



# Individual Behavioral Consistency in Virtual Communities

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## ABSTRACT

Compared to a traditional community, relational contact via computer-mediated communication (CMC) becomes the main behavior in a virtual community (VC). Consequently individual behaviors are different from that in real life. Previous studies on VC claimed contradictory impacts on individual behavior: some believed interpersonal relation became hokey in the community while others thought it became genuine. Therefore a question on individual behavior in VC arises: as the physical world changes to the virtual one, will individuals still keep their behaviors probabilistically consistent? Using individuals in online alumni associations as samples, we study consistency of individual behavior, i.e. whether individuals behave consistently across time in a VC; and the impact of the environmental stimuli on individual behavior, i.e. whether individuals behave differently in different VCs across time. Posted messages in the forum, including the posting frequency and message length, are chosen as the objective measurement of individual behavior in this study. The result shows that individuals still keep their consistency in VC activities, as in the physical community. However it is not so clear about consistency across VCs. This behavioral study provides a fresh approach to analyze individual behavior in CMC: firstly behavioral information is mined objectively, to avoid any psychological bias from subjective data; secondly it emphasizes on discovery of common behavioral characteristics from regular life, rather than seeking their internal causes.

## 1. INTRODUCTION

Research shows that people spend a large part, about 75%, of their lives in communication (Tubbs and Moss, 2000), which means individuals develop and maintain their inter-personal relationships during most of their life. As people communicate with one another, a community is developed simultaneously as the social relationships draw people together (Heller, 1989).

In CMC, communicators' main behaviors are moved from physical contact to the relational one via network, which consequently changes community characters. Some researchers believe that inter-personal relationships via CMC may be impersonal, hokey and illusionary (Heim, 1993; Stoll, 1995) while others assert that genuine communities are commonly developed via CMC (Parks, 1996; Rheingold, 2000). As psychological studies have claimed that communities influence individuals in them (Seidman, 1990), the above conflicting visions raise psychological questions on individual behaviors in VC: do individual behaviors become fluctuating in these VCs which consequently causes those conflicting conclusions?

Although the common consistency of individual behaviors in the physical society has been proved (e.g. Burger, 1990; Hjelle and Ziegler, 1992), such consistency has not ever been tested in a virtual environment. If it cannot be held in the computer world, CMC studies may face some doubt on the generality of their results, i.e., whether individual behavior in one particular experiment can be representative. Furthermore, from behaviorism's perspective, proving and understanding individual behavioral consistency in VC provides a theoretic foundation for predicting, and even controlling, behavior in it. Today, more and more people immerse in CMC as a main communication method and more businesses, especially those related to electronic commerce, are devel-

oping their B2C (business to customer) relationships online. Some companies build online forums to facilitate customer discussion about their product/service quality as part of their CRM (customer relation management) strategy. This study may help them understand more about customer behavioral regularity and adopt suitable online communication scheme to provide more customer satisfaction.

This paper aims to analyze individual behavioral consistency via CMC and is a research on psychological issues in VC. In the following sections, we introduce the research hypotheses and method after literature review. Then sample data is collected to examine such consistency, followed by the discussion and conclusion.

## 2. LITERATURE REVIEW

CMC studies put much attention on analyzing the different effects of computer-based media. A major theory is the media richness theory, Daft and Lengel (1984), which claims that media richness is an objective and fixed property of any communication media. However, researchers are also drawn to the psychological reasons for users to choose a medium for communication (Huang et al., 1998). Such psychological perspectives can integrate rational and social view of media choice and consequently affect user behavior and communication efficiency (e.g. Fu et al., 1998).

In community psychology (e.g. Orford, 1992; Duffy and Wong, 1995) and personality psychology (e.g. Burger, 1990, Hjelle and Ziegler, 1992), researchers focus on considering people within the contexts of social settings and systems, i.e., the community to which they belong. Lewin (1997) developed a widely-accepted equation to represent individual behaviors in context:  $B=f(P,E)$ . Behavior is a function of the person, the environment and the interaction between the two. Such claim of the interaction impact between the individual and the situation provides a theoretic motivation to consider the consistency of human behaviors in virtual communities: as the physical world changes to the virtual one, can individuals keep their behaviors consistent enough, which reflect their personalities?

Before going further, terms of personality and behavior should be further defined and clarified. Personality is a complex pattern of an individual as a result of the continual interactions among himself, his behavior and the external environment around him (Bandura, 1982). Most personality theory researchers believe that personality shows consistency across time and across situations (Hjelle and Ziegler, 1992). In other words, an individual's behavior patterns display probabilistic consistency across time and situation (Burger, 1990).

Behavior is what an individual is doing, which is observable by another person (Skinner, 1938). Behaviorism views behavior as the physiological reaction to external stimuli, such as Hull (1934), or immanent cognition, such as Tolman (1948). Since individual learning, or adapting, process occurred as a result of responding to or operating on their environments, behaviorists believe that individual behaviors are predictable and controllable as consistency leads to predictability. The assumption of the probabilistic consistency (Hergenhahn and Olson, 1998) of behavior is common in psychology studies.

### 3. RESEARCH HYPOTHESES AND METHOD

#### 3.1. Research Hypotheses

We focus on the text-based online-forum to study individual textual behavior in VCs while ignoring other factors, such as video, audio and so on. Therefore, an individual's activity in a VC can be described as follow: one logs in to a forum, browses and posts messages to share ideas with others, and then quits. As a result, posting messages is individual behavior in a VC. There is valuable information hidden behind it: the frequency of posting and the length of posted message represent an individual's immersion in that VC and in its topics; the time of a posting a message marks when the individual enters the community. Since un-welcome and outliers' messages can be deleted by the forum master, existing messages represent poster's membership and his influence in that VC. In summary, we consider the frequency and the length of messages as the characteristics of posting behavior to measure. The different forums an individual attends are treated as the different VCs: an individual faces different people and discusses topics that are usually different across forums.

We choose a large online alumni-association service provider in China, <http://www.5460.net>, which was founded in 1998 and had over 5-million members at the end of 2001. It mainly provides text-based forum, chat-room and album for classmates to communicate online. Each association is viewed as an independent VC. Since alumni association has many important and basic elements common to other types of VCs, such as web-page interface, posting mechanism, community leader, membership system, email information for asynchronous contact, and so on, choosing them as the subject will not affect the generality of the result.

Based on previous CMC and psychological studies on individual behavior in the community, we summarize two propositions. Concerning the consistency of individual behavior, we get proposition 1: individuals would behave consistently across time in a VC. Most personality studies agree that an individual's behavior patterns display some consistency (Burger, 1990). Although an individual does not always behave exactly the same in similar situations across time, such consistency still exists which describes what the individual will usually do in such a situation. Although not every one behaves the same way, what we expect is the consistent behavior patterns that may exist in the majority of the population. Furthermore, based on this consistency, the regularity of some individuals' behavior pattern, i.e. the time correlation of individual's behavior, can be predicted. Therefore, we make the following hypotheses:

- H1a. A majority of individuals' posting frequency would be consistent across time in a virtual community.*
- H1b. A majority of individuals' posting length would be consistent across time in a virtual community.*
- H1c. Some individuals' posting frequency would have significant correlation with time periods.*
- H1d. Some individuals' posting length would have significant correlation with time periods.*

Concerning the impact of the environmental stimuli on individual behavior (e.g. Skinner, 1938), we get proposition 2: individuals would behave differently in different virtual communities across time. Studies in personality psychology argue that there is some consistency in individual behavior across different situations. However in our studies, the alumni associations of college class, high-school class and primary-school class, mostly of different sizes, are also the chronological and distinguishing experience to the individual, which reflects his different growth stages. As personality is a life long development, individual behavior may be influenced greatly by age and consequently a person may behave differently across different alumni association across time. In this setting, the environment may play an important role on individual behavior. Therefore, the following behavior patterns are hypothesized:

- H2a. A majority of individuals' posting frequency should not be consistent across different virtual communities.*
- H2b. A majority of individuals' posting length should not be consistent across different virtual communities.*

#### 3.2. Method

To gather objective data, we gathered individual activity information in VCs without questionnaires or prior announcements. Therefore psychological bias occurring in subjective responses to surveys and controlled experiments can be greatly avoided and individual behaviors in VCs are natural. The data, including the message content, length, date and so on, are gathered from the web pages for future analysis. This behavioral study focused on discovering common behavioral characteristics from individual observable activities, not on seeking their internal causes.

We determine some basic criteria of choosing communities. First, to study active communities, a lower-bound requirement of its size is necessary. Here we choose forty, which is usually the minimum size of classes in China colleges. Second, the VC should have at least one master. Based on our pre-sample test of 50 associations, one of the distinguishing signs of inactive communities is that these do not have a master. Third, the community should be open to the public (the website allows the community itself to determine whether to open to public visitors). From a total of 214,504 registered associations, 1931 satisfy the criteria. Out of these, 324, i.e. one-sixth of them, are randomly chosen. In each chosen community, we randomly pick one individual to study, so altogether 324 individual samples are chosen. After tracing their postings, we find that only 225 of them are active in the community, i.e. posting more than one message. Out of these, 88 join more than one community simultaneously. As a result, 369 record sets of individual behavior in VCs over time are gathered finally. In these data, the average number of posted messages is 59.1, with a standard deviation of 80.8. The average word count of what each individual posts is 3607.0 words, with a standard deviation of 7855.0. The average membership duration of these individuals is 72.8 weeks, with a standard deviation of 39.9.

### 4. ANALYSIS

We compare the mean of each sample's posting frequency and posting length in the former half of his community life to the latter, using his / her posting frequency / length for each week. This is repeated using frequency and length for each month. Analysis is done with SPSS. Where a result shows there is a significant difference, it means that the individual's posting behavior cannot be viewed as consistent in a VC, and vice versa. Our analysis is based on 95% confidence, which is the traditional significance level used by psychologist (Burger, 1990). The results show that 68.8% (74.0%) of individuals do not show significant difference in posting frequency, measured weekly (monthly). 81.0% of individuals do not show significant difference in posting length either measured weekly or monthly. In summary, H1a and H1b are supported, i.e. a majority of individuals' posting frequency and posting length has no significant difference across time in a VC.

Based on this consistency, behavioral regularity, i.e. the time rule behind behaviors, can be predicted. Consistency does not necessarily lead to regularity, but is a precondition of it. Therefore, we cannot expect to find as much regular behavior as that of consistent one. But a higher percentage of regularity supports stronger behavioral consistency in a VC.

Here we consider two levels of regularity: daily and weekly. Daily regularity refers to whether an individual has behavioral patterns based on the hours of a day, as in our physical life where we commonly work in the daytime and rest at night. To check for daily regularity, we divide 24 hours of a day into eight segments from one am to twelve pm, each containing a 3-hour period. Data of individual posting frequency and posting length are summarized based on these segments to study the correlation between behavior and time segments. Weekly regularity refers to whether an individual has behavioral patterns based on the days of a week, as in our physical life where we work on weekdays and rest in the weekend. Similarly, data of posting frequency and posting length are summarized based on diurnal segments, from Monday to Sunday, to study the correlation between behaviors and these segments. Result shows that a large, though smaller, portion of the individual behavior show correlation with time periods. Based on 5% significance test, 32.0% (8.1%) of the individuals show significant daily (weekly) regularity of

posting frequency, while 32.2% (7.9%) of them show significant daily (weekly) regularity of posting length. It also indicates that individuals may be more regular in daily life in a VC. Like in physical world, people usually have a relatively fixed timetable for work, dining and rest in daily life, but they will face different events in a week so their activities in diurnal segments may be less regular. This similarity between the virtual and the physical community encourage us to consider the influence of physical world to the virtual one and the consistency of individual personality in both worlds.

To get insight on individual regularity in a VC, the correlations of their online behaviors with time are summarized: the average absolute value of Pearson correlation is 0.50 (0.38) on daily (weekly) regularity of posting frequency, and 0.49 (0.38) on posting length. As correlations ranging between the absolute value of 0.30 and 0.60 obtain enough practical and theoretical value in making predictions in personality research (Hjelle and Ziegler, 1992), this result shows a significant trend of behavior regularity in a VC. Also, 66.4% (58.0%) have greater than 0.30 absolute Pearson correlation on daily (weekly) regularity of posting frequency, with 65.3% (57.5%) on daily (weekly) regularity of posting length. In summary, H1c and H1d are supported.

Multiple VC participation occurred for 88 samples. They belong to more than one community simultaneously, varying from two to seven. They participate in a total of 223 virtual societies. Among them, 60.2% attend two communities simultaneously, which covers 48.0% of 223 communities, while the rest are even more active.

We compare the means of each sample's posting frequency and posting length, measured over weeks and months, across different communities. The result indicates that 51.1% (42.0%) of samples show significant difference in their posting frequency, measured weekly (monthly), in different communities, while 43.2% (33.0%) of them have significant difference in posting length, measured weekly (monthly). In summary, H2a and H2b are not supported as only some individuals, and not the majority of samples, behave differently across VCs. It is hard to claim whether individual behavior is inconsistent over virtual communities based on current data. From behaviorism's perspective, this result may be caused by insufficiently strong environmental stimuli, i.e. different online alumni associations in this study may not offer significantly different experiences to the individual. From personality theory's point of view, this result is natural: an individual's internal factors cause him to express same traits and to behave consistently over a range of situations. For example, diffidence may cause the person to be wordless in most cases. Study also showed that people would behave more consistently in low-constraint or weak-pressure situations rather than high-constraint ones (Monson et al., 1982). Since alumni association is such a free place for individuals to communicate, it is not surprising to find many samples behave consistently across various communities although these associations represent different chronological and distinguishing experiences to them.

## 5. CONCLUSION

This behavioral study provides a fresh approach on analyzing individual observable activities in CMC: firstly it mines individual behavioral information objectively and avoids any psychological bias usually occurring in surveys or controlled experiments; secondly it does not emphasize on seeking the internal causes of behaviors but rather on discovering common behavioral characteristics from individual's regular life.

By using individuals in an online alumni association as samples and collecting their activity information objectively from the website, we study the consistency of individual behavior and the impact of the environmental stimuli on it. Results show that individuals show consistency in VCs, as in the physical communities. However there is less evidence that such consistency exists across different VCs.

Behavioral consistency in VC is the precondition of further research on human behaviors and psychological issues in online behaviors. Without such consistency foundation, studies on VC may face some doubt whether individual behavior in one survey or experiment can represent his usual behavior, and lead to the problem of repeating studies to validate individual responses. This work provides a way to answer this

question in CMC. Based on this observed consistency in a virtual community, individual online behavior is predictable and controllable. Therefore, online business may explore further into customer behavioral regularity and adopt suitable online communication/ negotiation scheme to provide more customer satisfaction.

Because of the generality of our study, the result could apply to other forms of virtual communities, such as B2C electronic commerce, customer community and many other online CRM forms. As more companies are developing their online support forums as a part of their CRM strategy, to facilitate customers sharing comments and ideas about products and services, studying individual behaviors in VCs may help organizations understand, predict and satisfy members' sense of belonging to their communities.

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