# Design Production and Appreciation with Computer and Internet

## Evolving Phenomena of Design Review in CAD Studio and Internet-based Competition

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*This study intends to investigate some evolving phenomena of the interaction between design production and appreciation in the environment of computer and Internet. The result of this study indicates that the interaction between design production and appreciation during the review processes could differ significantly. The design production and appreciation seem to be more linear in CAD studio whereas more cyclic in the Internet environment.*

***Keywords:*** *CAD Studio; Internet-based competition; design review.*

## Introduction

Architectural design has been changing because of the vast and creative use of computer in different ways. From the viewpoint of designing itself, computer has been used as drawing tools in the latter phase of design (Mitchell, 1977), presentation and simulation tools in the middle phase (Liu and Bai, 2001), and even critical media which triggers creative thinking in the very early phase (Maher et al., 2000). All the various roles that computer can play have been adopted in a number of professional design corporations and so-called computer-aided design (CAD) studio in schools worldwide (Kvan, 1997, 2000). The processes and outcomes of design have been continuously developing to capture the movement of the computer age. However, from the viewpoint of social-cultural theories of architecture, the evolvement of design cannot be achieved solely by designers or design processes. Any new idea of design can be accepted socially, culturally and historically only under one condition: The design outcomes could be reviewed and appreciated by critics in the field at the time of its production (Csikszentmihalyi, 1988; Schon and Wiggins, 1992; Liu, 2000). In other words, aspects

of design production (by designers in different design processes) are as critical as those of design appreciation (by critics in different review processes) in the observation of the future trends of architecture.

Nevertheless, in the field of architectural design with computer and Internet, that is, so-called computer-aided design computer-mediated design, or internet-based design, most existing studies pay more attentions to producing design in design processes as mentioned above. Relatively few studies focus on how critics act and how they interact with designers in the review processes. Therefore, this study intends to investigate some evolving phenomena of the interaction between design production and appreciation in the environment of computer and Internet.

## Observing CAD studio: A qualitative analysis

### Observing environment

To gain a better understanding of the media used duringw design presentation and how designs are assessed, the study intends to research the real

presentation made by visual and verbal media to present conceptions to reviewers. Besides the weekly reviews, design presentations with several critics were held in four months. And an analysis of a selected review case was made. The possession of excellent design skills, were the main criteria used in selecting the designers for this phase of the study. Abundant teaching experience and excellent communication skills provided the basis for the selection of reviewers. The following categories were used to observe:

- Visual media: 2D drawings, 3D models and digital media.
- Verbal media: including text and oral communication.

Review process: Video recorders were placed to record the review process, and included designers' presentation, the questions put to designers by reviewers, discussions between designers and reviewers, and the appreciations and critics made by the reviewers.

### Presenting media study

After the reviews, recordings of the three post-graduate designers — to be known as designer A, designer B, and designer C making use of design media to present their ideas were made: both visually and verbally. Facilitating to analyze the contents, two different categories of visual media-digital and conventional-were used.

In using conventional visual media, designer A relied mainly on the hand-drawn 2D drawing, while in digital media generally preferred computer models, digital graphics, and computer diagrams. In respect to verbal media, written documents were of average length, while oral communication tended to be much more copious. Designer B's preferred design tools in respect to conventional visual media were photographs, schematic sketches, and 3D models, while the digital design tools used were synthesized computer model images and images. Texts were of average length, but respecting oral communication, it revealed that designer B was unable to communicate a concrete description of his design conceptions.

Designer C made no use of conventional design media, preferring to rely exclusively on digital media, a list that included computer model synthesized images, computer synthesized images, and computer animation. Designer C's texts were of average length, but he made very little use of oral communication in presenting his design presentations.

After studying in four months, we induce media used by these designers: besides the visual media in designer A's presentation, verbal media occupied a position of considerable importance. In respect to this latter tendency, verbal means communications were sometimes even used as a substitute for visual media. Designer B relied mostly on visual media as a means of communicating ideas, while language-based media did not play a decisive role in the presentation process. Besides making use of the main architectural visual design tools, designer C demonstrated a fair amount of reliance on language-based media.

### Analysis of review process

Three principles were established to hunt a case from several reviews: designers and reviewers would be observed in one-to-one situations, observation time would be approximately the same for each observed case, and subjects be observed in environments that they were familiar with. These would thus enable us to analyze in detail. Moreover, we intended to gain more insight phenomenon into the inter-reaction taking place between the reviewer and the designer.

The review process undertaken by designer A: during the time he was describing the design concepts, the reviewer just interrupted to ask; it seemed that he took objection to the design concepts After the designer answered these questions, the review process came to an end. Designer B's review process lasted 6 minutes and 4 seconds: after explaining his design concepts, the designer answered a number of questions, then the reviewer gave the designer quite a lot of advice. The designer asked the reviewer a number questions. The reviewer answered them then the review came to the end. Designer C described his design concepts, and the

reviewer drew a number of conclusions then began questioning the designer. After the designer answering these questions, the reviewer provided a fair amount of advice to him, and the review process came to an end. Figure 1 provides models depicting the review process.

In the six minutes for designer A's review, verbal media had a crucial role to play. And over 50% of designer A's review process time was taken up by discussion, so the degree of inter-reaction between reviewer and designer being pretty high. Visual media played the most important role in designer B's review process and 50% of his time was taken up with design presentation. Discussion constituted 35% of the over-all time, so the degree of inter-reaction being reasonably high. In designer C's review process, visual media design presentation and language-based media played a more or less equal role. Close to 25% of his time was taken up with design presentation, with reviewer assessment occupying 75% of the time. The degree of inter-reaction was not high.

## Internet-based competition: A quantitative analysis

### Observing environment

The 2000 Far Eastern International Architectural Design Awards held on the 30th of September in the year 2000 is the subject of this case study. The competition was open to participants from all over the world, and the main theme of the competition was the use of digital media as a means of assessing digital design in the computer and network age (Mitchell, 1994).

The competition was broken down into three differing stages, with the final stage ending on December 3rd when a list of winners was announced. In the first stage, participants were required to present their design work on the Internet. The rest of this first stage was taken up with the assessment of design work, awarding points, and critical commentary-activities that were also conducted entirely online. As participants needed to present their design work in a
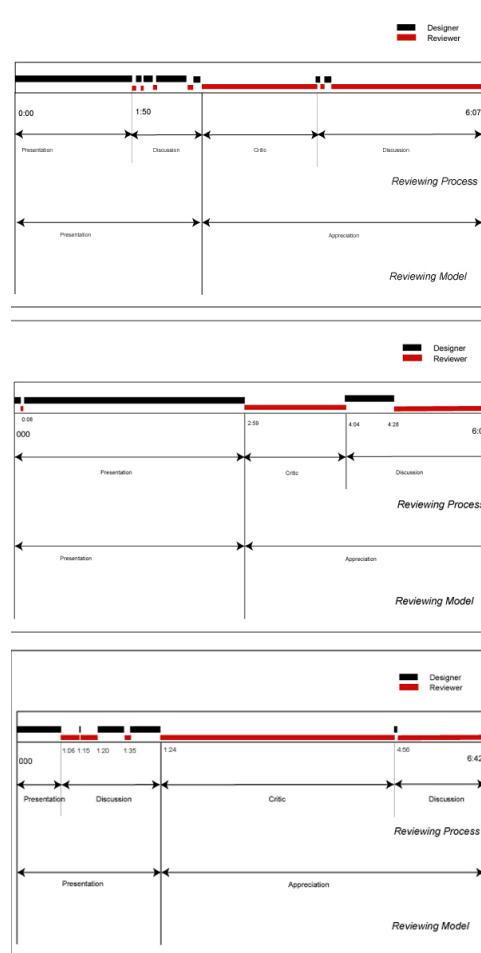


*Figure 1. The review process of designer A, B, and C.*

format that would be compatible with the demands of web page design. By increasing the degree of interaction allowed by the human/software interface, such skills helped to ensure that a better understanding of the contents and essence of the work presented was arrived at (Dave and Danahy, 2000). In order to overcome the limitations of web-bandwidth,

in the second stage of the evaluation process, contest contestants were asked to copy their design work on to a CD ROM and then send it to the reviewers. There have already been several studies published researching the relationship existing between students or teachers in virtual design studio (Chen, 1994; David and Zimring, 2000; Kvan, 2001). In this study we hope to gain further insight into the differences existing between the work of traditional design houses and the means by which Internet-presented design work is assessed. For this reason it will focus on that aspect of digital design found expressed in the first stage of the evaluation process, and will collect data and provide analysis in respect to the behavior of the reviewers in awarding points and evaluating design work.

After recording a log in, the system then listed the hyper links of the contestants and the design work of the contestants, and at the same time it recorded the date and time of the log in: time of log in indicated the time the reviewer began the evaluation process. Every time a reviewer connected with another hyperlink system the time and date of the link-up were recorded, and in this way showed that the reviewer had been looking at the work of other designers. In the same way, every time points were awarded, reviewer identification code and design work serial code—as well as the number of points scored, and times and dates—were recorded. In this first stage of the evaluation process 23 reviewers were given the responsibility of judging design work submitted by the 216 qualified contestants. Because of the limited time available, it was thought necessary to divide the reviewers up into teams of eight members, with each team responsible for the work of 20 to 30 contestants (each member of the team would evaluate the work of every contestant), so that in this way every work would be judged by at least five reviewers. Record the evaluations made by every reviewer including the number of points awarded, and then use this information to analyze the on-line behavior of the reviewers.

### Analysis of reviewer behavior

Collate all of recorded data and then draw up on-line, evaluation time, distribution figure, as seen in figure 2. The rhomboid shaped symbols indicate the time the reviewer began his or her evaluation, the triangular shaped symbols indicate the time when points were awarded to the same design work (same value on Y axis). The distance between these two symbols indicates the time spent on evaluation, the greater the distance the longer the time. If other rhomboid symbol appears anywhere between the time of evaluation commencement and the awarding of points, this means that the reviewer looked at the work of other contestants before awarding points. The way in which the management system allowed the movement to and from other hyper-links demonstrates one unique aspect of the Internet, and as can be seen in figure 2-B, 2-C, and 2-D. On the other hand, figure 2-A is more representative of the behavior allowed by conventional means of evaluation, in other words the evaluation is made without first making on the spot comparisons with other works.

From the analysis made of the results it could be inferred that four main patterns of behavior existed in respect to evaluation behavior: The first type was one in which points were awarded without the reviewer first looking at other work. This type of behavior is more in accord with the type of behavior seen in conventional contests: once the content of the work has been evaluated, points are immediately awarded. The second type was one in which the work of other contestants was observed before points were awarded to the work being evaluated (see figure 2-B). This type of behavior is one which utilizes the unique hyper-link system offered by the World Wide Web, one in which the various contestant can be evaluated as a single group, and one in which on the spot comparisons can be made so as to better judge the good points and bad points of individual works before points are awarded. The third type of behavior was one in which on the spot comparisons of all the work exhibited or in the group of works designated to
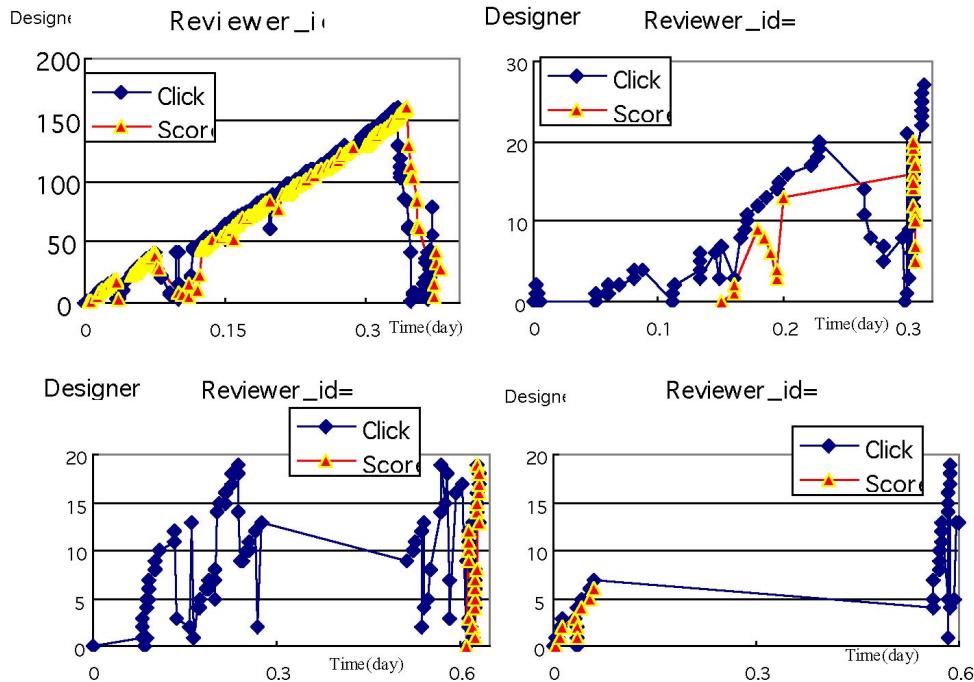
*Figure 2. Internet evaluation time analysis figure: (a. top left) See One and score one,*

*(b, top right) See more and score more,*

*(c,bottom left) See all and Score all, and*

*(d, bottom right) See one score one and see all.*

the reviewer was made before points were awarded (see figure 2-C). As with the second group, this type of behavior shows a willingness to make use of the special characteristics of the Internet. However this type of behavior suggests that the reviewer(s) believed that all of the work on display had to be seen before an accurate assessment could be made. The fourth type of behavior pattern was one in which points were awarded before looking at the work of other contestants, but after this assessment was made the work of other contestants was viewed (see figure 2-D). This behavior is similar to the first type of behavior in that it resembles the behavior patterns of reviewers in conventional contests. However, it is note that although the viewing of other work did not influence the number of points awarded, the special characteristics of the Internet did lead to a change in behavior patterns. Moreover, it seems that the degree

of inter-reaction existing between the system of displaying works and the reviewer encouraged the reviewer to spend more time comparing different works. This kind of inter-reaction is equivalent to the inter-reaction of two people communicating with each other on-line, generally helps the reviewer to better understand the work being assessed (Nakakoji et al, 1998). Not included in this study, was research into the behavior patterns of reviewers in examining individual works, research that could be undertaken by researchers in the future.

## Conclusion

The result of this study indicates that the interaction between design production and appreciation during the review processes could differ significantly. The review processes could be either linear or cyclic due to the influences from the kinds of media, the

environmental discrepancies between studio and Internet, as well as cognitive thinking/memory capacity. The design production and appreciation seem to be more linear in CAD studio whereas more cyclic in the Internet environment. This distinction coincides with the complementary observations of designing as a linear process (Simon, 1981) or a cyclic movement (Schon and Wiggins, 1992). Some phenomena during the two processes are also illustrated in detail in this paper.

This study is merely a starting point of the research in design production and appreciation in the computer and network age. The future direction of investigation is to establish a theoretical model for the interaction between design production and appreciation based on current findings. The model is expected to conduct using revised protocol analysis and interviews. The other future research is to explore how design computing creativity emerges from the process of producing and appreciating.

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