THE CHANGE IN TECHNOLOGY IN PSYCHOLOGY

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INTRODUCTION

Psychology is a science. It uses the Scientific Method, that is, come up with a hypothesis, test that hypothesis, modify the hypothesis and so on.

If you are doing Physics, for example - measuring current through a fixed resistance; for a given current through a given resistor, the voltage across the resistor will ALWAYS be the same. Unfortunately it doesn't work this way in Psychology. In Physics, the electrons passing the current ALWAYS act the same. But ask 10 people what their favourite food is and you will get 10 different answers. To establish what is the most favourite food, you have to ask hundreds of people and then apply statistics to get the result "For the sample population tested, the favourite food was icecream, with a probability of error of 10%"

People don't act like electrons! Thus devising Psychological experiments is very different from say, Physics experiments. Psychologists are often looking for small effects in large data sets.

AIM

The aim of this talk is to show how the technology behind Psychological experimental apparatus has changed in the last 15 years, and therefore how the nature of technical infrastructure and staffing has also changed. The implications of this technology shift for the future in Psychology and other disciplines will also be discussed.

TECHNOLOGY IN EXPERIMENTAL PSYCHOLOGY

Some types of Psychological testing that need experimental apparatus are:
      Perception
      Physiological – GSR (Lie Detector)
      Brain function (Cognition) - Reaction Time Experiments
      Behaviour - Animal Experiments

Examples of Technological Change
      Physiological Measurements
      Rat Behaviour Experiments

Examples of experiments done now completely using a computer program
      Image Display
      Timing
      Spinning Disks
      Tachistoscope
      Muller-Lyer Apparatus
      Voice Operated Relay

REASONS FOR TECHNOLOGY CHANGE

The nature of the apparatus used in Psychological experiments has changed, mainly due to the advances in electronics and computing. A time line from 1930 to 1990 shows a decrease in size, a decrease in cost and an increase in complexity (number of logic units).

COMPUTERISATION

From 1930 to 1980 advances in electronics meant that the size and power requirements became smaller. However, the real breakthrough came with the introduction of the microcomputer chip and from that, the desktop PC. This meant that:

      Complex hardware was replaced by simple hardware, with the complexity being implemented in software.

A good example of this is the "Stress-O-Meter". The electronic interface essentially exists of a digital to analog converter and a voltage comparator. The total cost of the unit is about $100, including labour. The software to run the hardware comes to about 200 lines. Obviously, if there needs to be a change, only the software needs to be modified, a very much easier task than modifying the hardware.

But an even better example is the Voice Operated Relay (VOR). Nowadays, no extra hardware is needed, everything being provided on the sound card that is shipped with every PC. Software is used to look at the digitised sound that comes into the card, averages this digital stream, and if the average is greater than a preset limit, fires off a Windows event to tell a waiting program that the sound threshold has been exceeded. The hardware for the VOR used to cost around $250, and the experimenter had to lug around a bulky box, an interface box, leads, power supplies etc. Today, the experimenter merely plugs a microphone into their laptop and runs the program.

Further, there are programs that are designed specifically for an experimenter, with little training, to setup relatively simple experiments for themselves. Examples are Eprime, Superlab and DMDX.

Companies such as National Instruments have packages to graphically set up data acquisition and control (LabView)

And there are stand alone simulation programs such as "Sniffy the Rat".

Analysis is generally done by the experimenter. There are specialised programs such as Statistical Package for Social Sciences (SPSS) and even MS Excel

STAFFING CHANGES

Naturally, the change in technology has changed the nature and number of technical staff.

At UNE we have a medium sized School - about 18 academics. In 1990, the School foresaw a need for a computer person and I was hired. At that time we had effectively four other full-time technical people. The job mix was something like:

Professional Officer	- Technical coord, PDP11 operations
Technical Officer	- Animal house, Audio Visual, Presentation Graphics
Technical Officer	- Electronics and Computing
Technical Officer	- Electronics and Mechanical

Since 1990, staffing has changed, partly by attrition, but mainly by the change in technical requirements.

Today we have:

Computer Systems Officer	- Technical coord, computer programming & support
Senior Technical Officer	- Audio Visual, Pres Graphics, Computer Support
Technical Officer (Part-time)	- Computer Support

This is essentially a loss of 2 ½ technical places.

So the change in technology means that
1. The type of technician has changed – now the emphasis is on computing, whereas in 1990 it was on electronics.
2. The number of technicians is less

How do we survive?
- We outsource some of our Computer support and any electronic/mechanical construction.
- No electronic design has been needed in the last four years. We either buy ready made products or build up interfaces from kits.
- All of us are capable of carrying out trivial tasks such as soldering, cable manufacture, etc.

FUTURE TRENDS

From a quick look around UNE and also on the Internet, the trend to computerisation, and thus the lessened need for traditional technical support is obvious. This trend is not only affecting Psychology, but most other disciplines. In Psychology, some universities no longer have any technical staff employed. Temple University in the US is one of these. All technical support is outsourced.

The increase in computing capacity and sophistication in data acquisition equipment presents new opportunities for Psychological research and therefore the need for technical support. Behavioural Genetics is a relatively new field where enormous amounts of computer power are needed. Examination of brain function using both MRI scans and electro-potential mapping produces enormous amounts of data. Technical staff are needed to set this type of equipment up, calibrate it, run it and ensure that the data being acquired is valid and free from artefacts.

There will always be a need for some technical support in Psychology.
For example:
- Large Animal Houses will always need technicians/lab assistants.
- Experiment generator programs such as DMDX are not tailored to do everything and there comes a point when it is easier, and more flexible, to write a computer program from scratch.
- And of course, there remains the need for someone to arrange outsourcing both for new projects and breakdowns, or even changing the laser printer toner cartridge.

However most technical support people will almost certainly need to be skilled in computer support and perhaps computer programming. Naturally, they will also have a good understanding of the discipline in which they are working. To be able to carry out these tasks, I believe that technical staff of the future will need formal qualifications in not only Computing, but also in the discipline in which they are working.

I also believe that the need for people with only technical trade qualifications will be less. To ensure future employment, these people should seek some computer qualifications. Doing so should also mean that work will be more interesting and also more varied.

I welcome your comments on my view of the future.

Thank you.