COMPUTER APPLICATIONS IN ANTHROPOLOGY

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A computer usage survey was mailed to anthropology departments of 84 academic institutions in the United States and Canada which have graduate programs. Five specific areas of use were designated and open-ended answers were solicited.

The five areas of major interest were:

1. Hardware available to the departments
2. Software available
3. Relative frequency of use
4. Types of ongoing research that is computer oriented
5. Computer Aided Instruction (CAI) utilization and computer/mathematical training offered or required

One purpose of the survey was to ascertain if future large scale, quantitative, detailed surveys were warranted. Judging from the nature of the small, though by no means apathetic, response, it appears that many anthropology departments across the nation should first be educated about the potential uses of computers for education and simulation studies as well as conventional data storage.

Only 22 responses were received from the 84 queries mailed. Four returns were unsigned and contained no information. Follow-up by phone and personal contact at meetings indicated either limited or zero utilization of computers. One return, from Brown University, contained a brief note from the secretary that no computers were being used. Another return by Robert Bell of the University of Oklahoma was too general to warrant inclusion in Table 2 which summarizes the comparable information gained from the survey. Table 1 alphabetically lists schools that submitted responses which could be compared in summary form.

HARDWARE

It is readily apparent from Table 2 that most academic institutions offering graduate degrees in anthropology have large and relatively active digital computer centers which are readily accessible to all departments, which justify their use. A variety of computers, plotters, and remote terminal devices appear to be widely available. Thus, availability of hardware is not a limiting factor; however, lack of funds to purchase CPU and terminal time may be an important limitation, even though most academic centers allow use to all while charging only those who can pay (personal communication, Joe DiSalvo, Indiana University). Nevertheless, remote terminal devices must be supported with "hard" money. Discontinuation of funds resulted in the removal of Rochester's departmental terminal.

SOFTWARE

Software, defined as the various programs operating the computer hardware, is limited in this survey to programs and specifically excludes programming languages. Many of the available "canned" programs do not require computer-programming skills to use.

It is known that all of the 84 universities surveyed maintain sizeable libraries of these typed programs. The most often mentioned and used by anthropology departments included BMD, SPSS, SAS, OSIRIS I - III, and KINPROGRAM. Many institutions also have a large assortment of information retrieval systems such as SELGEM. Interactive systems and text-editors such as WYLBUR and MUSIC are also found. Finally, locally pro-

duced statistical and convenience packages which require only slight modifications are also available.

It is apparent from this sample that, like hardware, software is not a limiting factor. A battery of programming skills is not a prerequisite to either data processing or application of computer resources to anthropology. Even though competent manipulation of some existing programs does require access to programming aid, this is usually available at minimum charge to faculty members.

FREQUENCY OF USE

The reported returns expressed computer usage estimates in a variety of units. SUNY-Albany, Ohio State, Stanford, Rochester, and the University of Arizona used dollar allocations and expenditures as the unit of description. The University of Pittsburgh and the University of Wisconsin - Milwaukee estimated in number of "jobs" or "runs". The Universities of Pennsylvania, Florida, Case Western, Hawaii, Syracuse, Missouri, and Arizona State reported "high" and "moderate" to describe their usage. However, the base for comparison was not mentioned! Stonybrook listed number of hours, but did not specify whether this was real-time hours or CPU hours. This variability in use estimates makes comparison between groups difficult, but not impossible.

It is apparent that the University of Arizona's expenditures far exceed the others in this reported sample, with the possible exception of Missouri. Long recognized as a leader in the field, the department employs seven professional programmers, fourteen full-time equivalents, and three keypunchers, most of whom are also trained in anthropology. This department is easily distin-

guished from others in the country where users are personally responsible for data transformation as well as the routine tasks required in data manipulation.

The Anthropology Department at University of Missouri is the second or third largest user on campus (22 users). As such, it is suspected that this department's activity must surely be comparable to Arizona's. However, R. A. Benfer was unable to cite figures as specific as those of Larry Manire (Director of Data Processing, Arizona State Museum - University of Arizona).

SUNY-Stonybrook, with 1000 hours computer time per semester, and the University of Wisconsin - Milwaukee, with 20-140 runs a week, are included in the group of high users. SUNY-Albany, with a $12,000 budget, also deserves placement in this category of users.

Ohio State, Stanford, Rochester, and possibly the University of Pennsylvania appear to have comparable levels with non-sponsored research usage running between $2,700 and $5,000 a year. It must be remembered that due to the variability in rate policy between the computer centers of the different institutions, no linear relationship exists between different departmental expenditures. The placement of the University of Pennsylvania in this category is based on subjective evaluation of the literature since no specific data was volunteered in either the letter or follow-up telephone call.

Arizona State, Temple University, Case Western, and the University of Florida are roughly comparable to the above mentioned groups. They all make consistent - if not high - use of the computer. The data received was not quantifiable.

Syracuse, University of Hawaii, and the University of Oklahoma use the available computer resources sporadically. However, they should be categorized separately from those universities where no usage occurs.

Table 2 indicates which subdisciplines monopolize computer resources at each listed institution. In seven schools, the computer-resources are used by all sub-disciplines relatively equally. Archeology and physical anthropology shared equal use in two schools. Archeology was, by far, the highest user in the two Arizona institutions, as was physical anthropology (biological anthropology) in two other schools. At three schools, social anthropology indicated the highest use. Table 3 summarizes this data.

The data compiled in survey precludes a statement about which subdiscipline of anthropology makes the most use of computer-resources. Therefore, this point should be stressed: There is no area of anthropology that is prevented by the nature of its subject matter from applying the powerful electronic aids offered by the various computer-resources.

DISCUSSION

Some redundancy or overlap of computer-oriented research was discovered in this study. Since possible prevention of such time-wasting duplication of effort was one of the objectives of this survey, these findings were of great interest.

Clues to the probable existence of duplication of effort in various institutions was stressed by Larry Manire. The application at Rochester of G. A. Collier's KIN-PROGRAM (Stanford) is a positive effort toward reducing unproductive redundancy

since similar types of research are being conducted at both institutions. It should be mentioned that both Stanford and Rochester have similar hardware and use the interacting text-editor WYLBUR system via remote terminals.

On the negative side, it appears that duplication may be occurring between the University of Florida and Rochester where current work is proceeding in linguistic analysis and dictionary formation. Apparently, separate programming efforts are in effect because workers in both schools apparently are not communicating with each other! Also, R. M. Hursh of SUNY-Albany and several graduate students are developing a system involving Ethnographic Atlas data which could possibly lead to a general purpose system for cross-cultural analysis. This could probably help Tom Evasce, a graduate student at Ohio State, who is programming data with Dr. Erika Bourguignon which is also based on the Ethnographic Atlas. We have informed Mr. Evasce of the SUNY research.

One of the distinctly disappointing aspects of this study is the apparent lack of research into novel applications of computer-resources to anthropology. In this regard, the University of Arizona is by far the most innovative. Their large, professional Staff is attempting to modify currently existing programs to the needs of the various departments and subdisciplines. However, most of the current work and applications of computer-resources in anthropology is in the traditional areas of data analysis. The necessary research to exploit analog applications to anthropology is apparently not being done; what is being done is work based solely on statistical manipulation. Innumerable non-statistical applications exist but exploration in this field

is apparently lacking in anthropology. Perhaps we should ask the question: where, in a time of retrenchment, does one apply for funding for this type of endeavor?

There are two areas of computer exploitation that are immediately available. The first is computer aided instruction (CAI). While many schools offer statistical training in which the computer provides the computational machine, the numerous existing programs which involve the interactive use of a terminal to teach statistics as well as other subjects is utilized at very few schools. Only one in this sample, Stanford, is making use of this available technology in its anthropology programs, and it is used for statistics!

The second area of use that could be immediately implemented is information retrieval (IR). While some schools use museum originated systems like SELGEM for information storage and for retrieval, no mention of broader bibliographic and literature search IR systems was found. Specifically, there is MEDLINE (National Library of Medicine), Lockheed's DIALOGUE™ (Plato Alto), and SDC (Systems Development Corporation) all of which offer on-line searches of many files supplied by secondary publishers such as Cumulative Index Medicus, Social Science Citation Index, Biological Abstracts, ERIC, and Science Citation Index. Lockheed's DIALOGUE™ currently offers access to 27 files.

EDUCATIONAL REQUIREMENTS

It is strikingly apparent that computer-resources are being applied to all subdisciplines of anthropology. Thus, it was assumed that educational requirements and course offerings, at least at the larger, doctorate granting institutions would be

shifted to meet needed skills in the future. Apparently, this is not the situation. Statistical methods and mathematical logic should become part of the standard curriculum of anthropology departments. In our sample only 5 of the 18 schools required statistical courses, computer programming or mathematics.

This is somewhat surprising considering the amount of use occurring and the level of mathematical skills needed in multivariate statistics which presumes knowledge of matrix theory. Game theory and complex simulation programs require at least some knowledge of calculus. Thus it would seem that if current students are being trained to meet future demands, their training should include these subjects.

CONCLUSION

This survey was unable to discover a significant amount of duplicative current research. However, it was found that SDC's SSIE file and Lockheed's FOUNDATION GRANTS AND FOUNDATION DIRECTORY files will soon provide this service. The present study did, however, indicate a trend towards increased traditional use.

Most advanced educational institutions have roughly comparable hardware and software. The use of this material rests on the skills and ambition of the individual. The majority of Anthropology Departments, with the notable exception of the University of Arizona, are not oriented towards computer-resources. The limiting factor seems to be the awareness and competence of the individual researcher. Those who are working with computers are for the most part, aware of ongoing research in their specialized fields. With the increasing popularity of

interdisciplinary approaches to specialized subjects, the computer may be a powerful tool to facilitate communication.

It was disappointing to discover that none of the respondents indicated any interest in developing innovative CAI programs for anthropological education. Only Stanford was using interactive CAI as a supplement to teaching statistics to those students who elected to take the course. Statistics is not anthropology, per se.

Equally disheartening was the fact that only 20 universities were able to contribute data to this survey. The remaining 84 schools either did not respond to the letter or indicated limited use of computers. Several non-respondents were personally contacted by telephone and/or at society meetings and also indicated that no data was available for this study.

FUTURE PLANS

A summary of this report will be submitted to the American Anthropological Association with a request that they appoint a TASK FORCE to compile more complete data and launch an educational program focused on the value of computers in anthropology.

Table 1. Alphabetical listing of schools included in this survey.

University of Arizona
Arizona State University
Brown University
Case Western Reserve
University of Florida
University of Hawaii, Maniloa
University of Missouri
Ohio State University
University of Oklahoma
University of Pennsylvania
University of Pittsburgh
University of Rochester
Stanford University
State University of New York, Albany
State University of New York, Stonybrook
Syracuse University
Temple University
University of Wisconsin, Milwaukee

SCHOOL	HARDWARE	SOFTWARE	USAGE	RESEARCH	CAI	RESPONDENT
Albany	UNIVAC 1110 DCT 500 terminal in department	Full	$12,000/annum Biological	Cross-cultural studies DA	None	Thomas Mercer Hursh
Ohio State	IBM 370	Full	$1500+/sem All	DA Cross-cultural studies	None	Micheal W. Gendler
Pennsylvania	IBM 370 Departmental terminal	Full	Full All	DA	None	Francis E. Johnson
Florida	(na)	(na)	Regular All	Linguistic	None	Paul L. Doughty
Case Western Reserve	UNIVAC 1108 PDP II in Biometry NOVA mini in anthro.dept.	Full	Moderate Phys and Arch	DA	None	Pete E. Lestrel
Hawaii	IBM IBM 2741 terminal in bldg.	Full	Sporadic Arch and Phys	DA	None	Michael Pietrusewsky
Syracuse	IBM 370/155 IBM 360/25 PDP 10	Full	Little or none Physical	DA	None	Mark L. Fleischman
Pittsburgh	DEC-1077	Full	500 jobs/annum All	DA	None	Allen L. Tan
Stonybrook	UNIVAC 1110 SPECTRA 70/6	Full	1000hrs/sem Social	DA(Data Analysis)	None	R. E. Gardner
Temple	CDC 6400 (2)	Full	(na) Social	Gaming Simulation	Supplementary	Henry A. Selby

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SCHOOL	HARDWARE	SOFTWARE	USAGE	RESEARCH	CAI	RESPONDENT
Arizona	CDC 6400 DEC 10	Full	High Archeology $28,000/per annum	Information Storage/retrieval and processing	Supplementary	Larry Manire
Stanford	IBM 360/67	Full	$5000/yr All	KINPROGRAM -G.A.Collier	Interactive (stat)	George A. Collier
Missouri	IBM 370/185 Calcomp plotter UNIVAC interpretor 029 Keypunch	Full	High 2nd or 3rd on campus All	DA	None	R. A. Benfer
Arizona State	UNIVAC 1110	Full	Intermediate Archeology	DA	None	S. W. Gaines
Rochester	IBM 360/65 Calcomp plotter Departmental terminal	Full	$2700/yr Social	DA Linguistics	None	Robert S. Merrill
UMW	UNIVAC 1106 UNIVAC 1110 Arch lab plotter	Full	20-140 runs/ week All	DA	None	Ralph W. Alexander

Table 3. Usage of the computer by the subdisciplines of anthropology.

Subdiscipline			
Archeology	Biophysical	Sociocultural	Linguistic
[1]Arizona			
[1]Arizona State			
Case Western	Case Western		
Hawaii	Hawaii		
Missouri	Missouri	Missouri	Missouri
Ohio State	Ohio State	Ohio State	
Oklahoma			
*Pennsylvania	*Pennsylvania	*Pennsylvania	*Pennsylvania
[2]Pittsburgh	[2]Pittsburgh	[1]Pittsburgh	
*Stanford	*Stanford	*Stanford	*Stanford
[2]Albany	[1]Albany	[3]Albany	[3]Albany
*Stonybrook	Stonybrook	Stonybrook	*Stonybrook
	Syracuse		
Temple	Temple	Temple	
Wisconsin	Wisconsin	Wisconsin	

* assumed

1 usage rank (highest)

2 usage rank (secondary)

3 usage rank (tertiary)