The Context of System Development

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ABSTRACT

This paper uses several different instruments to survey students in Hawaii, representing both Asian and US origins. The results indicate that acceptance of technology correlates most directly with gender, father's education, and area of national/cultural origin, in contrast with measures of interest in media, acceptance of newness and new people, and concern about public issues. These results suggest that old conceptions concerning what drives the growth of technology are incomplete, and that we must include attention to belief systems or mindscapes. Doing so leads us to adopt a cyclic epistemology, described by Maruyama and discussed as the dialectic by Hegel, as a better way of understanding how technology is appropriated in response to needs.

INTRODUCTION

Theories that relate to the acceptance of technology (e.g. Herbig and Palumbo) tend to discuss the issues of media, leadership and networking. Although these processes are important in the acceptance of technology, it is proposed that epistemologies as measured by belief systems or mindscapes also play an important part in the acceptance of technology. Epistemology also provides a broader understanding of the context of system development.

Epistemology is the basis for knowing. Here, we study the division of epistemology into four different types as defined by Maruyama (1994). The four types are the H-Type that looks at the world through a hierarchical approach, the S-Type that sees the world as cycling indefinitely, the I-Type that sees the world as made up of facts that are unrelated and free-form, and the G-Type that views the world as cyclic but able to change and improve.

I would like to expand the meaning and understanding of the cyclic epistemology by calling it contextual epistemology. This is a slight change in emphasis but it develops a better understanding of the relationship it has to the hierarchical epistemology. Cyclic refers, in fact, to the rooting of the epistemology in the context. The changes in our surroundings over time are regarded as cycling and not really changing. The context is the stability in the processes of change, which is what we

Figure 1. The epistemology spectrum.

mean by cyclic epistemology. Calling this contextual produces a broader concept of the place of this epistemology in the thought and recognition processes.

The term 'contextual' allows us to discuss this problem on more philosophical grounds. For example, Wittgenstein discussed the problem of philosophy as a problem of language. The language we use is contextual, and not hierarchical, as some Western philosophies would require. The Symbolic-Interactionist social theorists (Meade, 1934) discuss this same problem. All our meaning is contextual and nothing has meaning (including our selfhood) outside of the context.

Similarly the holistic approach expresses doubts that all problems can be divided up, in a hierarchical way, and thus solved. According to this view, we should not always look for solutions in parts. Of course, it is exactly here that the Yin and Yang meet Western philosophy (Tzu, 1995).

The contextual epistemology that I have hypothesized is still an Eastern epistemology, and is contrasted with the hierarchical epistemology of the West. The G-Type of Maruyama accepts creative possibilities in the midst of the never changing cycles or the context of life. This is really a combination of the two epistemologies. The contextual epistemology provides the base and the hierarchical allows for change.

All of this discussion states the importance of epistemology in the acceptance of newness and the development of new ideas. There is every reason, then, to test these concepts against each other with some kind of survey.
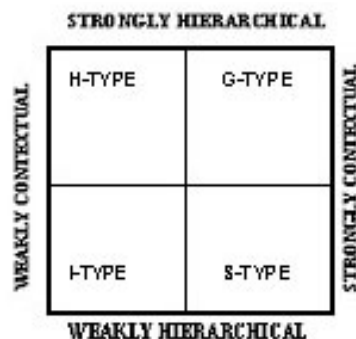
THE SURVEY

The tests I used to study these issues included the Harvey-Gore Belief System test, which measures concepts similar to the epistemologies of Maruyama (1980). Maruyama testifies to the similarity between the systems of Harvey and the mindscapes to which he is referring.

To determine the relationship between acceptance of new technology and epistemology, I administered a survey to students studying in the Honolulu area. The survey compared their claimed acceptance of technology with the results of the Harvey-Gore Belief System test. To compare with other factors, I included the Inkeles and Smith Modernity Scale, which measures interest in media, acceptance of newness and new people, and concern about public issues. This should measure the issues that we ordinarily consider as important in the development of technology.

The survey also asked a series of demographic questions, especially ones that were considered to be related to the acceptance of technology. This part of the survey was extremely successful as most subjects answered all of the demographic questions.

The fact that we had a good response from our demographic questions, appears to be related to the character of the Harvey-Gore scale questions. These questions are quite personal. But they are set up in a Likert-like scale so that the person does not have to state an opinion specifically, only generally. By the time the demographics are reached in the survey, the subject has already answered a number of very personal questions.

THE POPULATION

The survey was taken at the University of Hawaii and the Hawaii Pacific University. Both universities are known to have a very diverse population. There is a difference between the diversity at the two universities. Hawaii Pacific University has a large number (in the range of 30%) of students who were born outside of the United States. Most of these students are from Asia, where they were born and raised. Hawaii Pacific University was their first experience in the United States. Although much of the population of students at the University of Hawaii is of Asian decent, most of them were born and raised in Hawaii (in the United States). These, then, are two unique populations.

The population also included a variety of majors, ages, year in school, and an even split in gender. The survey was taken in a number of different classes including computer science, sociology, and business. I also handed out surveys at cultural organizations at Hawaii Pacific University and the University of Hawaii. The combination of both lower and upper division courses led to a distribution of ages and year in school results.

RESULTS

The survey indicated strongly that neither the Modernity Scale results nor the Harvey-Gore Belief System Test results were related to the use of technology. The demographic issues seemed to be far more important. This is in contrast to the theory envisioned.

Age groups were defined in order to divide the total population into reasonably equally-sized groups rather than merely controlling by individual ages, which might be populated with rather small groups in particular years. The age range of the respondents was from 18 to 56. I chose to use the break points <21 for group 1, <24 for group 2, <32 for group 3, and the rest into group 4. This divided the population into four equal groups. The use of technology showed a significant difference for many of the technologies we were studying. In most cases, the older the person, the greater the use of technology. The technologies with the greatest level of significance for different ages were the spreadsheet and the facsimile.

With all the technologies that were affected by the father's education, it appears that the use of technology increases with greater education of the father. The particular technologies that showed this trend were laptop computers, facsimiles, and the Web. Where correlations were significant between father's education and technology use, those correlations were always positive, meaning that the father's higher education increases the acceptance of technology.

There was less effect on technology use when controlling for the mother's education than for the father's education but, where there was an effect, it was the same as with the father's education; that is, higher education appeared to result in greater use of technology.

Social class was not a consistent determiner of the use of technology. The direction of the correlation of social class and technology use was always positive, although not always significant. The social class of the least use of technology, in the cases where technology use showed a significant difference, appeared to be the lower to middle class. The social class of greatest use appears to be the lower class or, in some cases, the upper class. There is a difficulty here, caused by the fact that most respondents listed themselves in the middle class, and the other class designation groups are very small in size.

In relationship to national groups, only three technologies did not show any level of significant difference in technological acceptance: CD players, word processing, and digital camera. All other technologies showed significant differences in use, at least at the .05 level of significance, between national groups. In a large number of cases, the differences were marked by what appears to be a higher acceptance of technology by the students from the Chinese centers (Hong Kong, Taiwan, and Singapore). These students have an extremely positive attitude towards technology.

CONCLUSIONS

The need for information is a contextual process. Before the printing press people were satisfied with the little information they had

Figure 2. The spiral of technology need/use.
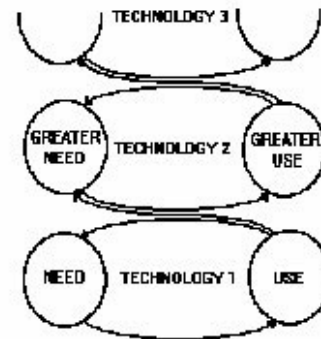
because they knew nothing else. With the Web, we have a dramatic increase in the amount of information available. If there were no Internet, or if I did not know it existed, then such information has no value to me. But once I know about the Internet, and see a need for some of the information that comes in that form, my relationship to that technology will cycle from need, to use, to need, and grow.

The father's education differences, the gender differences, the age differences, and the lack of class differences tend to indicate a need function rather than economic function in the growth of technology. The lack of significance in either the Harvey-Gore or the Inkeles and Smith scales indicates that the old conception of the growth of technology is flawed. Herbig and Polumbo (1994) list the criteria for innovation. These include applicability, profitability, and affordability. These can be summarized into the concept of need/use (Figure 2). The use is contextual and the need is hierarchical. This is definitely a spiral. The spiral goes on indefinitely, shown here by cropping the upper bubbles.

It is obvious that new technology efforts need to be tied to the needs of those for whom the technology is aimed. The acceptance of one level of use based on need can be used as a starting point and stepping stone in developing further need from the need/use cycle. An innovation that is not needed in this kind of relationship with use will not be accepted or the acceptance will be minimal.

The process of development in technology is reminiscent of the development of texts in their cultural milieu. Gunkel (1917) tied the development of texts to the concept of *Sitz im Leben* which means the place in life of the texts either as spoken or written words. This process was a result of efforts to recognize a transcendental basis of the texts of the past by using the hierarchical methods of science and philosophy to interpret those texts. The concept *Sitz im Leben* means that the meaning and process of development of the texts is from the context - the *Sitz im Leben* - where the text was developed and adopted.

As Wittgestein remarks, the foundations of the language game are not in the language game. Also the foundations of textual validity are not in the text, but in the context. The transcendental of texts is the context - the *Sitz im Leben*.

We have a similar process in the development of technology. The technology should no less grow, change, and develop out of the *Sitz im Leben*, or place in life, that surrounds that development. Again, the context is the transcendental that informs the development.

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