THE STATUS OF FAMILIES COMMUNICATION NEEDS IN TAIWAN AND DISCUSSION OVER FUTURE INTERACTION DESIGN

CHING YANG [*a], HSIU HUI HSIEH[a]

[*a] *Professor, Department of Industrial Design, National Yunlin University of Science and Technology, Taiwan, R.O.C.*
[a] *Ph.D. student, Graduate School of Design, National Yunlin University of Science and Technology, Taiwan, R.O.C*

ABSTRACT

This study mainly discusses the status of the daily family life in different periods and the interactive communication design in Taiwan. Firstly, from six cases based on three stages including the stage, child-growing stage and mature stage, the research conducts a lifestyle interview and on-the-scene investigation via field survey and environmental observation. Preliminary findings suggested that at different stages, many factors would influence family lifestyle and interactive communication, such as children's age, whether they are full-time mothers or not, the parents' type of work and whether they are living separately or not. Parents in Taiwan focus on looking after little children during the nursery stage and the growing stage, whereas during the mature stage, they use more spreading messages when children become more independent. And based on the lifestyle and the interactive communication need of the above cases and through a scenario-oriented approach. The research proposes four notions of situation design listed as follows: refrigerator acting as an inter-medium; family members being in different areas; members at home providing assistance to the members outside; and children being in emergencies outside. Therefore, we have concluded that a design of interactive communication should include memos, messages, notes, sound identification, security, electric

[*] **Corresponding author**: 123 University Road, Section, Douliou, Yunlin 64002, Taiwan, R.O.C.
yangi@yuntech.edu.tw

appliance control, also Kansei Engineering, Ubiquitous High-Tech, and related internet knowledge and skills to reach the best of interactive communication. The result of this research can provide references to the research of the design of interactive communication and the interactive products and would carry on the study.

1. INTRODUCTION

1.1. Research background

As technology and business quickly developed in Taiwan over the last thirty years, family life styles have changed from the style of the extended family to the style of modern nuclear family. Advanced technologies, such as RFID, GPS, wireless transmission, and electronic paper, have been widely applied and showed remarkable effects in medical care, architecture, military defense and business. However, it hardly contributes to family life or meets the demands of family life communication. Therefore, there will be a great market for various new products developed by Ubiquitous High-Technology leading into future family life.

At present, in the modern nuclear family in Taiwan, after entering the nursery stage or children-growing stage, parents are busy and under great pressure to support the family. When children go to college or enter careers, family members become independent and interactive communication lessens. Among them, we find that internet, mobile, and other electronic means have broken time-space limitations, playing a vital role in communication during our life. Two questions trigger our research: how will family life cope with the high-tech society changing with each passing day; and what role will high-tech products play in interactive emotion communication between family members?

1.2. Research Objectives

For six cases mentioned above, the research observed their living environment and carried out investigation of their daily lives and interactive communication status via environmental observation and interviews. Taking *Crystal House*, smart housing in central Taiwan, as an example, the research conducts a survey of the application status of the high-tech environment. Finally, on the subject of family lifestyle and interactive communication, the research proposes a design of interactive communication platform in future families through scenario-oriented approach and application of AI technology and Kansei Engineering to our future family interactive communication.

1.3. Research Limitations

The research can't fully cover the whole family life as it involves an invasion of privacy. The research only made a summary and analysis based on the interviews of the research subject. As to for the design of a scenario-oriented approach, the research introduced the circumstance simulation design in future family interaction with AI technology and Ubiquitous-related technology notion while the application is yet to be fully assessed.

2. DOCUMENTS DISCUSSION

The research mainly studies the family Stages, daily schedules, the definition of interactive communication and the scenario-oriented approach. The related researches are as follows:

2.1. Family Life Stages

According to the survey conducted by Institute of Sociology, Academia Sinica in 2005, nuclear family remains the most important family type in Taiwan and it changed from rating 52.4%(1995), to 52.3%(2000), and to 55.3% (2005) [1]. In addition, Lin wenqi (1998) divided grown-up life into six stages in *Exploring the six stages in life:* (1) School-life stage(single, student), (2)Single stage(single, no-longer-student), (3)Honeymoon stage(married without kids), (4)Nursery stage(married with kids under age 6), (5)Child-growing stage(married with child ages from 7 to 18), (6)Mature stage (married with child over age 19) [2]. Our research focuses on the last 3 stages, 4-6.

2.2. Daily Schedules

According to the analysis of reports from Office of Accounts and Statistics (1988) of Executive Yuan, ROC [3] and Canadian Statistics Department (1998) [4], the research defines the family behaviors as follows: (1)Necessary behaviors: such as eating, sleeping, bathing, resting etc; (2)Contracted behaviors: such as working, studying, commuting, doing chores, shopping and social activities; (3)Free behaviors: such as recreation, watching TV, exercising and interested activities.

2.3. Interactive Communication

Interaction is the process of constant actions and reactions between two objects. It includes not only the physical actions but also the psychological activities (Bolullo, 2001) [5]. Communication is mainly through languages, but Argyle (1998) proposed nonverbal communication such as eyes, hand gesture and facial expression etc [6]. Yuan Tianzhao(1996) mentioned that the key of designing communication medium lie in understanding the interactive relation between human and machinery even the interpersonal design in terms of experience [7]. Thus, such ideas might be taken into consideration in the interaction design between future family members.

2.4. Related Research of Family Interactive Communication

Domestically, there are two studies about family interactive communication. First, Jiang Deyi (2006) mentioned in his study that mother is superior to father in parent-child interaction for children in primary school, and the only child with well-educated parents in extended family performs better in home recreation [8]. Secondly, Sun Zonghuang(2006) designed multi-functional communication tools for parents in nest period through scenario-oriented approach and provided tools to remind of communication topics [9]. The above studies are the reference for the survey of home interactive communication and the scenario design.

2.5. Scenario-Oriented Approach

It is an important method to clarify the unknown future. (Pierre Wack, 1985) [10]. Anderson stated in 1992 there are two features of scenario design: (1)scenario is a continuation of activities or procedural activities or events descriptions, transforming from certain state to

another; (2) scenario is to give a description from the user beyond the scenario but not within it [11]. With the introduction of the notion of Ubiquitous technology, this study proposes hypothetical solutions to the future family interactive communication in the form of pictures and plot.

2.6. Kansei Enginnering

Kansei Engineering is a method for translating feelings and impressions into product parameters, defined by Japan Material Research Corporation. Professor Mituo Nagamachi defines Kansei Engineering as "Measure the feelings and shows the relationship to certain product properties. In consequences, products can be designed to bring forward the intended feelings." Shinohara Akira and some other people define Kansei Engineering as "Heart communication that support happiness." Professor Mituo Nagamachi divides Kansei Engineering into 5 categories: 1.Catergory Classification; 2.KES (Kansei Engineering System); 3.Hybrid Kansei Engineering System; 4.Kansei Engineer Modeling; 5.Virtual Kansei Engineering. [12]

3. INVESTIGATIONS OF CURRENT SITUATION

This research conducts interviews and environmental observation of six Taiwanese families; recording their daily schedules [13]. The 6 cases are divided into 3 different stages: A. Nursery stage: A1 Mrs. Zhang, Tainan, A2 Mrs. Wang Yunlin; B. Child-growing stage: B1 Mrs.Ni, Tainan, B2 Mrs. Lu, Taizhong; C Mature stage: C1 Mrs. Chuang, Taipei, C2 Mrs. Su, Gaoxiong. Although the child of C1 is under the age of 19, the research classifies him into maturity period as he behaves quite independently. The principal content of the research consists of records of family members basic information, records of daily schedules, including three periods: morning to noon, afternoon to dinner, dinner to bedtime, and in the end, observation of floor plans, environment photographs, and the site map of communications equipment. The investigation period begins on November 11[th.] and continues until November 18th, 2008.

3.1. Basic Information of Interviewees

From the basic information shown in table 1, we can find these families can be classified into two types: single-income families like A1, B1, C1, C2 in which the wife is a housewife and two income families like A2 and B2. Further classifications includes that each family has one to three children.

3.2. Environmental Observations of Each Family

This research investigates the current status of six Taiwanese families, observes, and records the housing environment, including residential floor plans, environment photographs, site maps of communications equipment. Observations indicate that condominiums and houses are the most common housing arrangments in Taiwan, so this research uses condominiums, A1, and houses, C2, as representatives (figure 1 and figure 2). This study finds that the living room, dining-room, and study-room are the main interactive communication sites for Taiwanese families. For A1, the communication site is located in the heart of the house; For C2, the site is located in the living room and dining-room on the first floor while main bedroom, children's room, and study rooms are on the second floor and third floor.

Table 1: House type and family member's basic statistics

Period	A		B		C	
No.	A1	A2	B1	B2	C1	C2
Family's member	Father 37 yrs old Electronic engineer	Father 40 yrs old University technician	Father 39 yrs old Engineering Manager	Father 41 yrs old Factory Manager	Father 42 yrs old Operator	Father 53 yrs old Worker
	Mother 36 yrs old Housewife	Mother 34 yrs old Executive	Mother 28 yrs old Housewife	Mother 34 yrs old Lecturer/ Ph.D. student	Mother 40 yrs old Housewife	Mother 52 yrs old Housewife
	Eldest daughter 6 yrs old preschool	Son 2 yrs old	Eldest daughter 13 yrs old Primary student	Eldest daughter 10 yrs old Primary student	Daughter 16 yrs old High school	Eldest son 26 yrs old Operator
	Youngest daughter 1 yr old		Youngest Daughter 12 yrs old Primary student	Elder twin son 9 yrs old Primary student	Son 15 yrs old Junior student	Eldest daughter 25 yrs old Graduate student
				Younger twin son 9 yrs old Primary student		Youngest Daughter 23 yrs old Unemployed
House Type	11-storey apartment bldg. 139 m²	3 storey Apartment 317 m²	3 storey Apartment 324 m²	7-storey apartment bldg. (Split-level) 132 m²	Apartment 119 m²	3 storey Apartment 317 m²
House age	17 yrs	16 yrs	5 yrs	17 yrs	28 yrs	23 yrs
Interview Date	2008/11/18	2008/11/12	2008/11/13	2008/11/12	2008/11/12	2008/11/11
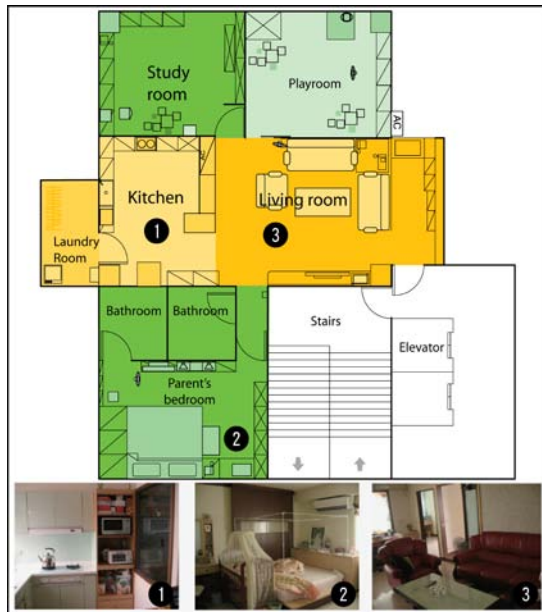
Figure 1：A1 Floor plan of condominium
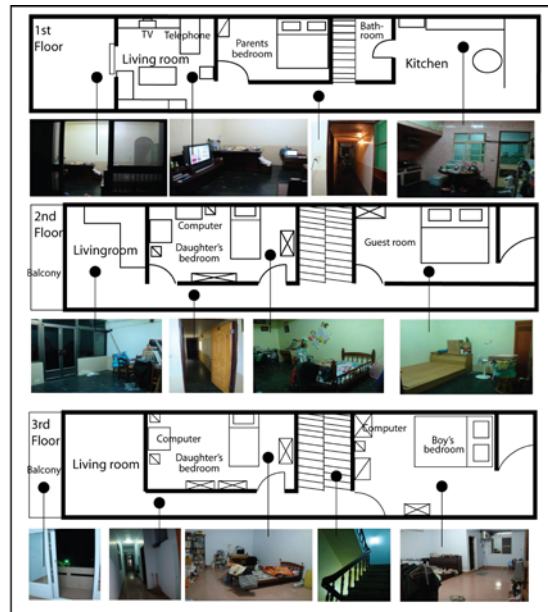
Figure 2：C2 Floor plan of house

3.3. Housing Environmental Observation of the Smart Housing Case

On April 10th, 2009, research was carried out in the form of a case study on the sample house at *Crystal House* in the Taichung area, on the effects hi-tech equipment. It is a 22 story building with an additional 4 stories underground. It covers approximately 2,479 square meter, with a moat-style waterscape and double-halls on the first floor and the basement. There are totally 51 families in the building. More specifically, there are 3 families on each story, each family having 334 square meter to 383 square meter totaling 1074 square meter per floor. The installation of AI, artificial intelligence e technology, artificial smart E-tech produces mainly three interactive situational facilities:

1. Security Automation: secure access in the porch, iris identification and emergency call etc. (figure 3)

2. Communications Automation: image recording in the kitchen, preservation of public facilities, message notes, and situational lighting control, etc. (figure 4)

3. Home automation: magic mirrors in the bathroom, infrared identification, and physical check-up etc. (figure 5)

Figure 3: Electronic system automatic doors.

Figure 4: Services interface in a touch screen control panel.

Figure 5: Bathroom screen & mirror.

4. ANALYSIS OF DAILY SCHEDULE IN EACH STAGE

The research sums up the daily schedule of the six families in the table 2, in which the white bar represents personal schedule, grey bar represents the parents' schedule and black bar represents the whole family schedule. The following sections, 4.1 and 4.2, makes a comparison and analysis based on table 2.

### 4.1. Analysis of the Schedule Setting for Each Stage

During stage A and B, the parents' daily schedules must coordinate with the care and pick-up of young children, which is rather regular. And the waking-up time and dinner time takes up main part of the daily schedule that all members get together. During stage C, respective activities take up main part of the daily schedule with less common activities. And communication is concentrated during dinner time. From Table 2, we can find that A1 and B1 both have homemakers as mothers. A1 has to look after her child all day since he is very young, while B1 has much free time compared to other working mothers after her child goes to school. From the black area in table 2, we can see the time for family interaction is different, B having the most, then A, C having the least.

4.2. Discussion and Analysis

From the distribution of the black bar and grey bar in table 2, the daily life of the parents during stage A and stage B focuses on taking care of children. Especially the mother in A1, a full-time housewife, spends all the day with the children except for the sleeping time, while the father supports his wife occasionally to play with the children. During child-growing stage B, the family daily life is regular because children are in the school. The communication between father and mother is dominated by sending children to school in the morning, having dinner after class in the evening and supervising the homework of their children. During A2, the children must be taken care of by a nanny because their parents are at work in the day time. The daily life of the children should be coped with the working time of their parents. Their

interaction is similar to stage B. During Stage C, as the children in the family go to high school or university with independent activities and self-caring, they have their own recreations and interests. So the communication between parents and children is via telephone or messages, and the face-to-face interaction is when they are having dinner or watching TV together. Even the elder son and daughter hardly interact with the family members during the whole day. On the contrary, the interaction time of the parents increases thanks to their common hobbies, such as farming after work.

Table 2: The daily schedule of the six families
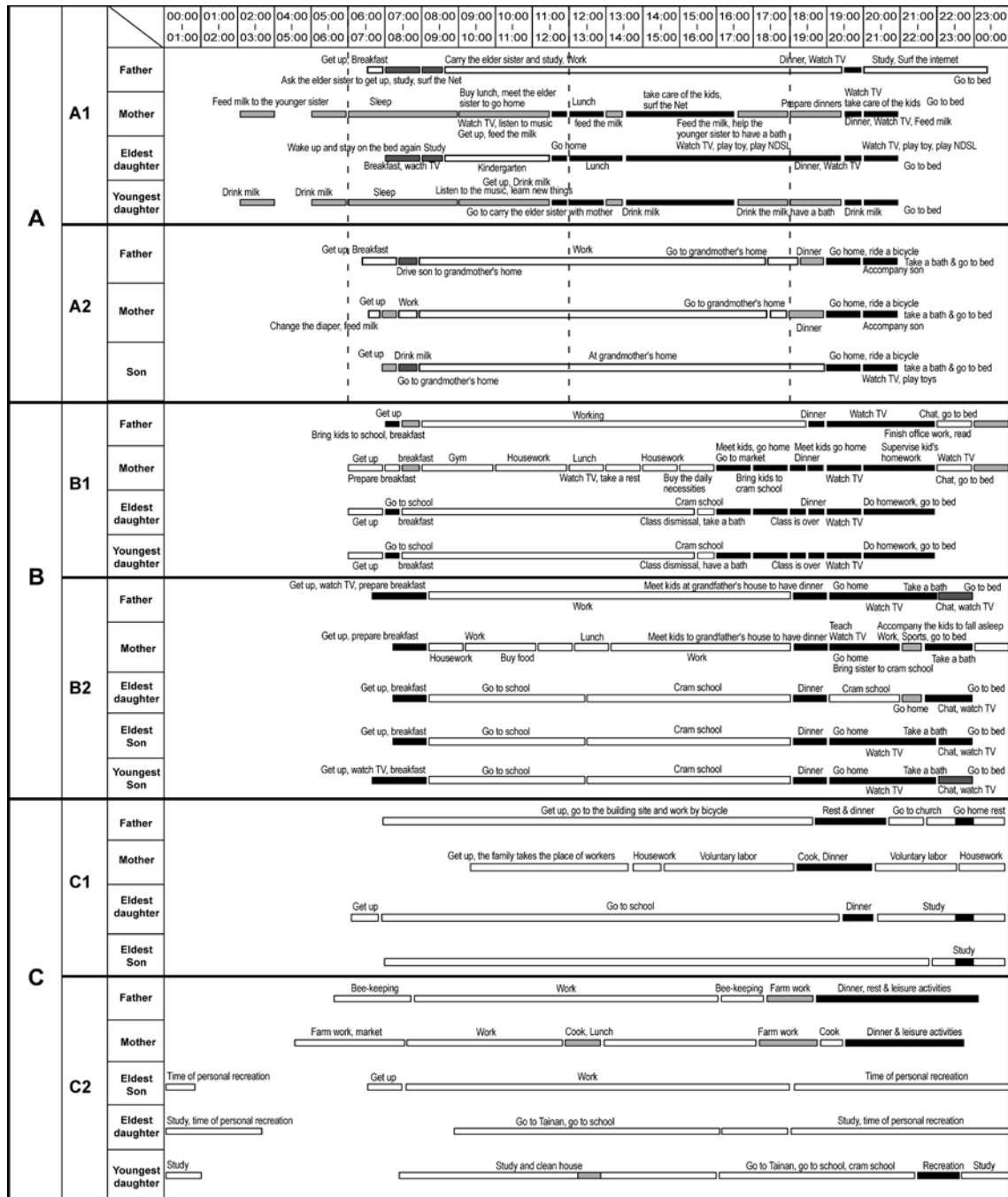
Family's interdynamic state □ -1 person activity ▨ -2 person activity ■ more person activity

5. THE ANALYSIS OF COMMUNICATION BEHAVIOR DURING THE INTERACTION IN EACH STAGE

According to Chapter 4, this study shows that in family daily schedule of the three stages, besides time and behavior activities, an interactive effect among the members is also the focus of this study. Therefore, as to the family daily schedule and necessary, contracted and free behavior, the research falls them into different categories as it shown in figure 6 where blue represents necessary behavior; red contracted behavior; yellow free behavior; green whole-family-activities; white weekday and grey weekend. Then, the research makes analysis based on the interactive communication and behavior patterns in the six families.

5.1. Interactive Communication Behavior in Nursery Stage

A1 and A2's Necessary behavior, it is the mother who takes care of child's physiological needs like bathing, breast feeding and changing diapers. In terms of contracted behavior, A1 the father sends daughter to school and the mother picks up the daughter. In A2, father sends children to the grandmother to look after them. Lastly, in terms of free behavior, parents spend most of their time accompanying children listening to music, playing toys and so on. Compared with other two stages, nursery stage has the least contracted behavior.

5.2. Interactive Communication Behavior in Child-Growing-up Stage

The necessary behavior takes up most of the dinner time in both B1 and B2 families. Table 6 shows that B1 has more contracted behavior than B2, since B2 lives near the primary school, there are differences between her and B1 in supervising kid doing homework. In free behavior, B1 likes playing badminton and B2 likes various outdoor activities and parents enjoys chatting before bedtime.

5.3. Interactive Communication Behavior in Mature Stage

Same as in the stage B, the necessary behavior mostly takes up the dinner time in both C1 and C2 families. In terms of contracted behavior, C1 the father supervises children's homework while C2 the parents do farming sometimes with their children. Meanwhile as for free behavior, C1 the parents enjoy chatting before bedtime. During stage C, children have their own thoughts and activities. Family has very few activities together besides watching TV together.

5.4. Analysis of Family Interactive Communication Pattern

Generally speaking, family interactive communication pattern falls into two categories: (1) Horizontal interactive relationship: interactive relation between parents and that between children; (2) Vertical interactive relationship: parent-child interactive relation. To Sum up the interactive communication behavior in the above six families, the research finds that the main pattern is vertical interactive pattern. Raising children features the parent interactive activities and parent-child interactive activities. In terms of stage C, children become independent and family members mainly communicate to each other by leaving messages and calling and telling your parents you are safe etc.
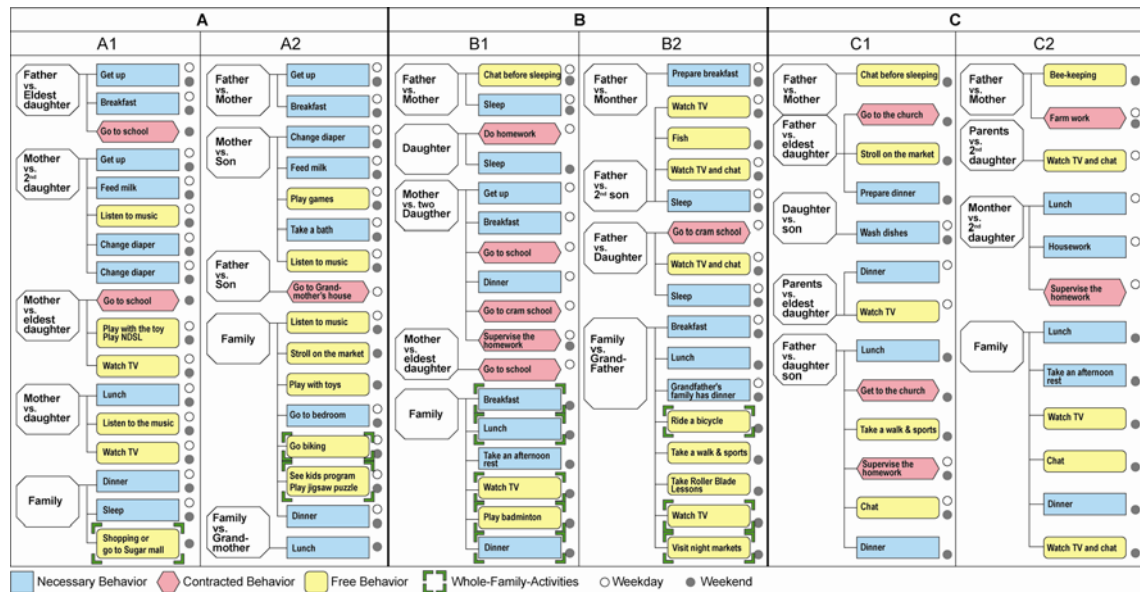
Figure 6: Decomposition diagram of lifestyles and interactive communication behaviors

6. SCENARIO DESIGN

According to the summary in chapter 5, communication problems emerge between A1 parents due to the emphasis of taking care of their children; B2 parents have communication problems during the preparation of breakfast; C2 has more communication needs in different scenarios as C2 family members often have independent activities separately from others; and C1 has parent-child communication needs due to parents work. The research respectively presents the interactive communication situation design at home and outside the home based on scenario design.

6.1. Interactive Communication Scenario Design at Home

According to the above analysis of interactive communication problems and related needs, the research conducts scenario simulation design for B2 and C2. First for the design at home: situation 1.Parents interactive communication; situation 2.Comprehensive parent-child interactive communication and child-child communication. The possible scenario design for future interaction product is as follows.

• **Scene 1**: The mother keys in the breakfast recipes and kids pick up schedule on the refrigerator display before going to bed (Figure 7-a). The next morning when the father is up, he follows the direction on the refrigerator to make breakfast and learn about the kids pick up schedule (Figure 7-b). The interaction technology in future refrigerator can apply RFID (Radio Frequency Identification), which can track how much food left in the refrigerator electronically and this will meet the interaction and communication demands of double-income couples.

• **Scene 2:** The son is upstairs listening to music and the daughter is upstairs studying (Figure 8-a). The parents return home after work and read from the interactive platform device and learn their son and daughter are both at home, so they know they have to prepare dinner for four. When the dinner is ready, the parents ask children to go downstairs for dinner by using wireless interaction device (Figure-b). For this kind of technology, you can also use blue-teeth to

transmit information to your personal computers, which can meet the communication demands of the family members if they are in different places in the future.

6.2. Interactive Communication Design both at Home and Outside

The design is based on A1, C1. Scene 4. Parents interactive communication: the father needs the help from his son; scene 3. Parent-child interactive communication: the mother learns the situation through the system and urgently informs her husband to deal with the situation.

· **Scene 3**: Elder daughter has a fever at kindergarten. The school sends her mother a message about the situation. The mother reads from the interactive display system learn that her daughter has a fever in kindergarten and has been sent to hospital. Due to the mother was busy taking care of the younger one, she notifies her husband via the system (Figure 9-a). The father sees the message from the mother on his digital phone, he hurries to the hospital immediately to take care of the ill daughter, and then informs his wife not to worry (Figure 9-b). This kind of interactive communication platform can use words, sounds, images in emergency situations to make sure family members are safe.

· **Scene 4**: The father realized he left the important construction blueprint at home when he left the house, so he immediately calls the little son at home (Figure 10-a). The son talks to his father through porch interactive remote platform and transfers the drawing to his father by distant transmission. Finally, the father got to finish the meeting successfully (figure 10-b). This kind of distant transmission platform design can be used by smart-phones, cameras, computers, etc.. This will help your family members when they are not around and need help.
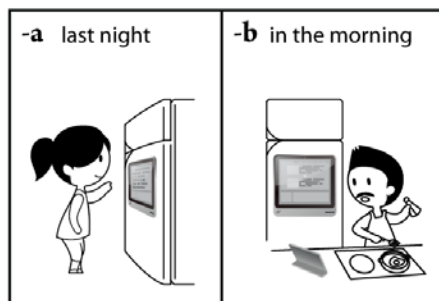

Figure 7: Interactive communication based on refrigerator which acts as the medium

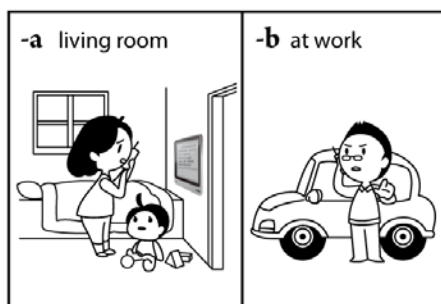**Figure 8:** Interactive communication between persons at home and outside

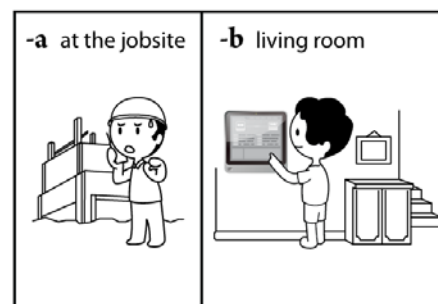**Figure 9:** Interactive communication when child is in emergency outside

Figure 10: Interactive communication between persons at home and outside

6.3. Introduction of Ubiquitous in Senario Dsign

The Ubiquitous High-Tech applied in interactive communication platform design like refrigerator or demonstration screen mentioned in the above is as follows: the research applies KES (Kansei Engineering System) and Virtual Kansei Engineering with Ubiquitous High-Tech to be the family interactive platform in the future. The following are the 4 main technologies of Ubiquitous High-Tech. (1) RFID is a kind of advanced wireless identification technology on a product, which can transmit information into computer network through microchip to identify, track and confirm the status of a product; (2) Wireless transmission technology can be divided into internal data transmission and external information exchange; (3) Zigbee can control electrics appliances and the "802.15.1/ZIGBEE in security system. It is applied in fields like digital household controlling, security monitoring, tracking of product transporting and household care etc.; (4) Sound identification technology: mobile phone, future pocket PC video-on-demand and internet devices can be applied in the platform for interaction communication in future family.

7. CONCLUSION AND SUGGESTIONS

Based on the data, analysis, and proposal in previous chapters, the research reaches the following conclusions and suggestions:

1. Through environmental observation and documents, it is found that not only human behavior like verbal communication and body language, but also environment and furniture objects are media to Kansei Engineering and help family interaction. Therefore the design of interactive communication in future family should attach more importance to the combination of human and object, so that family members can have closer emotional connection.

2. From the research, it shows many facts: the double-income trend, the situation whether mother is a full-time child caretaker in nursery stage; in child-growing-up stage, parents are busy with their work so grandparents would look after their children; in mature stage, family members need distant communication because of their different work types. So high-tech should be borrowed to confirm interactive communication devices to provide support and service, giving play to the virtual function of human-oriented technology.

3. Simulate the situation of the application of future interactive communication devices based on the introduction of scenario design, learn the need of household interactive communication, ex: taking care of children or the elder, different daily schedules and connections in different areas etc.

4. As family members have different daily schedules resulted from busy work, they have less time for face-to-face communication, therefore they need to leave messages, sound identification, security monitor, operation of household electrical appliances and other platforms for interactive communication. It proves that the introduction of Ubiquitous in future family life and the conformity of wireless communications and computer network for close communication would be supported by the future market.

REFERENCES

1. Institute of Sociology, Academia Sinica, *Taiwan Social Change Survey*, from http://www.Ios.Sinica.edu.tw/sc/, 2005.
2. Wen-Q L., *Exploring the six stages in life*, *The Island Lifestyle and Supplies Design Trends Symposium*, pp.7-1~7-23, 1998.
3. Accounts and Statistics of Executive Yuan, ROC, *Report on time-use surveys in Taiwan*, Taipei, 1988.
4. Canadas, S. 1998, Overview of the Time Use of Canadians in 1998.
5. Roberto Bolullo, *Interaction design: More than interface*, available at http://bolullo.com/roberto/topics.htm, 2001.
6. Argyle Michael, translated by Shen-C T, Szu-C W, *Physical communication*, Liwen Publisher, 1998.
7. Y Tian-Z, translated by Chong-bin H., *Reactive Interface Design —And the external world as the next generation user interface response relationship, 1996 Sino-Japanese Design Education Symposium*, National Yunlin Unversity, Department of Industrial Design, Taiwan, pp.8-15, 1996.
8. De-Y J., *The Study on Home Recreation, Parent-Child Interaction, and Interpersonal Relations in the Family of Primary School Students*, College of education, National Kaohsiung Normal University, 2006.
9. Tsung-H S., *The research on patterns of parents' social activities in nest period and the design of auxiliary devices*, Institute of Applied Arts, National Chiao Tung University, 2006.
10. Wack P., Scenarios: Uncharted waters ahead. *Harvard Business Review,*63(5).pp.73-89, 1985.
11. Anderaon, J.S, and Durney, B., Using scenarios in deficiency-driven requirements engineering, *In proceedings of the IEEE International Symposium on Requirements Engineering*. Washington, pp.134-141, 1992.
12. Y Tian-Z, translated by Chong-bin H., *Status of Kasei Engineering Development and Possibility of Long Distant Control Design*, *1998 Sino-Japanese Design Education Symposium*, National Yunlin Unversity, Department of Industrial Design, Taiwan, pp.17-26, 1998.
13. Zeisel J., translated by Hwa-S, K., *Inquiry by Design: Tools for Environment-Behavior Research*, Garden City Publisher, pp.129-163, 1996.
14. Hong-I H., *A Study Of The Generic Family Living Style And The Communication Pattern Among Family Members, Department of Design*, National Yunlin Unversity of Science and Technology, Taiwan, pp.14~18, 2008.