annual Audiovisual Competition.

The Best of Show award went to a slide-show, Library Binding: A Life Beyond Life, directed by Jean O'Neill for Library Binding Service, Inc. The production demonstrates that books in mass-circulation libraries need special protective binding, and explains how technicians rejuvenate book covers. Brief narration, the use of some soft-focus photography to represent the feel and purpose of fine books, and subtle audio-effects combined to make a prize-winner. Credits go to Wayne Demouth for script, Perry Struse for photography, and Robert Dow for sound.

Awards for Distinguished Technical Communication in the three Competition Categories were given as follows:

Marketing: Writer/producer/director Morris Wertenberger's Fast Crash Course in Cost Effective Audio Visual Communications, made for the DuKane Corporation, uses mime players to show the use of filmstrips and how they are produced.

Instruction: Heredity: What is DNA?, produced by Dan DeWilde and directed by Nahum Zilberberg for Harcourt Brace Johanovich Films, is a filmstrip on genetics for junior high school students.

Information: Another DeWilde-Zilberberg production for Harcourt, Contemporary Artists at Work: Volume I—Sculptors, shows recognized sculptors working in their studios as they discuss their techniques and philosophy.

Eleven other awards were given—for Excellence, Achievement, and Merit—variously in the three Competition Categories. The honors will be presented and the winning shows screened during STC's 26th Annual Conference in Los Angeles, May 16-19, 1979.

Chairman S. M. Shelton has announced that a fourth Category, "Programmed Instruction," will be used in next year's Competition, for which there is a February 1980 deadline. Sponsors and producers may obtain further information about STC and its Audiovisual Competition from Curt Youngblood, Executive Secretary STC, 1010 Vermont Avenue, NW, Suite 421, Washington, DC, 20005.

Be Careful

Don't Use

expect
fewer
few in number
breadth of timescale

top priority
in outside locations
get operational
involved in a shooting
accident

facilitized
new innovation

When You Mean

anticipate
less
few
duration

priority
out of doors
start work
shot

equipped
innovation

—Adapted from The Communicator (News Supplement, Aug./Sept. 1978)

Energy in our Future

by

Charles J. Hitch

The Key Reporter, quarterly newsletter of the United Chapters of Phi Beta Kappa, published recently (Summer 1978) the text of a public lecture by Charles J. Hitch, President of Resources for the Future. A somewhat shortened version of this speech is reprinted here by arrangement with the author and Phi Beta Kappa.

Speaking on "Energy in Our Future," Dr. Hitch views his subject as a citizen of the United States, but what he says may be interesting, if not applicable, to people and conditions in other countries. For some time, he points out, it has been "nearly impossible to see the word energy in a magazine or newspaper without the word crisis following close behind.

"Yet to my mind," he continues, the energy crisis does not exist.

"Energy is a keystone resource, the one irreplaceable factor upon which all--or nearly all--others rest, through which almost every other resource can be obtained. If we solve the energy problem, then we have solved simultaneously nearly all our other resource problems as well. But what confronts the nation and the world now is not a crisis, for the word carries with it a connotation of temporary emergency, of turning point, of imminent resolution one way or the other. It is a dilemma which threatens to last at least twenty years; there may not even be a single turning point; and most of the decisions made now--for good or for ill--will not bear results until many years later. This abstract quality--the distant payoff for decisions taken now--helps account for why so many people treat the problem like the Easter bunny: they don't believe in it.

"Not only is energy not a crisis, it's not an 'it': it's a 'them'--a bundle of severe problems made all the more complicated by the fact that they are interrelated. There are at least five distinct energy problems.

"1. Energy is a problem of national security and foreign policy, stemming from...dependence on foreign sources of oil. By itself--regardless of political geography--this fact would be cause for caution, if not alarm, for no nation wants to be dependent on any other or group of others for something so important as petroleum. But what is undesirable in theory is even worse in actuality, for Nature in her ineffable wisdom placed the world's major petroleum reserves directly in the midst of the world's major political tinderbox--the Middle East....

"2. Energy is a domestic economic problem. In the short to medium run the task is to insure economic health, growth, and employment through the expected oil crunch of the 1980's and 90's. Nobody knows for sure--estimating oil and gas reserves is more art than science--but the best guesses of most experts indicate that sometime during the next two decades demand for petroleum will exceed supply, which may peak and begin diminishing absolutely as well as relatively, and prices will jump accordingly. And when oil sneezes, the whole economy catches cold, for oil is pervasive: we depend on it for heat, transportation, industrial processes and products, chemical feedstocks, and other things. Oil is a comparatively recent part of human society--its major use really has been confined to this century--but we have structured our whole society around it. It will be difficult indeed to wean ourselves from this petroleum habit.

"Over the long run, the domestic economic problem [i.e., in the U.S.] centers on making a smooth transition from fossil fuels to renewable or inexhaustible sources. In both time frames--that is, from now until as far ahead as we can foresee--a heavy, energy-inspired demand for capital will complicate the national economic picture, for nearly all the new technologies, such as solar, nuclear, and synthetic fuels, are highly capital intensive. Nor are modern coal-fired power plants exactly cheap. Moreover, conservation also is surprisingly capital intensive, for really significant conservation--beyond turning off lights and turning down thermostats--involves the turnover of capital stock. Old, inefficient cars, homes, factories, and office buildings must be replaced or substantially modified and that will take much time and money.

"3. Energy is a balance-of-payments problem. Last year this nation's bill for imported oil came to \$45 billion, a sum about fifty percent greater than our entire trade deficit. We are the world's number one agricultural exporter, but it now takes two years' worth of agricultural exports to pay for one year of imported oil. The shaky value of the dollar abroad is directly related to our astronomical oil bill and the transfers of wealth it represents. And the situation will get worse: projections for the mid-1980's are for the \$45 billion tab to double or more. Again, this problem is not ours alone, but one confronting most of the non-Communist, non-OPEC world, including in an especially painful way the poorest nations of the Third World.

"4. Energy is an environmental problem. Energy production and consumption combine to form the world's greatest environmental insult. The list of effects is long and ugly: death for coal miners from cave-ins and black lung; air pollution from electric power generation, industrial processes, and automobiles; an increase in the proportion of carbon dioxide in the atmosphere, perhaps leading to adverse changes in climate having far-reaching implications; ocean oil spills; water pollution from acid mine drainage; scarring of strip-mined landscapes. Coal is a primary villain in most of this, yet the President's national energy plan--and every other reasonable estimate of future needs--contemplates a vast expansion of coal mining and combustion if we are to meet our energy and economic requirements. How are we to achieve this without grave damage to the environment and human health?

"5. Finally, energy is an equity problem. How will we be able to solve the other four problems making up the energy dilemma without grave injury to poor people in the United States and poor countries around the globe?

"How are we to deal with these five sides of the energy problem? What policy and technology choices are open to us? Perhaps it is easiest to begin with the choices that are not available to us.

"We do not, for example, have the option of choosing the pattern of future sources of energy over time, even though the man on the street--and some people in research and development, too--may think that's what the energy fuss is all about. We are too ignorant to make even semipermanent choices and commitments.

"We have no more than educated guesses about the economics of energy sources now in prototype or planning

stages, and the affordability of those that exist only in the imagination is purely conjectural. Nor do we know much about safety, or carcinogenicity, or climatic effects. The solutions of 1985 could look like dinosaurs before we got very far into the next millenium.

"Rather than an immediate and urgent search for the answer to the energy dilemma of what to do when the oil and gas run out, we should be asking ourselves what procedures should be adopted, what processes set in motion, that will maximize the chances of tapping cheap, safe, clean, secure energy sources as we move into the future. Specifically, to what extent should we rely on markets and prices, and to what extent on prescription, proscription and other nonmarket measures?

"Broadly, my conclusion is that there is a role, and often an important role, for direct regulation in certain areas, but that our main reliance must be placed on prices and markets. The market is now giving decidedly the wrong signals. They say that energy as a whole is cheaper than it really is, and that certain sources of energy are relatively cheaper than their alternatives, when that isn't true either. The result is that we are subsidizing imported oil, penalizing domestic production, and discouraging both conservation and fuel switching by industrial and final consumers....

"In general, we can say that pricing a unit of energy below the cost of providing another unit is the chief obstacle to substantial conservation and to the development of new, benign sources such as solar. It is ironic that we impose price controls on the one product--energy--which we most want to conserve and to develop new sources for.

"Because of price controls, the market is confusing both producers and consumers, and we are compelled to cope with the problem by all sorts of devices which aren't working well, such as exhortation and detailed regulation.

"Of course, there are some reasons for not rushing to push prices up. We are rightly concerned about inflation, about equity, about our international competitive position. I have no objection to decontrolling prices gradually, over a few years; it minimizes the inflationary impact. What is important is a really firm commitment to move toward world petroleum prices, such as Canada has made. For many of the responses we desire, it is expected future prices that matter, not current prices.

"All the standard rhetoric about free enterprise notwithstanding, we simply have not even tried using prices to help achieve our objectives. The litany that OPEC oil prices increased fourfold in 1973-74 is true but extremely misleading. For example, in constant dollars, that is, allowing for inflation, U.S. gasoline prices have gone up only about a third since the oil embargo. Home heating oil has gone up 44 percent, electricity 14 percent and gas service 26 percent. This, however, is only part of the story. Since the embargo and the celebrated price hikes, energy prices have stayed almost constant, with the exception of gas service, which is up about a quarter.

"Further, when compared with prices of two decades ago, 1956, gasoline is up only 4 percent, fuel oil up 31 percent, gas service up 5 percent, and electricity down 37 percent. Except for winter and strike dislocations, the American consumer has hardly noticed energy prices. With the highest standard of living in the world, he is paying the lowest energy prices, and about the same prices as 10-20 years ago.

"What does all of this mean in terms of policy choices? Higher prices mean less demand and more sup-

ply, but how much more of each? In economics jargon, we do not know what the demand and supply price elasticities are. We do know, however, that they are much higher in the long run than in the short. And we know that elasticity is much higher for any one energy source --even one as important as petroleum--than for energy in general.

"This is important, for we want to encourage switching--for example, the use of coal instead of oil as a boiler fuel--as well as overall energy conservation. The President's energy plan recognizes the efficacy of prices, bolstered by what look like prices to consumers --taxes--to affect both the total and the mix of energy use in this country. This reliance on prices and taxes is an historic turnaround, for the nearly instinctive response heretofore has been to create a complete set of regulations, along with a new bureaucracy to try to enforce them. This approach has been as ineffective as it has been ubiquitous.

"Of course, there are other costs involved in energy besides economic costs. As I noted earlier, there are environmental, health and safety, and security costs as well, and these immensely complicate the picture, for they set at odds people who might otherwise agree on one policy or another.

"For example, growth-oriented people give by far the greatest weight to cost; they think economic growth, high incomes, and jobs are worth the environmental side effects of what now promise to be the cheapest sources--coal and nuclear. Some people are gravely offended by dirt and what it will do to health and climate, which rules out coal.

"Many are concerned mainly about safety. They ask, 'What do dollars matter when human lives are at stake?' They would eliminate the dangerous options before choosing the most economical among the rest. A subset of these would accept 'normal' risks, such as those of coal mining, but find intolerable any increased risk of catastrophic damage, such as a war resulting from nuclear proliferation. They want to rule out the nuclear option unless we can devise safeguards far superior to any now in prospect.

"How do we resolve the conflicts in values among cheapness, cleanliness, safety, and security? The answer is that we can't, at least not completely, for people are always going to have different values. Political compromise will have to be hammered out in negotiations among elected representatives. But there are certain measures which can be taken to reduce areas of conflict and to make compromise more palatable.

"1. One of these would be to assign a very high priority to conservation. Whenever we can save a BTU as cheaply as we can supply a new one, we gain economically. Moreover, since we would actually reduce adverse effects on health and environment and on international security --all those things that give rise to conflicting values --rather than intensifying them, the benefits are double-barreled. There clearly is a case for a special premium on conservation, achieved not just by appeals to conscience but by taxes and regulation, and the President's energy advisers obviously recognize this.

"2. Another measure: we can go much farther than we have in internalizing certain external environmental, health, safety, and security costs associated with energy supply. 'Internalizing' and 'externalities' are two more economics jargon words. Externalities, or external costs, are those costs of producing something which normally are not borne by the producer, but by society at large or some segment of it.

"Polluted rivers, for example, are to some ex-

tent costs imposed on the downstream residents by upstream users. In the case of coal, the costs of cleaner combustion and of restoring strip-mined land should be internalized, that is, charged to factories and coal producers, and the same is true of the costs of disposing of nuclear wastes. In the case of imported oil, the costs of insecurity could be made internal. It would make great sense, for example, to tax imported oil at a rate which at the least would pay for accumulating our strategic stockpile.

"3. Besides conserving wherever feasible and internalizing the externalities, we can learn to achieve some of our environmental and health objectives by choosing energy sources which are less polluting. Some of these are obvious, with various forms of solar heading the list. Others may seem surprising. Coal is just about the nastiest energy source we have, but just how nasty depends on how it is used. If instead of burning it directly, as is usual in generating electricity, the same lumps of coal are converted into synthetic natural gas the results are much different. For a coal gasification plant and a coal-fired electric power plant of the same size, that is, producing the same amounts of energy, the amounts of pollutants from the gasification plant are only a sixth or less than those from the electric power plant. The end products, gas and electricity, can be directly substituted one for another in many important uses, such as home heating, and syngas may often be cheaper as well.

"Let me move to another major issue, some would even say the issue--nuclear power, which seems to be at a crossroad. What are we to think about this one-time panacea for all our future energy problems? To begin with, nuclear fission power is not one energy system, though both proponents and opponents of fission tend to argue as if it were, and with such theological fervor that one despairs of a rational reconciliation. There are three quite different and entirely separable nuclear systems about which we have to make decisions. These are

1. the currently in-place light water converter reactors;
2. the same converter reactors, but with reprocessing of spent fuels to recover both uranium and plutonium;
3. the liquid metal fast breeder reactor, which both burns and produces plutonium.

"I believe that a decision on only the first system is necessary now, and that it should be an affirmative decision. I am aware of the drawbacks; to me the most serious is waste disposal. At best this eventually will have an adequate technological solution, and indeed there are some hopeful signs. At worst, however, we already have the waste problem with us, especially a military waste problem. The addition of commercial wastes, even for as long as twenty to thirty years, will affect the magnitude of the problem only in degree.

"There are definite advantages to relying temporarily on light water reactors. Perhaps foremost among these is that they work: the technology is proven, in place, and productive. Moreover, these reactors are generally cheaper than comparable coal-fired power plants, much cleaner environmentally, and--contrary to popular misconception--they are safer over time, even if a major accident should occur, which both sides of the debate agree is highly unlikely.

"In addition, light water reactors without reprocessing have little impact on the potential proliferation of nuclear weapons. If anything, staying in the nuclear business will enhance our leverage on other countries in

preventing or limiting proliferation.

"The decision on the other two fission systems, however--reprocessing for converter reactors, and the breeder--do not need to be made now. We certainly should continue research on them, as well as on other ways of stretching uranium supplies, to design the best possible breeder or near-breeder in case we should have to rely on fission for the indefinite future, but we can and should wait before moving to commercialization.

"Both of these technologies involve the routine production, use, and transport of plutonium--ten pounds of which can be made into a bomb--and we are neither technically nor politically ready to cope with a world energy economy based on plutonium. Also, the economics of reprocessing for converter reactors appear to be marginal. Even with a strong economic case the safety considerations should not be ignored; without one they clearly dominate the decision.

"I look upon the breeder as insurance. We must find some new, relatively inexhaustible and affordable source of energy. The breeder is such a source, and will almost certainly 'work,' at costs probably not too different from current fission reactors. I hope we will find others--like pure fusion or some form of solar--which don't also create a plutonium economy. But we may not.

"Fusion may not work at all, and solar electric may remain more expensive by factors of 5 to 50. The combustion of huge quantities of coal for decades may have unacceptable environmental, health, or climatic effects. We'd better have some kind of breeder, the best kind of breeder--the least proliferation prone--in reserve. Like life insurance, you hope you don't need it--at least not soon--but it is folly not to have any just because you happen to feel healthy at present.

"What does the future hold? Our answers are only guesses. A century ago no one foresaw the age of petroleum, and we too peer at the future through the curtain of the present. That we think we see the outlines of things to come attests more to our powers of imagination than to our vision.

"About all that is really clear is that the future need not, and probably will not, resemble today. Thus, we should approach it cautiously, and with a humility consistent with our ignorance. We should be working on as many feasible options as possible, with our minds open to change and fully prepared to do so. Above all we must approach the energy problem with the profound knowledge of our place in the planetary and natural scheme of things. Industrial man temporarily forsook nature, his own and that of the world around him, but we cannot escape nature or nature's limits. I believe that more and more people are grasping both the challenge and the beauty of truth."

If we [were to] speak as we write, no one would listen; if we [were to] write as we speak, no one would read."

--T. S. Eliot

Calculators ? Chips ? Microprocessors ?

PC-er Ray Stephon of Air Products and Chemicals, Allentown, Pennsylvania, sends the following discussion of a technology which touches us all but which may not, until now, have reached the understanding of many:

"A calculator is a hand-held computer with chips inside." More particularly, a calculator contains a printed circuit board to which are soldered small capacitors, resistors, sometimes transistors, indicators (to show answers), switches, and "chips."

A chip is a combination of interconnected circuit elements inseparably associated on or within a continuous silicon or silicon-tantalum substrate. Chips are very small and very thin, something like a woman's smallest finger-nail; one chip containing 50 thousand transistors can pass through the eye of a needle.

Yet a chip processes data just as a large computer does, by performing four kinds of operation: arithmetic, control, input/output, and memory. As one chip can operate on programs stored in other chips, these tiny components are used singly or in combination, as "microprocessors," to refine the performance of any device, like a camera, typewriter, vending machine, or household appliance, that can be improved by "thinking power."

Chips are manufactured in "clean rooms" where the air is constantly filtered and workers wear "operating clothes" like surgeons. About 250 chips come from one razor-thin slice of silicon some three inches across. Silicon is used because it can be either a conductor or a non-conductor of electricity according to how impurities are added to it. If two small zones "doped" to be electrically negative (excess of electrons) are separated by an electrically positive zone, they act as a transistor or electronic switch; a small voltage in the positive zone can control currents flowing between the two negative zones.

Chips may contain as many as ten layers of circuitry, created slowly, one at a time. The basic wafers are rusted in hot oxygen, masked with ultra-violet-sensitive emulsion, etched from a scaled-down drawing of many identical patterns of a single layer of circuitry, and baked in an atmosphere of dopants.

After these steps have been carried through for each layer, the wafers are coated with an aluminum conductor, which is also masked and etched. A computerized probe scans the wafers and marks defective chips for discard. After the chips have been separated by a diamond cutter, the good ones are externally wired, sealed in foil or plastic, and shipped to users.

Ultimately, the chips become microprocessors, or parts thereof--much-scaled-down versions of the digital computer. Some of the microprocessors being made in 1979 have as much computing power as most computers that have been on the market for five years. It should be noted that although a microprocessor can be a chip, not all chips are microprocessors.

A certain confusion of terms, however, must be understood and kept in mind. The word microprocessor is used in two senses: as a generic word referring to all or any of the devices in a three-level hier-

archy, but also as a specific word referring to devices in the lowest of the hierarchies. There are, then, three kinds of microprocessors:

1. microprocessors, or one-chip processors
2. microcomputers
3. microcomputer systems

These classifications are discussed in order:

1. A microprocessor consists of a single chip, called an integrated circuit or set of circuits; it processes logical and arithmetic data under program control. Chips are classified according to the number of logic functions they can perform. They may be VLSI chips, with very-large-scale integration; LSI chips, with large-scale integration; MSI chips, with medium-scale integration; or SSI chips, with small-scale integration.

A VLSI chip contains over 1000 logic functions, which are themselves microprocessors or, in some cases, memory. The VLSI is the "microprocessor on a chip."

LSI chips contain from about 100 or 500 up to 1000 logic functions. They perform decoding and custom operations.

MSI chips contain from about 10 or 15 up to 100 logic functions--shift registers and adders.

SSI chips contain up to 10 or 20 logic functions which are, typically, AND/OR gates.

2. A microcomputer consists of several microprocessors (on a circuit board), memory storage, and receiver/driver circuits to take in and send out information.

3. A microcomputer system consists of a microcomputer (circuit board-mounted in a chassis), memory, storage, power supplies, control panel, and input/output devices.

The following paragraphs discuss performance and capability:

Word length in microprocessors ranges from 4 to 16 binary bits in even multiples of bits. A minicomputer has a word length of 8, 12, 16, or 32 bits (calculators have word lengths of one or four bits). All of the bits in a microprocessor word move in parallel (i.e., 16 bits move simultaneously), as does the minicomputer word; a calculator word moves in serial/parallel mode (i.e., 2 bits move in parallel followed serially by the other 2 bits which also move in parallel).

Instruction cycle time (the time required to read an instruction out of memory and execute it) ranges from 500 n sec to 100 μ sec for a microprocessor. Typical times for a minicomputer are 200 n sec to one μ sec, and for a calculator 4 to 40 μ sec. (One n sec, or nanosecond, is one billionth of a second; a μ sec, or microsecond, is one millionth of a second.) Microprocessor capability is generally evolving toward the minicomputer.

Another way of considering microprocessors is in two general classifications, as one-chip and multi-chip processors. One-chip processors contain the program counter (logic that controls operation sequence), instruction decode and control (logic that interprets instructions), arithmetic logic unit or ALU (arithmetic logic for performing computations), and operating registers (for temporary storage of

operands and computational results). Typically, one-chip processors have a word length of four to eight bits.

Multi-chip processors usually consist of several ALU chips and a CROM chip (Control Read-Only Memory, which handles instruction decode and control). They have word lengths up to 16 bits.

New applications for microprocessors are being found almost daily. They are used in a wide range of areas such as deep-space probes, computer peripheral equipment, industrial controllers, office equipment, and home computers. They also serve as amplifiers in hearing aids, replace relays in telephones and pin-ball machines, and regulate automobile brakes and ignition systems.

The Future of Communication

Last September, Lewis M. Branscomb of IBM corporation spoke on "Information: The Ultimate Frontier" at the General Electric 100th Anniversary Symposium. An article based on his talk appeared in Science for January 12, 1979 and is summarized here:

Branscomb points out that although food and energy are basic resources for human life, a third resource, information, is needed to manage their use and distribution. At present, if we take a world-wide view, the three seem to be in uneven supply, and two kinds of difficulty have arisen—one kind because of under-supplies of food and energy, and another because of over-supplies of information.

Again, food and energy are consumed or disintegrate; the stock becomes depleted as they are used. But information does not disappear with usage—it generally becomes more valuable; the more people have, the more they want; and it does not decay or dissipate. But how should its over-supply or its distribution be managed?

Branscomb answers, predictably, "By using the computer." At this point, he makes two very important differentiations. First, speaking humanistically and metaphorically,

People rarely distinguish between data, information, knowledge, and wisdom. Yet they are as different from one another—as and as interlocking—as starch molecules, flour, bread, and the flavorful memory of a superb morning croissant.

The second differentiation, in technological and engineering terms, sees information as machine-readable or machine-contained statements of fact and expressions of relationship which can be operated upon electronically. Communication, then, is simply the process of moving these elements of electronic traffic from one place to another, whether the signals represent random noise, numbers from a logarithmic table, a sonnet by Shakespeare, an opera by Wagner, a proof by Einstein, or reports from a space probe near Mars or Venus.

Branscomb's chief concern is with the future of communication. In the matter of circuitry, he sees a continuation of the trend to smaller computers with silicon technology, but points out that the need to draw off large amounts of heat from midsize devices will be a size-limiting factor. Further development of Josephson (cryogenic) technology may solve the heat

problem, however—new computers, with circuits in superconducting metals at 4.2 degrees above absolute zero, will be very small, very fast, very cold, and, at first, very expensive.

Minuscule computers, of course, will have minuscule memories. By the time only three atoms of space remain, some sort of three-dimensional memory cell will be needed—something like a strand of DNA, which has a genetic memory of more than 10^{10} bits of information, a specific structure unique to its information content, and ability not only to replicate but also to rebuild itself to accommodate new experiences.

In his discussion of gaining access to information, Branscomb promises that the computer of the future will respond to speech, read symbols, and "write" with non-impact ink jets or with laser electrophotography. Differences among information technologies will disappear, he says, as typewriters, television, movies, radios, telephones, records, and tapes become interrelated and interchangeable.

Within the next hundred years, just as mathematical tables are now obsolete, so computers will no longer store such information—data will be cheaply reconstituted from stored algorithms. Information will be obtained by immediate access and documents will be secondary sources or by-products. Furthermore, light-wave technology—the use of glass fibers and lasers—will enormously reduce the cost of communication and increase the message-carrying capability of transmission channels.

In the future, too, Branscomb predicts, computers will make personalized manufacturing and service possible. For example, if shoe machinery is computer-controlled, detailed measurements of a person's feet, along with information about style and color preference, can be sent to the factory and custom-made shoes can be made at mass-production prices. High-level machine languages similar to English or other "natural" languages will be developed so that people can ask computers to provide information on various subjects and instructions on how best to use this information for particular purposes. Similarly, new computer software will simplify and "humanize" man-machine relationships, and interactive home video computers will make first-class individualized education, at all levels, possible, enjoyable, and inexpensive.

EURAB Terminal

E. Giovanetti, PC's Area Representative for Italy, sends word of a new computer terminal and a "new" Arabic alphabet. His information came as an article from the ESA Bulletin (No. 16, November 1978), a publication of the European Space Agency:

In "The EURAB Terminal," N. E. C. Isotta describes computer equipment capable of displaying, side by side on a single screen, two texts in different alphabets, and discusses a particular version, the EURAB terminal, which shows Latin and Arabic characters together.

The Arabic letters appear not in the traditional form but "standardized" to make them easier to read; they have been reduced in number from well over 300 to only 107, and characters for vowel-sounds (hitherto shown by "indicators") have been incorporated. The new alphabet, Arabe Standard Voyellé (ASV), was developed by Professor Lakhdar of Rabat, Morocco, who devoted 20 years to the project.

With the ASV system, Arabic letters can now be printed in books and newspapers as cheaply as Latin

letters, and its value in education is inestimable. At a recent UNESCO Conference in Nairobi, it received the official approval of 21 Arab-speaking nations, and a system has recently been devised for joining the characters to form conventional word-units. Furthermore, newly developed printers, which can now be attached to EURAB terminals, will produce bi-lingual combinations of English, French, Arabic, Russian, and Greek output in appropriate characters.

SELI, an Italian electronics company, expected to begin full-scale industrial production of EURAB systems in January, 1979. The educational applications of this equipment will be important; banks will use it to obtain bi-lingual representation of names and account data; airports will use it to display flight information; linguistic analysis and translation projects can benefit from its ability to trans-literate.

Student Creations

Since 1968, Creative Engineering Design Displays have been a feature of the Annual Conferences held by the American Society for Engineering Education.

The displays give engineering students--graduates and undergraduates--a chance to demonstrate ingenuity and professionalism. They also encourage instructors to develop creative methods for teaching design.

At least 25 judges evaluate the Display projects for statement of problem, design parameters, conceptualization to meet parameters, analysis of problem, feasibility of design, final presentation (verbal account, drawings, computer printout, photographs, mathematical or mechanical model, in any combination).

Awards are presented to individual and team designers in academic-year categories. Winning entries have ranged from a rubber-band-powered truck to a plan for raising the Tecumseh.

A student whose design was exhibited called the 1979 Conference/Display a unique and productive vehicle for student-faculty interaction and said that participation gave her a feeling of significant accomplishment.

One of the judges reported that many students seemed to have used the Display "as an opportunity to demonstrate their talents to possible future employers." He found the textual presentations of these projects sharp, concise, and well-organized; well-written and well-edited; both a challenge and a pleasure.

Other projects, however, seemed to the same judge like "just another course assignment hastily completed."

"There is little or no excuse," he wrote, "for a presentation in which, for instance, technical words are repeatedly misspelled. Illegible writing, mathematical errors, drawings made without the use of straightedges or compasses, half-finished pages, messy erasures and crumpled paper can indicate only a lack of interest or knowledge, uninterested review by instructors, and disrespect for the viewers and judge judges."

From these presentations, the judge received the impression that in the U.S., at least, the engineering educational process is "slipshod and inefficient."

We often hear engineers accused of writing poorly, but here is criticism of their technical performance.

It may be true after all that a careful engineer will apply quality control in all aspects of his work. Help is always available from artist or draughtsman, editor or teacher of speaking.

--Information from Engineering Education, January 1979

The barbarism, communication skills, which is the contemporary jargon for reading, writing, figuring, speaking, and listening, appears to have permanent relevance. These arts are important in any society at any time. They are more important in a democratic society than in any other, because the citizens of a democratic society have to understand one another. They are indispensable in a world community: they are arts shared by people everywhere. Without them the individual is deprived; and the community, too. In a technical age, these are the only techniques that are universally valuable; they supply the only kind of vocational training a school can offer that can contribute to vocational success. They are the indispensable means to learning anything. They must be learned if the individual hopes to expand his individuality or if he proposes to become a self-governing member of a self-governing community.

--Robert Maynard Hutchins in "The Schools Must Stay"

Word from the UK

Information about the Utrecht conference on technical communication comes to us via the August-September (1978) News Supplement of The Communicator of Scientific and Technical Information published by the British Institute of Scientific and Technical Communicators.

We are indebted to the same paper also for the following tidbits of information, misinformation, and inattention:

The New Civil Engineer for June 15, 1978, contained a 600-word editorial, "The Art of Communication," which suggested three possible reasons for engineers' poor performance as communicators: emotional immaturity, 'a constitutional dislike for the frivolity of words,' and the fact that engineering students spend so much time on technical studies that they have no time to speak or write about them."

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Tangled skeins, or interchangeable errors: "names which strike cords of memory" and "straining the vocal chords."

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In the name of religion: Money is dispursed (!) between Home and Foreign Missions as we tell of the life, crucifixion (!), and resurrection of Jesus Christ.

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A book advertisement praises a "first definitive history"--to be followed by the more definitive and final definitive histories?

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"We are now looking for more experienced authors" --authors with more experience, or more authors with experience?

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Our firm has the lowest service charges of all its rivals.

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In general, underspending is unacceptably high.

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A nature trail leaflet points out that "Here the track passes by a great tree, this is the American Red Oak, our route takes us off to the right." With luck, adds our British editor, you will see some comma butterflies.

Electromagnetic Pollution

A toaster that plays music, a truck that brakes when a CB radio transmits, and a heart pacemaker that goes awry are symptoms of what may become one of the nation's most perplexing environmental problems in the 1980s--electromagnetic pollution. This is the plethora of radio waves and other energy radiated from the burgeoning number of electronic products and components in our homes, offices, factories, and vehicles.

Experts say the electronics revolution is only in its infancy and as engineers apply solid-state circuitry and the mini-computers known as microprocessors to more and more jobs, their unintended consequences may become more serious.

The big problem is interference. Signals from one device can disrupt another. Another possible problem may be biological effects from non-ionizing types of electromagnetic radiation usually considered harmless. Natural electromagnetic waves have been around as long as the Earth has, but the amount of man-made electromagnetic waves in the environment was relatively slight until after World War II. The increase since then has been dramatic.

--From a UPI article in the Philadelphia, PA Bulletin, Sunday, November 19, 1978, via the Newsletter of the Electromagnetic Compatibility Society (Winter 1979).

Computerized Plato

In Baltimore (Maryland), the Mayor's Office of Manpower Resources and the Commercial Credit Company (financial arm of the Control Data Corporation in Minneapolis) have organized a cooperative educational venture called the Adult Learning Center.

Located in the heart of the city, the Center enables functionally illiterate adults to improve their mathematical, reading, and language abilities in a Basic Skills program "taught" by Control Data's PLATO, a computer-based educational system. A total of over 160 students work at the Center, which is open for six two-hour shifts per day, 60 hours a week.

PLATO was designed "to help the educationally disadvantaged who have failed in traditional learning situations." Its instruction meets the needs of the individual student, who interacts with the computer through a keyboard and the touch-panel on a television-like terminal. Visual displays, graphics, simulations, and games are the teaching media, and the curricula are not only individualized but also "modular, achieve-

ment- and mastery-oriented, diagnostic, and prescriptive."

Preliminary statistical studies show that students' average growth rate in reading has been almost one grade level for every 15 hours spent with PLATO; in mathematics, just over one grade level for less than 20 hours.

Students at the Center are not only reaching their immediate educational goals but have also found full-time jobs and "experienced success" for the first time; they have improved their self-images, extended their personal goals, and broadened their relationships with other people.

"I see myself now as a different person," one student commented, and another found "new hopes and dreams." A third said that the computer gave him more attention than he had ever had from anyone in his whole life.

Non-human Communication

Although chimpanzees cannot speak, some of them have been taught, and have been observed teaching others, to use a language which consists of hand-signs.

One such pupil, Washoe, is able, for example, to communicate her understanding that the sign tree "means" such diversities as a mature oak, a young cedar, and a miniature cypress, but does not "mean" a fern, flowering plant, vine, bush, or mushroom--whether she sees these members of the vegetable kingdom growing or pictured. She also, not knowing a sign for duck, "created" a "synonym"--the sign for water plus the sign for bird.

Another chimpanzee, Lana, has learned to use an electric keyboard, each key of which displays a geometric shape that represents a particular word. When a key is depressed, its symbol appears on a large wall-board. Lana has learned a small vocabulary of these symbols and combines them in "sentences" to communicate not only with her trainers but also with other chimpanzees.

Whales and dolphins have long been thought to have their own languages, or systems of species-intelligible sounds, but these are not as yet understood by humans. Perhaps a first step toward inter-species communication is the recording of "songs" of the hump-backed whale. The National Geographic Magazine for January, 1979, contains an article about these great creatures and a small plastic disc from which their singing can be reproduced by home-phonograph.

A. Volta

The metric unit for voltage was named in honor of the Italian physicist, Count Alessandro Giuseppe Volta (1745-1827), who constructed the first voltaic cell, the first voltaic pile (battery), and the first electric condenser. He received his title from Napoleon.

When Volta tried to resign his professorship at the University of Pavia because of old age, Napoleon refused to accept the resignation, saying, "He may give only one lecture a year, but the University of Pavia would be wounded to the heart if I were to allow so famous a name to be struck off the rolls of its members. Furthermore, a good general must die upon the field of honor." --From the Aerospace and Electronic Systems Society Newsletter, October 1978.

Accountability vs. Research

Increasingly, Bureaucracy seems to be stifling the efforts of Research and Development. Excessive, pervasive management and regulation are grave threats to research activity--forces that will minimize creative activities and innovation in the long run.

"Parkinson's Law," which has not yet been repealed, indicates that Bureaucracy tends to lose sight of what the real objective is and is concerned only in its own management and control function. For example Bureaucrats would have us show explicit relevance and complete planning in our innovative processes. One item the Bureaucrats don't worry about is insuring the innovator time to think.

In this regard, Rothwarf and Tauber (Physics Today, August 1, 1977) propose a managerial uncertainty principle,

$$\Delta A \cdot \Delta C = K,$$

where ΔA is the uncertainty in accountability, A , ΔC the uncertainty in creativity C , and K is a large constant related perhaps, to the number of hours in a working day. If Bureaucratic management insists on a high degree of accountability from scientists, there will be a corresponding large uncertainty in creativity/productivity with mediocre or commonplace results.

Scientists must be free to interconnect things in a no-holds-barred atmosphere, so that they can gain new insights and ideas with many possibilities. Regimented, they become bored and uninventive.

When time to play with ideas is eliminated from the working day through requirements imposed by accountability, creativity falters and deteriorates. Leaders should be aware of the penalties and use moderation in applying "management by objective" principles.

--Adapted with permission from a guest editorial by A. Clavin in the Newsletter of IEEE's Microwave Theory and Techniques Society (Fall 1978).

The Engineer as Communicator

"The Role of the Engineer in Improving the Communication of Technical Information" is the title of an article by PC-er Bob Woelfle in the Proceedings of the 25th ITCC (STC, Dallas, 1978).

Bob suggests and elaborates on three primary ways in which engineers can improve technical communication in general and their own presentations in particular:

1. Develop a greater awareness of the importance of technical communication in day-to-day projects and over-all professionalism.

A communication doesn't just become effective--it must be made effective. Its quality can be improved only when engineer, editor, and manager agree on applying high standards and self-discipline.

Excuses proliferate--like "The technical aspects are more important than the writing" and "The project is already behind schedule," or like pleas of inadequate training, lack of interest, excessive workload, poor work environment, lack of clerical support.

Their results proliferate also--misspelled words, incorrect numbers, inaccurate drawings, misplaced paragraphs, misleading sentences, poorly chosen words, confusing illustrations.

Spending time and money to produce high quality communications will yield such by-products as better understanding, improved productivity, enhancement of company image, professional recognition, career advancement, and personal satisfaction.

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2. Acquire and apply the basic skills needed to communicate effectively at all levels in writing and speaking.

When a circuit doesn't "work," the engineer re-designs and modifies it, and learns from the experience. He should do likewise with his reports and memos--devote time and effort to making them effective.

Engineers should read as much as possible, non-technical as well as work-related prose, and be critical of the authors' styles and methods.

Engineers should also write and speak as much as possible, communicating non-technical as well as work-related information, and try to produce the most effective output.

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3. Participate in professional activities that foster the improvement of technical communication.

Engineers, as educated professionals, should participate in the work of civic groups that influence educational programs--groups like Chambers of Commerce, Parent-Teacher Associations, and college advisory committees.

Engineers should participate, as students or sponsors, in seminars, workshops, committees, and other activities conducted to improve corporate and professional communication.

Engineers should take active parts in the work of professional societies--attend organization, technical, and social meetings; contribute to journals and newsletters; participate in conferences and programs.

Especially, engineers should join IEEE/PC and encourage their colleagues to become members also. PC helps engineers to bridge the gap between the two worlds that they must keep in touch with--the world of technical development and the world of technical communication.

Spelling Lesson I

Here are 10 more to make sure of:

Word	Warning
maintenance	acts of maintaining
persuade	only one <u>u</u>
precede	go ahead of
procedure	method
proceed	go ahead
proceedings	events
Proceedings	collection of professional articles
separate	se--pa--ra--te
supersede	su--se--
textual	no <u>r</u>

Spelling Lesson II

All the words in the list below are spelled correctly. Be sure they look like this when you write them.

Word	Warning
adaptation	a make-over
adoption	a take-over
compatible	only one <u>a</u>
excerpt	only one <u>c</u>
exercise	only one <u>c</u>
extension	one <u>t</u> , one <u>s</u>
foreword	word that comes <u>before</u>
forward	no <u>e</u> , like onward
genealogy	only one <u>o</u>
liaison	li-ai-son

Confusion

PC-er E. D. Maloney sends the following accident reports; he found them in Telephony (December 4, 1978) which had reprinted them from On the Line, a publication of Telecom Australia:

"A cow wandered into my vehicle, and I was afterwards informed that the cow has half-witted."

"I collided with a stationary tree."

"I heard a horn blow and was struck violently on the back. Evidently it was a lady trying to pass me."

"Three women were all talking to each other and when one stepped back and the other forward, I had to have an accident."

"I knocked over a man and he admitted that it was his fault as he had been knocked down before."

JIR Excerpted

In Vol. 24/4 (1978) of the Journal of Irreproducible Results, Robin T. Peterson reports on methods used by incompetent professors to obtain higher-than-deserved "grades" from student evaluators. Seventeen methods of concealing ineptitude are tabulated in four classifications. A selection follows:

I. Throughout the semester

1. Intimating that the instructor has connections with the Mafia.
2. Carrying three or four large tomes home from the classroom each day.
3. Informing students that the professor is a member of the Society for Basic Irreproducible Research.

II. On the day before evaluation

1. Serving tea and cakes to students.
2. Informing students that the instructor is a handwriting expert and will tabulate the evaluation results himself.

III. On the day of evaluation

1. Deferring students from attending class, as by locking the classroom door.

IV. After the evaluation

1. Accidentally dropping the completed student evaluation forms in a paper shredder.
2. Completing a set of evaluation forms and substituting them for those completed by students.

* * * * *

In the same issue of JIR David C. Grove and David E. Buge discuss "Prehistoric Demography, Behavior, and Ancient Pottery," using 3 pages, 28 explanatory footnotes, and one bibliographic reference (Agatha Christie's Murder in Mesopotamia).

The authors present two formulae, derived "primarily through our own brilliance," as they say, and from these and a series of laboratory tests show that archaeologists can calculate prehistoric populations by simply excavating sites in their entirety and using the equations and graph provided in the article.

The basic argument is as follows: As shards or potsherds are found in great quantities at prehistoric sites throughout the world, and as humans are primarily responsible for the breakage which produced the potsherds, it should be possible to reconstruct ancient demography and behavioral patterns from rigorous and statistical analysis of these bits and pieces of ceramic.

Of the two formulae used, one is demographic:

$$P = \frac{Q}{NC L}$$

- P: the ancient population on any one day
Q: the potsherd quantity
N: the number of sherds per broken pot
C: the number of vessels broken during the lifetime of an individual
L: the time span of the archaeological site given not in years but in average lifetimes

The second formula is behavioral:

$$\frac{TS}{B} = K$$

- TS: the total potsherds at an archaeological site
B: the total burials (population) at the site
K: total potsherds at the site per individual

The authors claim to have subjected two lots of prehistoric pottery to test procedures designed to replicate ancient breakage conditions: 250 "Mayan tomb vessels" borrowed from the local World Prehistory Museum, and 150 ceremonial vessels "excavated on the coast of Ecuador."

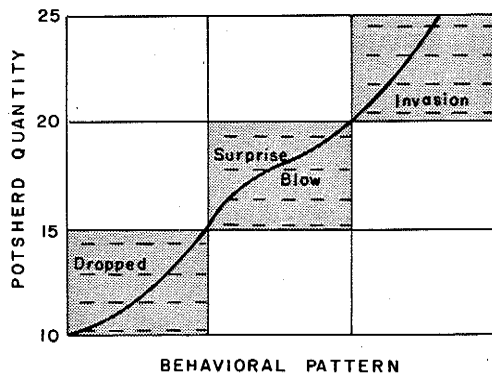
Three breakage tests were used: 1. An empty oven-heated vessel was placed on a table and an unsuspecting student was asked to lift it and look at its contents; laboratory assistants interviewed the student and counted the potsherds. 2. Vessels were struck by a heavy-weighted pendulum. 3. Vessels were subjected to random destruction (cf. invasion by barbarians).

A by-product of these tests was the formulation of David's law: for a given vessel, potsherd size varies inversely with quantity.

Data from the three lab tests gave the number of sherds resulting from the breakage of a vessel: the means were 17, 27, and 20; the averages were 12, 19,

and 15. These values are represented by N in the first equation; when N is divided into the number obtained for K in the second equation, the result gives a figure for C in the first equation.

The authors report that potsherd size and quantity are directly related to breakage methods and that these in turn can be correlated with ancient behavior patterns. This graph of their findings should make possible many new archaeological interpretations and reconstructions:



Clothes Make the Pirate

John Bradshaw's "Does Appearance Count?" (in *The Communicator of Scientific and Technical Information*, October 1978) describes a technical manual written by a company engineer for engineering colleagues. The general amateurish appearance, he says, deters most potential readers, and the few who do persist

are soon hampered by a random sprinkling of capitals, an excess of hyphens, and parentheses, unexplained acronyms, non-standard abbreviations, erratic bursts of punctuation, colloquialisms, and any number of elementary grammatical errors and syntactical misconstructions, all embodied in dry, passive text addressed to a phantom reader.

This "worst case" occurs, Bradshaw points out, because

[The engineer's] management sees no need for costly presentation or the use of standards, and the publications department is given responsibility for editing and typing only, with little time for either. Most significantly, there is no provision for rejection of the script.

Bradshaw thinks that professional authors, even with very little technical training and no specified communication Standards or guidelines, produce more attractive, readable, and helpful manuals than do engineers. But he insists that, in addition, an editor/book designer and a technical typist are needed--the former to establish company standards for documentation, the latter to ensure compliance with these standards.

There should be two sets of standards, Bradshaw says. The "literary" set should include lists of

difficult spellings, preferred spellings, odd plurals, hyphenated words, standard abbreviations, approved terms, deprecated terms. The "artistic" standards would consist of rules for presenting titles and headings, the use of initial capitals, indentation, line-spacing, the numbering of lists and figures, the formatting of tables.

In Bradshaw's view, documentation is something of an afterthought today, but will be part of every product tomorrow. Until tomorrow comes, however, "scientific and technical communicator" will continue to mean "author-editor-designer-proofreader" for engineers who care what their reports and manuals look like.

Telephone Gadget

Along with E. D. Maloney's contribution of poorly-written reports (printed elsewhere in this Newsletter) came the following well-written paragraphs which have been extracted from a longer item by Ray Blain in *Telephony* (December 4, 1978); they describe a new piece of telephone equipment.

"The mini-bridge lifter is a little device, manufactured by the Western Electric Co., that permits a telephone customer to have two or more telephones with the same number located in different places. A doctor, for example, may want an office telephone coupled with another phone located at home or in an answering service office. The small electrical circuit package, about the size of a piece of popcorn, does the job that once required an additional frame of equipment, installation time, and bookkeeping.

"When a caller dials the doctor's number, the central office equipment sends an electrical current to all phones connected to the number so that each rings. Up to four phones in different locations can be served by the lifter. When one of the phones is answered, the bridge lifter senses which one has been picked up, and directs all of the electrical current to that phone."

Computerized Translation

There is now available a "translating machine" that looks like a stand-alone video word-processing terminal. When the operator types a Spanish sentence into the system, the screen displays both the Spanish and an English translation. A translator can then use the word-processing features of the system to produce an idiomatic translation very quickly.

Within the next few years, capabilities for translating nine other languages into English--Arabic, Dutch, French, German, Hebrew, Italian, Japanese, Portuguese, and Russian--will be added.

By special programming, the system can operate on particular technical vocabularies, such as for ship-building, equipment use, etc. It displays multiple-meaning options for the translator to choose from and can produce a camera-ready copy of the final translation.

Users have estimated that the system can cut translation costs in half and quadruple the volume of text that a translator can produce in a given period of time. At present, the selling price is about \$125,000; rental; \$2700 per month.

For further information about this Multi-Lingual Word Processing System, write to Weidner Communication Systems, Inc., 3366 N. Torrey Pines Court, Suite 100, La Jolla, CA, 92037.

--Adapted from *Communication Notes*, December 1978.

The Value of Rules

The following paragraphs are reprinted from Saturday Review (January 21, 1978), with the kind consent of the publisher. In them, at the end of an essay, "On Learning the Rules," Thomas H. Middleton expresses his agreement with traditionalists, who think that children are given something priceless when they are taught the rules of language, and his disagreement with progressives, who think that children are frustrated in the expression of their own originality when forced into the "boring strictures of grammar and usage."

"To my mind," Middleton writes, "the grammarians [of the eighteenth and nineteenth centuries] did an admirable job and gave us an extremely useful structure with which to work. Classical English grammar should be understood as a system of guidelines useful in imparting a certain grace and clarity to our language, both written and spoken, but particularly written."

"I don't think children should be deprived of these guidelines. In fact, I think these rules are among the most valuable things a person can have in his mental storehouse. The fact that a child might be somewhat bored during the learning process seems to me a flabby excuse for not teaching. So does the fact that a child might speak another language and English might be a foreign tongue to him. English is unquestionably one of the world's richest and greatest languages, spoken by countless millions of people. The ability to use it well--the ability to communicate with clarity, in both speech and writing, with the best-educated members of the English-speaking world--is, of course, a priceless gift."

"I can't accept the theory that learning has to be fun. If it is fun, so much the better. Certainly, it can be fun. Equally certainly, learning can be tedious. But even when it is drudgery, learning something and understanding what has been gained on the way brings a sense of satisfaction that frequently leads to a desire for further achievement, however painful the process."

"The rules are there to be used or to be broken. Often the breaking of grammatical rules enhances style and clarity. But the knowledge of the rules and of how and why they work is always a tremendous asset. The important thing is to know that they are your tools, not your master."

Instant Translation

For \$225 you can buy a Lexicon LK-3000, a pocket-size translator with alphabet keyboard and light-emitting-diode display. Operating from either a battery or 110-volt or 220-volt current, the LK-3000 uses plug-in modules to translate between English and French, German, Italian, Portuguese, and Spanish. It comes in a carrying-case with a single module, space for two extra modules, and an adaptor/charger.

Each module contains about 2200 words, screened for double meanings and duplication. The user can search to find English words and phrases in the device's memory, combine these in a sentence, ask for a translation, show the displayed translation to an informant, have the informant type an answer in his native language, and read the answer translated into English.

Eight additional modules are being designed to permit English-speaking users to communicate in Arabic, Chinese, Greek, Hebrew, Japanese, Polish, and

Swedish. Other modules will calculate currency relationships and change measurements to and from metric values.

Inventor of the LK-3000 is a young Greek who came to the U.S. in 1961. He hopes to add paper-printout capability to his translator.

--From Washington Star-News, 225 Virginia Ave., S.E., Washington, DC, 20003, via Communication Notes, December 1978.

American English, 1978

In Time (January 1, 1979), "The State of the Language, 1978," by Stefan Kanfer, brings to notice a number of linguistic horrors, among which are the following:

carrying out crime and punishment
wheelchairs and other types of illnesses
self-inflicted suicide
self-autonomy
really irating remarks
a little unique
irregardless
of decisional significance

Transformations of nouns into verbs became epidemic in 1978, Kanfer points out--"Governments prioritized, runners marathoned, technocrats moduled their problems, diplomats liased with their colleagues, vans slept six."

"The media," he further remarks, "continued to be incorrectly used" [i.e., as a singular form] "and hopefully seems to have set down roots. Hopefully, the media has this on its conscience. (If you cannot find three errors in that sentence, see your local grammarian.)"

English has indeed been "besieged by vulgarities," as Kanfer says. He acknowledges, however, that it has also been enriched by vigorous terms and phrases, which "those who speak and write with care" recognize as the unmistakable heartbeats of a language alive and energetic.

Plan & Practice

In The Toastmaster for January, 1979, Thomas Montalbo ("Six Steps to the Lectern") suggests that if you go through half-a-dozen careful procedures you will never bumble your speech-making:

1. Find out who you'll be talking to and learn what their interests are.
2. Choose a subject, or a "slant," that you care about and that will appeal to this audience.
3. Decide whether you want to inform, persuade, entertain, or somehow combine these purposes.
4. Research or analyze your subject; make notes and organize them to carry out your ideas.
5. Write out your speech the way you would "talk" the material to a friend.
6. Practice delivering the speech--aloud, on your feet, to anyone who will listen or to a tape recorder.

Emerson Books

PC-ers may want to take notice of Emerson Books, Inc., Reynolds Lane, Buchanan, NY 10511. This firm publishes small, practical, reasonably priced (\$6-\$10) volumes of technical instruction. Their intellectual appeal falls comfortably between insultingly popular and confusingly specialized.

Four of these books have been reviewed to date in this Newsletter, in articles called "Quizzes" and "Explanations" (present issue), "Conservation of Energy" (January 1979), and "Housing" (January 1978).

Emerson serves other interests than those which pertain to home-owning and amateur mathematics, however. Available titles deal with such subjects as

- * arts and crafts (carpentry, drawing and painting, music, pottery- and candle-making, leather-work, paper- and string-work)
- * games, puzzles, tricks, and magic
- * self-defense and gymnastics
- * repairing and collecting

Write for Emerson's 32-page 1979 Book List. It contains prices and an order form along with descriptions of sensible, useable books for people who like to make and do things.

Explanations

MATH WITHOUT TEARS, By Roy Hartkopf. Emerson Books, Buchanan, NY, 10511; 1965, fifth printing, 1977; 247 pp., \$7.95.

Math Without Tears is almost math without numbers --but not quite. Instead of doing away with numbers, the author makes them appear non-threatening to the non-mathematical.

In its ten chapters, the book discusses mathematical operators, binary counting, logarithms, graphs, rate of change, right triangles, series and infinity, and the calculus of motion. This is not a mathematics text or even a presentation of "all you want to know about math but are afraid to ask." Rather, by explaining a limited set of mathematical concepts in simple, leisurely, anecdotal language, it makes them more humanistically understandable.

The excellence of the discussions can be only suggested in a brief review, but something of the author's manner appears in the following excerpts from his chapter on logarithms:

In the power shorthand we can write 2^{10} , which is far easier than the string of two's shown above [i.e., ten 2's written out in a long multiplication]. We use the same sort of idea when we are writing in a hurry and put mult^n or mult^V instead of the full word multiplication or multiply. In the case of figures, however, the use of a power not only saves time but makes them much easier to read, which is more than can be said for some abbreviations (p. 56).

We can write plain 10 for simplicity, but we are really writing $+10+1$ and we must never

forget it (p. 58).

Don't be disheartened if you notice that $10\frac{1}{2}$ is a power of 10, while 10, which is exactly the same thing, is a root of 10 (p. 60).

To write in mathematical language that 10 is the square root of 100, we can write $\sqrt{100} = 10$, or $\sqrt[10]{100} = 10$, or $\sqrt[10]{10^4} = 10^{\frac{4}{10}}$, or $\sqrt[10]{10^2} = 10^{\frac{2}{10}}$, or finally we can write $10^{\frac{1}{10}}$ = 10.

Mathematics, which is so often considered to be a shining example of neatness and logic, has more ways of saying the same thing than an exasperated truck driver (p. 59).

The mathematically adept find Math Without Tears useful when teaching "beginners" or encouraging non-mathematically adept friends and relations. Those in the latter groups, from intelligent high-schoolers to alert oldsters, find that the book dispels puzzlement, relieves tension, and improves understanding--it helps them "get into" mathematics and learn "what it's all about."

Quizzes

THE MATH ENTERTAINER, by Philip Heafford. Emerson Books, Buchanan, NY, 10511; 1959, 9th printing, 1976; 176 pp., \$6.95

The Math Entertainer is a collection of fifty quizzes (i.e., sets of questions or problems) dealing with various aspects of mathematics--arithmetic, geometry, trigonometry, symbols, abbreviations, even tricks and history. One quiz, for example, concerns arches (nine kinds are differentiated); another concerns circles (we all know about "inscribed" and "circumscribed" but not so many know "escribed"); another concerns famous mathematicians. There are two crossword puzzles, an exercise with Roman numerals, "word problems," questions on number series, curves, lines, dimensions and constants, and five limerick-riddles--as this:

Said a certain young lady called Gwen
Of her tally of smitten young men:
"One less and three more
Divided by four
Together give one more than ten."

However many admirers Gwen had, The Math Entertainer should have many more. It is a light-hearted book of recreational mathematics but also an informative collection of facts and puzzlements. The quizzes are challenging but not mind-boggling, and their variety is delightful. The explanations will be read with interest even by those who don't understand the questions very well.

The Math Entertainer is a good coffee-table book, for the "loner" and for the family. "Number people" read and enjoy the questions. "Word people" read and enjoy the answers--and very often go back to look at the quizzes. Educated people, from at least the late 'teens upward, enjoy remembering, figuring out, or learning the "mathematics" so pleasantly set forth in this little volume. It is fine to own or to give as a present.

Kinesics

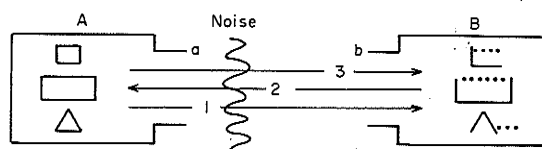
KINESICS AND CONTEXT: Essays on Body Motion Communication--Ray L. Birdwhistell (Philadelphia: University of Pennsylvania Press, 1970, 336 pp.)

Kinesics is the study of the communicative significance of non-linguistic body movement and attitude--nods, shrugs, position of limbs, facial expression, etc.

Kinesics and Context is a collection of essays, "an edited assemblage of published and unpublished writings," intended to show the linguistic and anthropological basis of kinesics as a discipline, as well as the psychological and sociological value of kinesics as a method of studying interactional activity.

The point of origin of Birdwhistell's investigative technique is the recognition that studies of word exchange alone provide incomplete understanding of social intercourse--that, even in the mind of a very young child, both language and body-motion systems are organized and cross-referenced. Separately and together, it seems, the two sets of societal patterns carry not only instructions, descriptions, and adaptations but also statements about these messages themselves, such as whether a given message should be taken literally or metaphorically, as a joke or as an unavoidable prescription, or that a series of apparently contradictory messages can be assembled as non-contradictory (pp. 10-11).

For exhaustive examination of human behavior, Birdwhistell discards the information theorists' "black box" representation of human communication,



wherein both A and B send and receive messages through transmission orifices. Line 1 represents a stimulus message, 2 a corrective or interpretive response, and 3 a corrected transmission. The geometric shapes represent information transmitted but received more or less accurately. Further exchanges (not indicated here) may occur or be needed.

Instead of using this model, which presents communication as the transmission of verbal material, with other behavior assumed constant or trivial, kinesicists think of communication as involving all sensory channels, though not necessarily all at once, in a continuous composite system. This point of view can be represented as,

Time:	T ¹	T ²	T ³	T ⁴	T ⁵	T ⁶	T ⁷	T ⁸	T...
Channel 1	—	—	—	—	—	—	—	—	—
Channel 2	—	—	—	—	—	—	—	—	—
Channel 3	—	—	—	—	—	—	—	—	—

etc. wherein broken lines represent intermittent audio-acoustic (vocal), kinesthetic-visual, olfactory, tactile, etc., transmission.

We can no more fully understand communication by considering language alone, says Birdwhistell, than we can understand physiology by studying only the nervous or the circulatory system. Communication, he points out, is not a simple process of action and reaction but a systematic, structured, social organization. It is more, also, than a purely psychological phenomenon, he continues, using an analogy from the field of sport:

to explain a baseball game, we don't describe and then sum up the behavior of 18 individual players but rather learn the regularities imposed by their rules for playing (pp. 71-2).

Kinesicists see communication as the process by which members of a group make and maintain contact with each other so that patterned societal interaction is possible. The process is one of symbolization, of recognizing, receiving, and sending ordered messages of two kinds--"informational messages," which are intermittent, and "integrational messages," which are continuous.

Linguists, for many years, have studied the verbal subsets of informational messages, and anthropologists have studied body motion in various cultures. We know very well, now, that no word has a precise and invariable meaning, and we are beginning to learn that gestures, too, carry no absolute denotation--even yes and no have shades of connotation, and the simple hand salute of a soldier can "dignify, ridicule, demean, seduce, insult, or promote" its recipient (p. 79). The shape and the sense of units of information are thus seen to be culture-linked.

Again, for example, what is a smile? It is neither only nor always a lateral extension of the corners of the mouth or an upward pull of the lips, or some combination of these motions. The same activities occur in a snarl or a grimace of pain. In what is called smiling, these movements are no more than the most easily recognized segments of larger kinesic structures. They may or may not be accompanied by changes in tonus of the cheeks, a shift in position of the eyelids, a tensing or relaxation of the scalp, a tilt of the head, small alterations in the position of shoulders, trunk, arms, or legs. Indeed, it can be shown that if he presents other pieces of behavior correctly, a skillful actor need not either curl or part his lips--a slight softening of facial expression will convince an audience that he is "smiling." (pp. 35-7).

Thus, kinesicists study kinesic strings and communicative blocks as integrative units; they speak in terms of kinemorphics, motion qualifiers, and action modifiers, and of the cross-referencing signals which tie together messages relating to such basic characteristics as age, sex, and state of health, social position and territoriality, mood and body position or motion.

To represent body motions, a standard orthography using "kinegraphs" has been developed, on the order of the Labanotation used to record dance sequences. Kinegraphics divide the body into eight parts--total head, face, neck, trunk, arms, hands, legs, and feet, including subdivisions (shoulders, fingers, etc.), and prescribes a separate set of symbols for representing the various positions and motions possible for each. For example, H = normal head position, H- = head bent to left, H+ = right eye wink, HXX = chewing, I = upright spine, T = straight shoulders, T- = bent knee, T+ = motion up, T- = motion to the left, and so on; notation for the limbs is more complicated.

This brief review may be an encouragement to understand communication as something more than just reading, writing, and speaking. As an account of kinesics, also, it should be a warning against such popular simplifications as Julius Fast's Body Language (of which librarians say, "We can't keep it on the shelf") and "How to Read a Person Like a Book," by Nierenberg and Calero (who are said to have provided "a key to the silent language of hidden thoughts").

These derivative authors leave the thoughtful reader with feelings of doubt and confusion. There is much truth in their books, but "body language" is often ambiguous. Better pay attention to the clusters, streams, and blocks of Birdwhistell's kinesics.