Digital Opportunity: The Digital Gap between Openness and Closeness of Relational Divide Upon the Mobile Phone Usage

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Abstract: The possibility of communication nowadays depends fully on the usage of modern technology. Several digital divides exist with respect to mobile phone usage, and they further aggravate the interpersonal relationship. In personal connection, the availability of mobile phone users can be measured by several indicators, such as phone number sharing behavior and phone answering strategies. The mobile phone users also look over the necessity of using their mobile phone to communicate with others in daily life. The "dual availability" model distinguishes active/passive attitude and behavior of individual's calling and receiving styles. In the relational connection, the usage of mobile phone, which shows multiple dimensions, such as phone contacts, face-to-face contacts and spatial distance effects, implies the openness and closeness of interpersonal relationships. In our research, mobile phone use is a proxy of human behaviour as well as relationships, and it represents a digital opportunity for users to improve their relationship. With regard to the personal connections, caller effects show overwhelming dominations over either the

media use or relationship change, while the receiver effects show weaker influence. Unilateral relationship and network relationship are respectively influenced by personal and relational connections and consequently demonstrate different appearances.

Keywords: interpersonal relationship, contact, mobile phone, mobile communication, dual availability, caller, receiver

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1 Introduction

As the basic need of human beings, communication has always been the most widely practiced activity in people's daily lives. The reason is that human being is a kind of social animal, used to participate in community life. Within the community life, at each occasion of interaction, each person's status is organized by the location of time vs. space, by the network of position vs. distance, and by the closeness of the relationships. In other words, the interpersonal relationships and the reciprocal communication regularly

constitute the social life of human beings. For example, the consequences of the development of industrial society has demonstrated that no matter how complicated the industrial society is, it still needs to run within the physical proximity of individuals under a concrete setting.

The most significant feature of a society transformed from a traditional one to a modern one is that people's geographical location is no longer limited to a particular place and their social relationship is no longer bonded to kinship only. However, such transitions did not happen in just one night. Unquestionably, behind these transitions, there are a series of social developments proceeding simultaneously, such as communication-technology, governmental regulation, market mechanism and social psychological transitions. Based on these simultaneous transitions, people began to obtain power to shorten the spatial distance by way of transportation and communication. They even gain the power to overcome the constraint of time. Under these transitions, the original linkages of the fixed location in people's daily lives become fluctuant and movable. No matter what is going on, people are still inlaid with the needs of mutual linkages into the interpersonal relationship. Embedded in this circumstance, it is quite an urgent issue to investigate how to communicate with people who are constantly on the move and how these fluctuating mutual linkages spread out.

Nowadays, we can often see people talking on the mobile phone while walking down the street, or heading toward somewhere by bus, by car, by train, or by subway and, at the same time, reporting his or her location to someone else who is on the other end of the phone. These images seem to be able to answer the following questions: how can we maintain the constantly changing communication and interpersonal linkages and how can we utilize modern technology to reconstruct new forms of social relationships in modern days. In brief, it is the science-technology that helps advance the transformation of interpersonal linkages. Based on the combination of the technical and socio-cultural evolutions, the science-technology could increase spatial mobility and extend communication capacity. After the changes caused by usage of mobile phone, what consequences will emerge in Taiwan? Will interpersonal contacts be extended or be restrained? Will it cause a lot of changes in intimate relationships? Will it widen the spatial distance and still be able to retain the newly created form of interpersonal communication framework? Taking the usage of mobile phone as the focal point, this study intends to provide empirical evidences to clarify these research issues.

2 The Particularity of Mobile Phone Usage in Taiwan

2.1 *The Development of Mobile Phone*

According to the Main Telecommunication Index of 2002, Taiwan has the most significant usage of mobile phone. The penetration rate is up to 106.45% that year and ranks as the number one throughout the world. As stated by the International Telecommunication Union (ITU), in the sector of Information and Communication Technology (ICT), the Digital Access Index (DAI) of Taiwan ranks as one of the highest popularized areas with regard to mobile phones. In fact, Taiwan ranks as the third place of the Asian-Pacific area with 0.79 point (second only to South Korea and Hong Kong), and the ninth place of the whole world.[1]

2.2 Brief History of Mobile Phone in Taiwan

The earliest usage of the mobile phone in Taiwan was lunched in 1989. The government formally signaled the green light to the public use of mobile phone. However, the market was still restricted, most of the use of mobile phone at that time was for business use. Later, under the consideration of joining the World Trade Organization (WTO) as soon as possible, the government was forced to promote the use of mobile phone. Because one of the pre-requirements to join the WTO was: it must stick to the principle of telecommunication liberalization of WTO's "Basic Telecommunication Protocol." In addition, the government positively promoted the Asian-Pacific Operation Centre plans and the policies of fundamental construction of National Information Infrastructure (NII). This also drove the telecommunication liberalization of Taiwan promptly.[2] The most crucial policy of liberalization of telecommunication was the so-called "Three Laws of Telecommunication," which was passed in January, 1997. At that particular moment, it truly paved the way for energetic development of telecommunication industry in Taiwan.[2]

2.3 Popularization of mobile phone usage in Taiwan and Concerned Issues

Within a span of five years, the usage of mobile phone in Taiwan has been booming and already approached to the critical point that every one owns his/her own mobile phone. Under this circumstance, is the Taiwan case unique? Is it possible to detect the influences of the mechanism of technology transformation upon people's life? Unfortunately, there exists few empirical studies on mobile phone usage in Taiwan. Still, most of the available literature comes from the research results based on studies of Europe, Canada and Japan. In spite of great difficulty, this study intends to investigate some research assumptions of mobile usage in Taiwan based on a telephone survey data.

3 Literature Review

3.1 Mobile Phone as a Communication Media

Let's take fixed telephone as an example. After being introduced to the whole world, it links users of different geographical areas immediately. Further more, it breaks the restriction of traditional face-to-face communication and promotes the mutual linkages of separated communities. Most recently, the introduction of mobile phone has changed the idea of "location" into"personal." At the same time, it breaks all fixed geographical delineation. As a result, the original place-to-place communication tool is transformed to person-to-person, further, it fosters new interpersonal relationships and cultural forms.[3] As Wellman (2001) put it:

> *"... mobile phones afford a fundamental liberation from place, …Their use shifts community ties from linking people-in-places to linking people wherever they are. Because the connection is to the person and not to the place, it shifts the dynamics of connectivity from places--typically households or worksites--to individuals." (Wellman 2001).[4]*

Consequently, the usage of mobile phone makes it possible that the interpersonal communication be liberated from geographic sites. Communication or connection with someone is then greatly and immediately facilitated.

3.2 Interpersonal Interactions and a Sense of Spatial Distance

There are plenty of studies conducted in Japan and Northern Europe concerning the impact of mobile phone usage on the spatial structure, interpersonal relationship and cultural exercises. However, there are few studies related to social impact, a sense of time and space, and standard of interpersonal trust. That is, study focuses on "implications" [5] of mobile phone usage is still scantily. Indeed, mobile phones have many specific functions and capabilities to facilitate or inhibit various modes of social behaviors, social interactions, and social relationships. Also, it has the potential to create new environmental conditions, which allows conventional social systems to continue working without any disturbance.

3.2.1 Interaction and Spatial Distance

The interpersonal interactions are constructed by many interpersonal status and messages. It conveys huge impact on the adjustment of spatial distance among people. These influences directly decide the status of people's interrelationships. Spatial distance forwards strong messages toward interpersonal relationships. Meanwhile, they mixed up linguistic and non-linguistic messages when expressing people's intentions.[6]

3.2.2 The Situational Context of Conversations

"Conversations are the groundwork of any relationships."[7] Through visible or invisible ways, the contexts of conversation inform the listeners that "how do we treat the world and convince someone of that particular perspective." Conversation is not only an action in which one person transmits a message to another, but a situational context to create and manage the meanings. [8]

3.2.3 Mobile Phone Usage Penetrate Daily Routine Behaviors

As Ling and Yttri(1999) stated:

> "The adoption, in its most basic form, is to solve a specific problem, ex. happened accidents. In this situation the interaction is directed towards the intimate sphere and perhaps the representatives of institutions such as emergency services. As the use and ownership becomes more routine, it goes over to various types of coordination. [9]

The mobile phone becomes more deeply and more broadly adopted into people's daily life. Apparently, the use of mobile phone is no longer restricted to emergency purpose, but has extended toward routine behavior and daily communication. From this point of view, the adoption of mobile phone embedded the effect of technology onto everyday lives. The trend of the transition starts from the unexpected and extraordinary toward the expected and mundane. In brief, the more frequent the use of mobile phone, the more profound its impact on people's daily life.

3.2.4 Spatial Proximity and Relational Intimacy

In general, the spatial proximity is positively correlated with the closeness of relationship. The more proximate the spatial distance is, the closer the relationship between each other. However, mobile phone can be used to contain relationship and to manage daily activities. This situation creates different spatial distance from the era of fixed phone. In spite of the extended distance, it is still possible that people feel very close to someone who is physically far away from them. In a word, the use of mobile phone allows individuals to retain communicative contact and to maintain various social relationships even if they live apart from each other spatially.

3.3 Social Effect of Media Usage

Sometimes, people use media to cooperate or to fulfill their social need. For example, people want to get in touch with someone and be connected with the society. People intend to use new media of interaction to keep contacts or expand new social contacts. For instance, using telephone to maintain associations with friends and family members for a longer time, to maintain daily contact with colleagues, and to keep daily contact with intimates, even from a long distances away.[10]

In his famous book,《UNDERSTANDING MEDIA：The Extensions of Man》[11], Marshall McLuhan (1964) mentions that "This is merely to say that the personal and social consequences of any medium—that is, of any extension of ourselves— result from the new scale that is introduced into our affairs by each extension of ourselves, or by any new technology". He points out that every time when we use a medium, it means the extension of ourselves. In other words, everyone embodies the image of himself each time when using the media. Especially, we can tell the effect of the new technology by observing the process of popularization of the mobile phone. The way to maintain and to establish relationship is changing rapidly. Therefore, it is necessary to have new concept of analysis and new method to explore and explain such a new phenomenon.

The social effect emerges from the choices and the management of the use of media. Media choice theory (Fulk,et al,1987) [12] can be differentiated into two sub-theories. One is Rational Choice Theory, and the other is Social Influence Theory. These two theories were applied to the main category of the interpersonal communication in daily life. Here we only focus on the latter.

Social Influence Theory: It comes from the social learning theory and social information processing theory. According to the social information processing theory, Fulk(1900,1993) [13] considered that social factors(i.e., organization, position, and interpersonal network) would affect people's aesthesia, attitude and use of the media, even the choice of the media. Here, social factors denote the attitude and behavior of employer, colleague in work place[14], peer group and intimate in school and they also have both positive and negative effects on individual's choice and use of media.

4 The Characteristics of Mobile Phone

4.1 Mobility

The significance of mobile phone lies in the fact that it enables people to engage in communication while at the same time keeps them free from the constraints of physical proximity and spatial immobility. Moreover, as for the impact of mobile phone upon social relationships, the function of mobility creates a sense of always being together with each other and it is the most important sense of attachment in modern society.

4.2 Availability

In the past, the need to maintain contact is the main consideration to use telephone [15] In contemporary society, more and more segregation and unknowable demarcated lines drawn among people make communication become more and more difficult and uncertain. The availability of mobile phone fit right in with people's need in keeping contact with each other. Given the ubiquitous availability of the mobile phone for sending and receiving calls, it is reasonable to expect that it will make phone conversation more similar to face-to-face communication.[16] To receive a call may in itself be considered as a sign that one has not fallen into complete oblivion, regardless of what is actually communicated.[17] In short, the availability of mobile phone not only facilitates interpersonal contact, but also creates a sign indicating the mutual-confirmed relationship to each other .

4.3 Dual Availability

As far as a mobile phone user is concerned, he has two kinds of identity, caller and receiver, at the same time and these two identities in turn has its own availability. With regard to this, it is essential to distinguish the behaviors of the caller from those of the receiver. The caller and receiver are both surrounded by the dual availability, but the dual availability must correspond with the quality and quantity of social contacts. Just like all the other communication media, mobile phones complicate the social world of individuals by creating many new decision dilemmas associated with "availability management." For example, this could be achieved by pondering when to turn their phone on or off, and whether an incoming call shall be answered immediately or sent to the voicemail system.[17]

4.4 User and Non-user of Mobile Phone

What is the difference between "user" and "non-user" of mobile phone? There is a very good explanation: "If you don't have a mobile phones, it means that no one depends on you for urgent direction, and no one needs to get in touch with you at all times. It means you are not cutting deals, giving orders; in short, not getting around all that much."[18] This reflects the relationship between an individual and others. The stronger the linkage, the more often one will take the initiative and begin communication to ask for resource.

4.5 Transformation of Interpersonal Relationship with the Use of Mobile Phone

The mobile phone is especially useful for making short-term, just-in-time adaptations to unpredictable changes in needs. Thus, each phone user is empowered to make more efficient use of his or her social resources. Under conventional conditions, individuals usually need to be satisfied by the support of others. Other's information or counsel might be able to answer their current needs. However, mobile phone users are tended to "choose the person who most closely satisfies their preferences at any given moment."[19]

As mobile phone systems are tightly knit cellular structures based on a fine distribution of personal antennas, the geographic location of every mobile phone user can not be rather precisely assessed at every moment. Differed from the case of fixed telephone, a mobile phone user can be located by his personal relationship with others. The location in which one is situated in his relational network represents the imaginary distance from him to others. Nonetheless, it has a necessary condition that one has to keep his/her mobile phone on. Thereby, turning the mobile phone on or off becomes one of the prerequisites to form network relationship. The behavior and pattern of mobile phone use could establish interpersonal relationship and then cause different kinds of social effects.

4.6 The Behavior and Attitude of mobile phone user: Caller vs. Receiver

Given the availability of the caller and the receiver, the mode of communication becomes more similar to that of face-to-face communication but without visible image. And we call it quasi-synchronic communication. It will be the positive behavior that using every kind of technique in mobile phone to improve or adjust the surrounding of communication. Therefore, users get the possibility of compiling individual information.[20] In brief, mobile phones open up a way for individuals to arrange their call-in. Thus, it enables them to get rid of any hierarchical controls and organized exploitation, which in turn enhances their independence.[3] On one side, the behavior of transmitting, exchanging and sharing the information with each other promotes the mobilization in intra-groups. It creates a new space between intimates or intra-groups.[5] On the other side, this newly created space also enables them to send secret information, even information concerning the crime.

From the receiver' s point of view, would it be unbearable for them to answer unwelcome phone calls each time the phone rings? In order to be able to maintain certain controls over their accessibility, five options are crucial:

1) by deciding when to turn on or turn off the phone,
2) by sharing the number of mobile phone to someone with social contacts,
3) by restricting the circle of people who possess the phone number[18],
4) by selectively filtering out "welcome" call numbers (so that all other callers hear the "busy sign" even if the mobile is turned on),
5) by ranging missed-call answered or unanswered, in appropriate time,

The fourth option is made possible by the caller identification function, and situation was reinforced by the deep-seated habit of receivers. Thus, answering a phone call means disengaging oneself psychologically from the face-to-face discourse at least on the level of verbal communication.[21] In other words, it liberates oneself from the face-to-face discourse. Such tendencies are supported by the fact that in contrast to fixed phone numbers, which are usually publicized in phone books, mobile phone numbers are usually only given to a small number of self-chosen friends and acquaintances.

When individuals are alone, their actions are more likely to be conditioned by subjective psychological factors and supra-individual (or cultural) factors. The former is formed by internalized norms and the later is formed by the values shared collectively with many others, such as their peers or company workers. [20] Whenever actively calling someone, an individual gets involved in a bilateral communication process. This process is completely separated from the present interaction field simply because a contact is being made to someone who is not present, and it also breaks the present social actions.

Accordingly, using the mobile phone to communicate with others represents that the users are voluntarily to maintain the relationships in spite of the high cost. In addition, "mobile communication systems allow for the redirection of transportation to meet the needs of social groups."[22]. Thanks to the technical characteristics of the mobile phone, individual can be immediately accessible to each other. It contributes to a larger social network and models to manage interpersonal relationships.

5 Overview and research questions

Based on earlier discussion, the use of mobile phone plays an important role in the communication of social life. When communicating via the mobile phone, the image of the user's location becomes fluid and moving. Will the interpersonal relationship change as the technology makes great progress? Taiwan is well known for its IT industries and the growth of mobile phone subscribers. Within a short period, Taiwan has undergone a great transformation both in the aspects of psychological status and social life. It would be appropriate to observe whether the interpersonal relationship has also changed right after the use of the mobile phone.

The place-to-place connection in the fixed telephone age would be substituted by individual-to-individual connection of the mobile age in the near future. Our study explores if this will foster new interpersonal relationships and cultural forms. The change of the content of conversation not only reflects the usage of new medias but also the transition of the relationship. The geographical location evolves into the relationship location from the outside world to the inner mind, and it also reshapes the connection of social network. Mobility is quite an important issue because it gives us the full control over the communication tool no matter where you are and in which kind of circumstance. What's more important, it's the very first time that we are capable of moving at the same time when we answer the phone. Originally, the behavior of telephone answering is only related to the time dimension. But the mobile phone answering behavior has opened up a new dimension, namely a new spatial dimension and gives the users the freedom of moving. The spatial distance changes while we are talking on the phone, which is so-called spatial indeterminacy, and the micro coordination becomes possible.

What is the meaning of availability? In most articles we have reviewed, it means whether you are available to someone by phone. Compared with the telephone era, the "mobility" in the mobile phone era enables the users to control the communication tools by their own will at anytime. When the caller makes a phone call to someone else, the latter should undoubtedly be available to the former. But, before this could be done, it is also important that the caller has the ability and intention to contact with the receiver. Availability cannot be established only with the receivers only; the caller should also be paid attention to. The two ends of the communication construct the mobile phone connection, along with social relationships and networks. Consequently, the availability of a receiver shows whether s/he could easily be reached, and the availability of a caller means whether the condition of communicative possibility is available. Thus, we develop a "dual availability model" to show the interchange of communication between the caller and the receiver on the mobile phone and to see how it affects interpersonal relationships. Our research questions focus on the following concerns:

A. What are the differences between mobile phone users and telephone-only users? Although we already know the numerous different characteristics between mobile phone and telephone, what is the connection between communication tools and users?
B. If the availability could be measured by the use of mobile phone, what are the relationships with regard to both the caller and the receiver within these indicators? Furthermore, how should we construct the "Dual Availability" model to distinguish the behaviors of the caller from those of the receiver? We would inspect the active and passive styles of answering and receiving, and then clarify the four types of users.
C. The dual availability may be regarded as indicators of personal connection because it does not specify the target with whom we communicate. However, the relational connection should also be taken into consideration. We suggest that the mobile phone usage could be both measured by the personal connection, which is defined as dual availability, and by the relational connection, which is defined as connection with friends and relatives.
D. Finally, we would like to know how different relationships, such as personal, intimacy, friends and relatives interact with mobile phone (MP) usage on personal dimension (availability) & relational dimension (connection with friends and relatives). Based on our research design it would be easier to see the change of relationship after MP usage.

6 Data, Measurement and Method

6.1 Data

Our research is based primarily on an analysis of the data from the "Taiwan Mobile Phone Survey" [1], which was conducted nationwide in Taiwan under the auspices of the Center for Survey Research and Institute of Sociology in Academia Sinica in 2003. The same questionnaire was used in Japan and Korea survey in 2001 and 2002, and then it was translated into Chinese to conduct this research. So the questions are much more reasonable for Asian people, especially the MP users. The respondents were chosen from a probability sample whose ages ranged between 12 and 69 years. The total number of respondents was 1,006, which forms a response rate of 40.3%.

6.2 Measurement

The parameters of each research variable are defined as follows. In order to establish a uniform scale among different indicators and agencies in the data analysis, we normalized each variable on a scale ranging from 0 to 7 .
The variables for agency attributes are defined on the following scales: (1) the five levels of government agency are labeled from 1 to 5; (2) the annual budget is ranged from 0 to 5

[1] The authors wish to thank Prof. Hiroaki Yoshii for supporting the research project in Taiwan.

according to size; and (3) the number of employees is ranged from 0 to 5 according to size.

The variables for agency information technology development are defined on the following scales: (1) network infrastructure is ranged from 0 to 5; (2) website service is ranged from 0 to 7; (3) establishment of e-document management system is ranged from 0 to 7; (4) IT literacy of civil servants is ranged from 0 to 3; (5) technical capacity is ranged from 0 to 3; (6) IT literacy is ranged from 0 to 10; and (7) IT budget is ranged from 0 to 3.

The variable for internal interactivity is measured using the following two indicators: (1) the percentage of e-documents issued relative to total documents issued; (2) the percentage of e-documents received relative to total documents received. Based on these two indicators, this variable is finally scaled in a range from 0 to 5.

The variable for online client services is measured by the following four indicators: (1) the number of service items dealt with online, (2) the average percentage of installation of electronic bulletin boards, e-newsletters, specific personnel and application download services; (3) the number of online applications accepted in the 2002 fiscal year; and (4) the number of replies to online applications by e-mail per month. Based on these four indicators, this variable was scaled on a range from 0 to 7.

6.2.1 Independent variables: mobile phone usage behavior

I. Personal connection: Dual Availability

Since availability is the focus of our research, we try to define various indicators to show its different aspects. Availability of mobile phone users, follow our instincts, can be measured by two aspects: one is caller and the other is receiver. When we make a phone call via mobile phone, the way we conduct our dialing behavior, the person with whom we communicate and things we talk about shape the calling styles of a mobile phone caller. On the other hand, three things must be done before picking up the phone: let someone know your phone number, keep the mobile phone on and answer it without hesitation. We choose to answer it according to different conditions, such as whether the phone is in the proximity of us and whether we are eager to answer it.

From the point of view of “caller-receiver”, we can not only tell if we can reach someone but also distinguish the availability of different levels of calling and receiving a phone call. Availability refers not only to whether the user is available when the phone rings, but also to a reflection of user’s behavior, lifestyle and relationship. We measure availability by the two parts:

(a) Caller availability

It is not easy to distinguish the caller’s behavior from the receiver’s behavior because we often mix them together to conduct a question. We refine the words in our questions or items and design some interesting indicators with the meaningful social effects:

Phone numbers recorded. It is not easy for us to remember so many complicated MP numbers, and the phone book we build could be of great help. We ask “How many phone numbers are recorded in your MP?” to show the demand of a caller. The phone book build-in helps us dial out more conveniently and immediately, and the amount of the phone number recorded represents the subtle scale of communication network and personal relationship. We suggest that the people who dial out more often would build a much larger phone book than others. Although some people use their phone book to

preview the caller's name when MP rings, in most situations we can ascribe it to the characteristic of a caller.

Numbers of people contacted. MP is widely used in business and work. If we can separate the personal conversation from the business conversation, we would see a much purer effect of personal and relational interaction. We ask "How many people do you phone via MP to discuss personal matters only?" to describe the actual scale of communication network and personal relationship contrast to phone number recorded, and the caller effect is still emphasized.

Personal conversation. Besides the people contacted, the content of conversation is also important when making a phone call. From a caller's aspect, he would talk about some specific topics or with some particular purpose. Most of the conversation is led by the caller, or it is at least constructed around his viewpoint. It is hard for us to separate and measure the content of the conversation, so we just ask " How much is the proportion about personal matters when you call out via MP?" to roughly filter out the part concerning the work.

Time spent. Time spent on mobile phone is not easy to separate caller from receiver, even though we emphasize on the "calling" behavior in our question, the factor of the time spent on using the mobile phone can not easily separate the caller from the receiver. So this indicator could be viewed as both caller and receiver effects. The question is "How long do you spent on calling on MP every day?" and we could observe the actual behavior of their MP usage.

Despite of the behavior of a caller, the indicators from receiver should also be considered as following:

(b) Receiver availability

Number sharing behavior. As various communication tools are gradually invading our life, privacy becomes the most important issue in this century. The number of the fixed telephone represents the common medium shared with the whole family, but the MP number represent the very existence of each and every individual. Sharing MP numbers to others represents not only that we have confidence in them but also that we need the communication with the other party and that we allow them to reach us anytime they want. It was the most important stage on MP communication. People might get angry if others get their numbers without their permission. They judge their friends by the developing friendship and relationship and approve their status by giving them their MP numbers. We ask "How do you tell your personal friends about your MP numbers?" and the response item ranged are as follows: "No matter who ask me, I would tell them", "I almost tell all of my friends", "I only tell several of my good friends", "I tell few friends", "Do not tell anyone". This question would clarify the communication style by the MP usage.

Phone answering style. Some people might be enthusiastic about answering the coming call, but the others might not take it seriously. If we want to measure the selective answering behavior of the user, we have to presuppose that he is aware that the phone is ringing but purposely choose to ignore it. There are several reasons for ignoring the ringing phone: not knowing who is calling, MP use forbidden, busy with other things or emotional consideration. We do not try to figure out the real cause behind this but simply ask them the frequency instead: "Do you choose not to answer the MP after seeing the

number of the coming call?". The answering items are "usually", "sometimes", "seldom" and "never". Here, "seeing the caller's number" is very important because we probably know who is calling if the number is on the phone book or in our mind, and we could at least call him back latter to trace who the caller is. Technology gives us the chance to extend our communication even if the receiver is temporarily unavailable. We can judge the condition and choose to become a caller from the previous stance as a receiver, or just neglect it.

Proximity between MP and receiver. Another answering style is based on the proximity, which means the closeness between MP and users. We are free to keep MP on anytime we want or force all coming calls disconnected. After we restart the connection, we could still get the missing phone numbers and message. So the proximity does not only measure the spatial distance between MP and users, it shows another aspect of phone answering style. Proximity measures the MP status, which is online / not online / selectively online and the spatial distance, which is close to you or in fixed place. After proximity, the phone answering style proposed above measures the will to answer the phone. We ask "How do you use your MP when you are at home" and the item are "keep it online near to me, so I can pick it up right away", "keep it online in fixed place", "keep it online only when I know someone is calling me" and " it is usually offline". The design of the question focus on home usage to avoid the interference of inhibition and work requirement.

Ⅱ. Relational connection: connection with friends and relatives

In the context of our research, personal connection means individual behavior while relational connection means mutual relationship. With regard to individual behavior, we do not focus on the relationship between the caller and the receiver. But if we want to know how relationship changes after using MP, it is necessary to take the relational connection into consideration. We use "Who is the one you call most frequently with your personal MP?" and "Who is the one you call second most frequently with your personal MP?" to know whether the receiver is a relative or a friend, and then we ask the face-to-face contact between them. Differed from personal relationship and intimate relationship, which we define as unilateral relationships because they are only emotional and non-social factors, relationship of relatives and friends clearly point out the relationship network constructed under social custom, norm or behavior. With these indicators, we could figure out the influence of relational connection on network relationship.

Whenever a new technology is created, the spatial distance is always an important factor when we discuss whether the amount of communication is increasing or decreasing. Mobile phone is quite a special case because spatial distance is shortened once the connection begins. We use the term "proportional accessibility" to describe the percentage of nearby relatives in contrast to the percentage of distant ones. We divide the amount of relatives living within one hour's drive by the total amount of relatives. And the result shows the density of relationship network in relatives and friends.

6.2.2 Dependent Variables: Relationship changing

We use a set of fourteen questions in a 4-point Likert scale to ask what are the changes after using MP . Among them, four questions are about relationship: "Personal contacts increase", "relative contacts increase", "friends hard to see can be communicated with" and "relationship deepens with intimacy". We regard these four items as indicators of the

changes of their relationship although some may argue that contact is not necessarily the same as relationship. Contacts could be considered as a very important part of the relational performance because the relationship could be judged according to the communication.

6.3 Method

First, we make a simple descriptive comparison between MP users and none users. Then we use latent class analysis with Categorical Data Analysis System (CDAS) v3.5 (Eliason, 1990) to sort out four types of people based on our dual availability model. After the entire MP users are well categorized into appropriate types, we use post hoc test to make group comparison. In the end, we use ordered logit model with STATA 8.2 to clarify the effects of calling, receiving and relational connection on the change of four types of relationship or contacts.

7 Results

7.1 The differences between mobile phone users and telephone-only users

In Table 1 the difference is quite clear. 53% of MP users are male, but only 41% of nonusers are male. Since it is impossible to talk about the MP application of nonusers, we choose to use other media use, such as Internet and PC Instant Message, as indicators to see if there is any difference between MP users and non-users.. 60% of MP users use the Internet, but only 29% of nonusers use it. However, 44% of MP users use PC Instant Message, and 36% of nonusers use it. Those who use MP would probably use the Internet. But, as young adolescents could not afford to have their own MP, the instant message software becomes their tools to communicate with their peers. This is why there is no great difference between the percentages of IM users in these two groups. MP users also send and receive much more email than nonusers (send: 16.8 against 3.9, receive 60.6 against 19.6) after we delete those who do not use Internet.

We use the "Social Functional Acceptance & Refusal" scale to observe the different thoughts between users and nonusers. MP has its own function and deficiency, and the scale shows people's points of view about them. Totally speaking, people show strong attitude about its function and deficiency, such as MP helps when faced with disasters (3.72), crime increases as MP becomes popular (3.12), we can call back while on the train, bus or MRT (3.01), Electro-magnetic Wave is horrible (2.96) and MP influences on health (2.77) . As to social aspects, the attitude is slightly inclined to the positive side, such as social climate corrupts (2.44) and personal relationship weakens (2.03, close to disagree).

Comparing the questions for MP users to those of nonusers, questions concerning the functional aspect are different while those concerning the social aspect are the same.. All of the significant questions show the same tendency that MP users seem to realize the positive and negative sides of MP, and show strong feeling about them. But nonusers are much neutral as to the MP which they do not possess. We confirm that people who possess communication tool will further realize its advantages and drawbacks, and for the MP users in Taiwan, what they experience more is the functional aspects but not social ones.

Besides, the age dominates the penetration rate of MP and we should consider how people of different age bracket conduct their medium use behavior. In figure 1 we can discover MP is not as popular as Internet in adolescents around the age of fifteen, but in other cohorts, MP was the much more prevalent and the penetration rate does not decrease too much until the age of sixty. In MP users, especially teenagers between 15

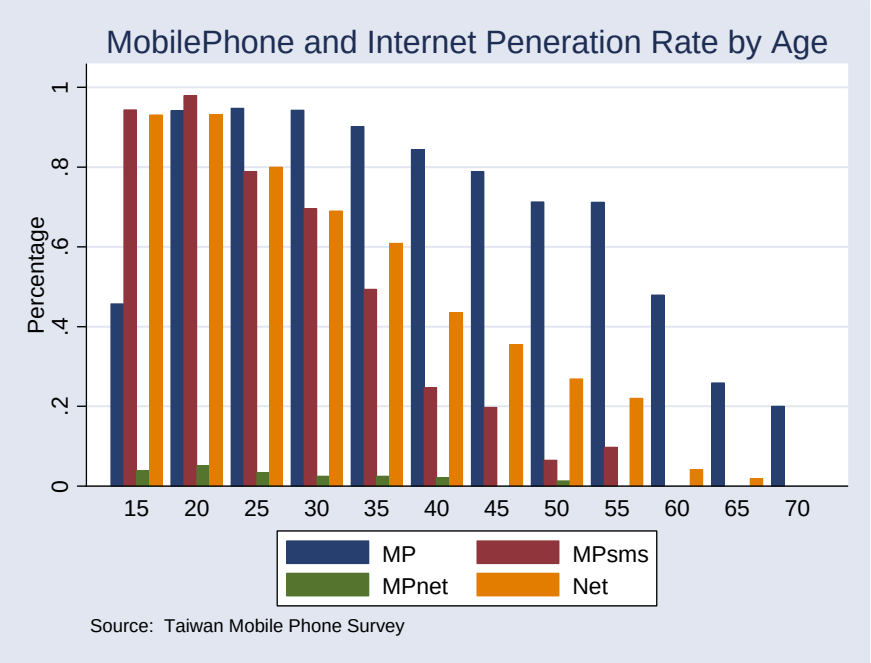
and 25, the short message services (SMS) is the most important MP application, but the mobile internet services is not quite popular.

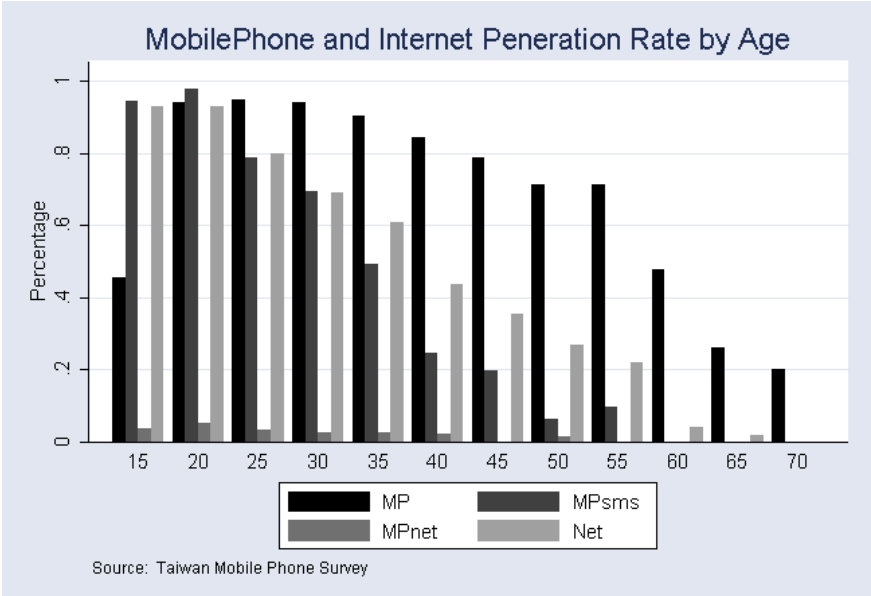
Table 1 The comparison of MP users & Non-users

		MPuser		Non-MPuser	
		n	**perc**	**N**	**perc**
Gender	**male**	390	53%	109	41%
	female	346	47%	157	59%
	Total	736	73%	266	27%
PC Internet		445	60%	78	29%
PC Instant Message		198	44%	28	36%
		mean	**Std**	**mean**	**Std**
Age		35.8	13.3	44.1	20.2
Education	*(years in education)*	11.7	4.14	7.1	4.15
Family members		4.6	1.9	4.7	2.3
Occupation	*(1=highest,9=lowest)*	5.12	2.32	6.3	2
Income	*(NT $)*	75875	70409	37653	29201
Mail-out	*(#/per week)*	16.8	47.7	3.9	6.3
Mail-in	*(#/per week)*	60.6	118.0	19.6	32.8
Social Functional Acceptance & Refusal		**mean**	**Std**	**mean**	**Std**
Crime increases as MP becomes popular		3.13**	0.81	2.95	0.83
MP Helps when Faced with Disasters		3.74***	0.51	3.55	0.67
Electromagnetic Wave of MP is horrible		2.86*	0.82	2.73	0.91
MP influences on Health		2.72	0.85	2.70	0.83
Social climate corrupts		2.56	0.86	2.57	0.85
Personal Relationship Weakens		2.10	0.79	2.14	0.83
We can call back while on train, bus or MRT		3.00*	0.89	2.84	0.95
(4=Strongly agree,1=Strongly disagree)					

Source: Taiwan Mobile Phone Survey (2003) ****p<.001 **p<.05 *p<.1*

Figure 1 Mobile phone and Internet penetration rate by age





7.2 Dual Availability: MP usage between caller and receiver

Here we show how dual availability model is constructed. If the MP users could be divided into several groups based on their calling and receiving characteristics, we can expect that both of the characteristic in Table 2 would then show active and passive characteristics respectively. If active caller and receiver is the most available MP user, passive caller and receiver should be the least one. We call them "High Availability (HA)" and "Low Availability (LA)" types respectively. However, there are some inconsistent combinations, such as passive caller - active receiver, which is named "Inactive-Faithful (IF)" MP user, and active caller - passive receiver, which we name as "Control-indifferent (CI)" MP users. Their availability is not apparent because we do not know the influence between their caller effects and receiver effects.

We use latent class analysis to separate different users. There are only four variables as the indicators to simplify our classification, so that phone numbers recorded and numbers of people contacted shows callers' behaviors and number sharing behavior and phone answering style shows receivers' behavior. With the four class divided, the number correctly allocated is 609 among 736 users, and the percent correctly allocated is 83.98 (there are 11 users missing in the variables). The lambda value is 0.74 and the model seems well constructed. With the final classification, we have four types of users which correspond perfectly to our dual availability model. The results in Table 3 show their different characteristics.

Most of MP users are low availability type (42%), followed by high availability type (24%), control-indifferent (19%) and inactive-faithful (15%). There are more male users in high availability and inactive-faithful type, but more female users in low availability type. We explain the effects by following sections:

Dual Availability. Caller effects are much stronger in HA and CI types than in IF and LA types, and receiver effects are much stronger in HA and IF types than in CI and LA types. Their differences show that the calling behavior and receiving behavior should be taken into separate consideration to well describe MP users' behaviors.

MP Use. As for the four indicators of dual availability model, the four types show exactly the same structure as our hypothesis. As to others variables, what is the patterns in the four types? We could see that frequency, time and money spent on MP are the same as the following patterns: HA is the highest, CI and IF are the second and LA is the lowest. The pattern is the same as the caller indicators even though we don not include them into our dual availability model. It does help us to distinguish and clarify the real calling behavior.

Medium Use. Despite of calling and receiving of MP, will other communication tools show the same pattern? We inspect SMS, mobile internet and PC internet and we discover that HA and CI types are still the highest, which shows that medium use could be predict by only the caller indicators. They work well on MP call, SMS use, mobile Internet, PC Internet, even the e-mails sending and receiving. High availability people are unquestionably heavy users of all kinds of communication tools, but Control-Indifferent people can not be ignored because they show great demand when they need to control or access the connection. LA type is still the lowest in medium access, and the huge gap is noteworthy. Most users are in LA type and they have the comparative lower media access. It should be the most important part when we develop our IT strategy.

Change of relationships. The focus of our study is to figure out how relationships change after using MP. The average rating points range from 2.82 (personal contacts) to 3.56 (relative contacts). Most people generally agree on the point that MP helps in performance of relationships, it benefits most the relationship with relatives.. Nevertheless, HA type shows the lowest improvement with their relatives.As a HA type person, it's necessary to devote much more time on communication than other types of people so it is reasonable for them to sacrifice the time they should contact their relatives. These could also be observed in the indicator " Personal conversation on MP". It was originally our indicator of caller availability, but we find it more interesting because it is the first time that LA type gets the highest grades. Most people during LA type do not access others as often as other types so they reserve more time for their family or friends. This is why LA type shows the highest proportion in talking about private affairs via MP. High availability should be a very important factor if we want to improve our relationship with others but it might undermine our relationship with relatives as well.

In conclusion, dual availability model helps us to identify four types of users. The combinations of active\passive and caller\receiver illustrate the full picture of MP use. When it comes to the time and money spend on the MP, the caller effects dominate. Even with other media use, such as SMS, mobile Internet, PC Internet and E-mails, caller effects still play a very important role. Although the high availability type of people own the highest rate and low availability type have the lowest, control-indifferent type of users cannot be ignored due to caller effects. However, over-availability might endanger the relationship between users and their family or relatives. Due to low use of the MP, low availability type of users might not report so much improvement in their personal contacts, friend contacts and intimacy relationship, but they have the highest proportion of personal conversation on MP. It shows their communicative network is quite closed and limited in numbers. Further researches about their relational network are necessary.

Table 2 Dual Availability model

Dual Availability model		*Caller*	
		Active	*Passive*
Receiver	Active	**High Availability**	**Inactive-Faithful**
		Open-caller	Close-caller
		Open-receiver	Open -receiver
	Passive	**Control-Indifferent**	**Low Availability**
		Open -caller	Close -caller
		Close-receiver	Close -receiver

Table 3. The comparison of four types of MP users

		High Availability (A) *HA*		Inactive-Faithful (B) *IF*		Control-Indifferent (C) *CI*		Low Availability (D) *LA*		Total		
Gender		**n**	**perc**	**n**	**perc**	**n**	**perc**	**n**	**perc**	**n**	**perc**	**Comparision**
	Male	106	61%	68	65%	70	50%	140	46%	384		
	Female	68	39%	37	35%	70	50%	166	54%	341		
	Total	172	24%	105	15%	140	19%	306	42%	725		
Medium Use	*MP short message services(SMS)*	**542**	75%	318	44%	**523**	72%	*196*	27%	360	50%	A=C>B>D
	Mobile Internet	**34**	5%	7	1%	**31**	4%	*5*	1%	18	2%	A=C>B=D
	PC Internet	**579**	80%	414	57%	**590**	81%	*306*	42%	442	61%	A=C>B>D
Dual Availability		Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	
Caller	*Phone numbers recorded*	**55.6**	45.9	*28.6*	32.8	**51.9**	38.1	*8.1*	7.1	30.9	37.5	A=C>B>D
	Numbers of people contacted	**11.7**	10.8	*6.9*	7.3	**10.4**	13.9	*5.6*	4.5	8.2	9.4	A=C>B=D
Receiver	*Number sharing behavior.*	**4.19**	0.39	**4.27**	0.44	*2.83*	0.40	*2.60*	0.59	3.27	0.90	A=B>C>D
	Phone answering style	**2.67**	0.75	*1.43*	0.50	*2.46*	0.95	*1.99*	0.98	2.16	0.96	A>C>D>B
	Proximity between MP and receiver	**3.39**	0.67	**3.25**	0.93	*3.25*	0.85	*2.72*	1.16	3.06	1.01	A=B=C>D
MP Use												
	Time spent on MP(minutes/day)	**39.6**	58.0	26.4	47.5	28.4	47.3	*12.4*	24.5	24.0	43.9	A>C=B>D
	Frequency of using MP	**7.06**	1.58	6.50	1.61	6.48	1.66	*5.22*	1.74	6.09	1.83	A>C=B>D
	Money spent on MP ($/month)	**957**	828	712	749	720	856	*443*	994	662	917	A>C=B>D
	Personal conversation on MP (%)	67.3	32.0	57.4	34.7	64.3	32.2	**72.1**	32.7	67.3	33.0	A>B,D>B,D>C
	PC Internet Mail-out (#/week)	**19.9**	38.4	*11.1*	24.7	**24.1**	77.9	*10.0*	22.6	16.9	47.8	A=C>B=D
	PC Internet Mail-in (#/week)	**73.2**	124.3	46.4	89.3	**74.8**	150.2	*42.9*	84.8	61.1	118.3	A>D, C>D
Change of Relationships after using MP												
	Personal contacts	3.01	0.90	2.99	0.89	2.98	0.94	*2.57*	0.98	2.82	0.96	A>D,B>D,C>D
	Intimacy relationship	3.18	0.80	3.23	0.68	3.23	0.80	*2.99*	0.92	3.12	0.84	A>D,B>D,C>D
	Friends contacts	3.51	0.67	3.38	0.70	3.42	0.78	*3.01*	0.95	3.26	0.85	A>D,B>D,C>D
	Relative contacts	*3.40*	0.81	3.65	0.57	3.59	0.64	3.62	0.72	3.56	0.71	A<B,A<C,A<D

Source: Taiwan Mobile Phone Survey (2003)

**The number with high grades is bald with heavy color, and the number with low grades is italic with light color.*

7.3 Change of relationships: The influences of personal and relational connections

Since we have talked about how the caller and receiver effects influence the change of relationship, what are the effects the relational connections, such as proximity of friends or relatives and the mode of communication with them via mp, has on the change of relationship. Table 4 shows that personal contacts and intimacy relationship have a resemblance and that friends contacts is similar to relative contacts. Frequency and time spent on MP greatly influence personal and intimacy relationship, while phone numbers recorded and number of people contacted affect friends and relative contacts. It is quite reasonable because the former could be considered as an one-way communication which does not directly show the interpersonal relationship. Therefore, we call them unilateral relationship. But as to friends, there are actual relationships between the users and them. When a user asks his friends' phone numbers, record them in the MP and contact them, he feels that his contacts are thus increased..

Although the evidence is not strong, we can consider the negative sign of phone numbers recorded on relative contacts is a symbol of friend-relatives ambivalence. We mention that the low availability type of people sacrifice their time for their relatives. There is a link among few phone numbers recorded, low availability and high relative contacts. Those who have many phone numbers recorded can easily reach others, they might feel a sense of guilty towards their relatives. Number recorded improves the relationship with friends but undermines the relationship with relatives. Receiver effects are not so clear as caller effects, but friend contact still reflects some interesting phenomenon. The contacts increase if the user always keeps his MP on-line and is eager to share his phone number to anyone. Proximity has the same effect on personal contacts.

Why do we consider friends and relative contacts as a kind of network relationship? The reason is that we design a personal connection and relational connection scale to discover the four relationships. Friends and relative contacts are more relational-specific and the links should be clearer in relationship connection. Some of the caller effects of personal connection have influence on relationship connection simply because they are network-oriented, just as phone numbers recorded show a communicative network of MP users and number of people contacted shows the scale of the network. As to the unilateral relationship, relational connection no longer shows influence on them. The MP contacts with relatives show very strong effects on the increase of relative contacts. This is not a kind of self-proved common sense because they are really the people who use their MP to contact relatives. The effect shows that friends and relatives really struggle for the limited communicative opportunities. Although the coefficient of friends model are not significantly different from zero, the negative sign simply shows that the effect is contrary to that on the relatives.

The other strong evidence is the friends' proportional accessibility. We know that the spatial distance often increase the opportunity of communication, but the MP use pattern in Taiwan is not the same. Friends living close to the user might be an offset of not calling. MP users can do without calling so frequently due to regular meeting and face-to-face contacts. The intimacy relationship and friend contacts greatly decrease with regard to the friends living nearby. As the friend contacts decrease, the relative contacts increase to compensate the communication gap.

Totally speaking, the distinction between personal and relational connections shows different kinds of impacts on the change of relationship. In the unilateral relationship,

personal connections affect on the MP using style. In the network relationship, the relational connections show great influence. Friends and relatives are competing for the communication opportunity, and friends' spatial distance shows a negative influence on friends' contacts.

Table 4 Change of Relationship with personal and relational connect

		Change of Relationship after using MP			
		Unilateral relationship		*Network relationship*	
		Personal Contacts	Intimacy Relationship	Friends Contacts	Relatives Contacts
Personal connection, Dual Availability					
Caller	*Phone numbers recorded*	0.22	-0.19	2.53**	-2.23**
	Numbers of people contacted	-0.04	0.50	2.19**	0.76
	Time spent on MP on weekdays	-0.92	-1.24	0.41	-0.03
	Time spent on MP on weekend	2.70***	1.62*	0.18	0.02
	Times of MP	3.45***	2.82***	1.11	0.53
Receiver	*Number sharing behavior.*	1.07	1.17	2.31**	0.27
	Phone answering style	0.42	0.57	1.02	-0.46
	Proximity between MP and receiver	2.06**	1.37	1.80*	-0.01
Relational connection					
	Phone with relatives / most often	-0.93	1.14	-0.65	2.02**
	Phone with relatives / second often	-0.67	1.32	-0.87	3.22***
	First nominee's face-to-face contact	0.44	0.30	-0.55	2.95***
	Second nominee's face-to-face contact	0.09	-0.62	-0.02	0.99
	Relatives' proportional accessibility	0.98	1.16	1.16	-0.48
	Friends' proportional accessibility	-0.65	-2.06**	-1.74*	1.67*
	Personal conversation on MP (%)	-1.42	0.78	0.50	-0.61
	Number of observations	628	628	628	628
	Likelihood ratio chi- square (15)	78.8	33.1	71.8	52.4
	Probability	0.00	0.00	0.00	0.00
	Pseudo R-square	0.05	0.02	0.05	0.05

Source: Taiwan Mobile Phone Survey (2003) *The number is in z score of the model,*

****p<.001 **p<.05 *p<.1*

8 Discussion

We propose some answers to our research focus. The differences between mobile phone users and telephone-only users are demographic variables and their media use. Age dominates the level of penetration rate according to different cohort. The users further realize the advantages and drawbacks of MP, but nonusers are much more neutral as to the MP which they do not possess. For the MP users in Taiwan, what they experience more is the functional aspects

The dual availability model helps us to figure out four types or users: “High Availability”, “Low Availability”, “Inactive-Faithful” and “Control-indifferent “. The pattern clearly distinguishes various characteristics of MP users as a caller and receiver. With only a few indicators we can tell apart people with different media use style, whether about it is the Internet or MP. Even the changes of relationship could be categorized as substantially increased or comparatively decreased. Caller effects show overwhelming dominations either on the media use or on relationship change. Receiver effects show weaker influence, but they are the key for us to distinguish the other types apart from high available and low available MP users.

The main contribution of our study is on the construction of dual availability model and we could observe its influences on media use and interpersonal relationship. The 15% of inactive-faithful users and the 19% of control-indifferent users are located in the middle of two extremes, namely the 24% of high availability users and the 42% of low availability users. The high and low availability types have their vivid images and apparent behaviors, but what is the image of IF and CI types users? We could see the “control” part of CI users through their high media usage but it is their indifference when they answer the phone that could really reflect their “indifferent” part. It is the same with the IF type users. If the “inactive” part prevents him from communicating with more people, how could the “faithful” part make up for his interpersonal relationship? Figuring out the IF and CI types is an important work because we can see the real interactions, consider in and out, as a proxy of human behaviors as well as relationships. We would work on more topics about the psychological and attitude performance to understand the subtle differences between them.

The openness and closeness of our title have several meanings. First, they show the way we use our communication tools, as we use active and passive styles to describe the callers and receivers. In addition, interpersonal relationship could be seen as a pass way we open to others or vice versa. Until now we can only detect if the road is open or closed. Who opens or closes it more often would be a focus of our further researches. Even if our survey was emphasized on MP and Internet use, there were not so many questions about the communication interaction with regard to bi-direction. Other than talking on MP, researches on media use, such as sending or receiving E-mail, MP short message, PC Instant Messenger or VoIP (Voice over Internet Protocol) could be replicated by our model and demonstrate the interesting multiplicity of communication media. In short, openness and closeness should be the main concerns regarding media use and interpersonal relationships.

Finally, media use and relational change should be considered as a state of transition. It is not easy to make a detailed sketch with only one survey. The development of media, especially MP and Internet in Taiwan, evolves rapidly and it is possible that we neglect an important history in a blink of an eye. If we fail to find out the link between the use of

media and the change of relationship, the influence of the media on human conscience and behavior could possibly be neglected. Longitudinal survey on information technology is very important to the so-called silicon island. More detailed researches on the STS studies are necessary.

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