Digital Ritualized Interaction: Towards Conceptualizing Mediated Familial Bonding via Family Connecting Technology

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Abstract

Appropriation of connecting technology in the context of family use has revealed its affordance as mediating tool to facilitate familial bonding, as that which is beyond communication. Yet, its operationalization through the HCI design is still not extensively studied. It is postulated that the theory of Interaction Ritual and family ritual could serve as a lens for understanding of how interface design mediates such bonding in digital environment. As theories, they are specifically tailored to understanding interactions among people and technologies which further assist in conducting an interpretative analysis in producing mappings of interaction design concepts to bonding eliciting design features informed by earlier work. The model serves as a new foundation to inform appropriate design of future family connecting technology in pursuit of familial bonding.

Keywords: Human-Computer Interaction (HCI), family connecting technology, technology-mediated familial bonding, interaction design, interaction ritual, family ritual

1.0 INTRODUCTION

Today, an abundance of connecting technologies including readily available applications have been invented and investigated to connect distributed extended family members – those who are related but do not necessarily co-residence [1]. Drawing on the definition of family connection [2], we coin the term Family Connecting Technologies (or FCTs) referring to a group of connecting technologies that support families to communicate with each other, to share their lives and routines and to negotiate for being together and apart.

As "families are more closely bound together as a group of interacting persons" [3], the adoption of FCT helps bring family members together, anytime and anywhere. In the earlier studies of FCT, familial bonding merely captured insignificant attention. Later, with the burgeoning interest from society towards technology and realization of its capability in engendering affective sense while maintaining interpersonal relationships makes it essential to explore how technology is appropriated in the pursuit of such bonding. In non-mediated environment, bonding is manifested through joint activity [4] or providing care and protection [5], which can be evidenced from verbal and non-verbal cues such as facial expressions and body gestures displayed during interaction. However, the trace of bonding seems to pose more challenges within technology mediated environment as all the bonding cues are embodied in other forms. In this regard, mediated familial bonding is defined as a group property that binds family members together emerged during interaction over FCT.

This article aims to explain the interplay between technology and family practice in pursuit of bonding through the lens of Interaction Ritual theory and family ritual. Hence, we present a preliminary conceptual model of digital ritualized interaction as a mechanism to facilitate mediated familial bonding via particular design features of FCT. In particular, the contributions of this article are twofold: 1) To introduce the notion of technology-mediated familial bonding (hereafter, mediated bonding), and 2) identification of two dimensions of digital ritualized interaction with corresponding bonding design concepts and characteristics that offers better understanding as on how particular design support its operationalization.

2.0 FAMILIAL BONDING IN HCI

"Familial bonding" as a concept is rarely mentioned in the main discussion of HCI community. Thus, deprivation of a solid understanding and definition of mediated bonding has led to ambiguities in this area. Perhaps a more visible way in reporting bonding-related research in HCI is to discuss it under the umbrella terms of family connectedness and family connection that relate to bonding articulated in this article. This section presents the literature on mediated bonding and the motivation behind this exploration.

2.1 Mediated Bonding Reflections

Family connection or connectedness which are built on family awareness about other members has received considerable attention from researchers [6], [7]. Connectedness as an important value [8] defined as "positive emotional appraisal, characterized by a feeling of staying in touch within ongoing social relationships" [6] that emerged from the interaction plays a significant role for bonding family together [2]. However, the focus has been centred on investigating the issues and inventing design concepts surrounding family connection [7] without giving much attention on the fundamental aspects of how design of these technologies mediate bonding or in other hands, the conduct of it [9].

Literature has shown that study on the interplay of design and the ways family use and appropriate it for bonding are independently investigated. It can be raised explicitly, implicitly or through its obvious absence with the lack of theoretical underlying support to illuminate such conduct. Although this practice is certainly acceptable and established approach in HCI but such consideration of theory may provide rigor foundation and insights to support deeper understanding [10]. In that way, designers may predict consequences of choosing particular design decision during design pro-cess using the predictive power from those theories. This has been reflected in proposition from value-sensitive design area suggesting that any technological artefact with particular value-laden perspective should "seek to ground them within an overarching theory with intellectual commitments from the social sciences, philosophy and system designs" [11]. As such, the incorporation of theoretical insight into design space and its contribution towards understanding the interplay of technology and human aspects in mediating bonding continues to be an open research agenda. This has been confirmed through previous exploratory preliminary study which revealed the ambiguity of mediated bonding manifestation perceived by participants [12].

2.2 Digital Ritualized Interaction: The State of the Art and Open Research Issues

In discussing the manner of which interaction is conducted via connecting technology, a few has seen it as a ritualized interaction that can give rise to bonding although most are not particularly rooted in HCI domain. However, the study is limited to the shallow analysis of interaction ritual in artificial virtual families formed on the online games platform [13]. This has raised concerns whether the operationalization and affectual effects is similar to the real family setting. Although more detailed analysis of interaction ritual focusing on mediated interaction has been forwarded [14], [15], the analysis are, in many respects, too broad to understand the role of design features in digital ritualized interaction with no evidence of these research part discusses on the kind of design that may elicit bonding, particularly familial bonding as articulated. Digital ritualized interaction within FCT design is currently still in its infancy, but already some researchers have become realized to the idea. An emerging theme has been to incorporate the concept of digital family ritual into interaction design concentrating on annually enacted family ritual [16]. Design implications invented are still a hypothetical proposition deriving from 'technology-free' setting with no specific discussion on ritual aspects of family-technology interaction. Nevertheless, this paradigm shift suggests a new conception of mediated bonding from a ritual perspective but what all these studies fail to advance thus far is the knowledge of how the design mediates bonding in a form of ritualized interaction beyond extant interpretation of human-technology interaction.

3.0 CONCEPTION OF MEDIATED BONDING

While FCT design is an important research topic, and one with which we are concerned, what is proposed is more fundamental: a preliminary research model that integrates Interaction Ritual theory with design concepts that will inform future FCT design. Thus, this section describes the effort to conceptualize digital ritualized interaction as a form of mediated bonding by taking the view of Interaction Ritual Theory and family ritual.

3.1 Review of Bonding Related Design Concepts in Interaction Design

A broad spectrum of new inventions begins to appear which caters both for collocated and distributed family interaction regardless of the abundance of readily available commercial social networking tools in the market. Through a literature review, over fifty inventions and commercial applications describing design concepts, implementations and issues has been identified. These studies are characterized by the nature of family interaction: FCTs for distributed family interaction and those for collocated family interaction. Interestingly, the insights from the review has shown that flourishing interest of HCI researchers has been recognized through a longer list of FCT that cater for distributed family interaction compared to collocated interaction indicating the importance in bringing together family living separately in virtual setting. With this in mind, discussion of mediated bonding as articulated has been limited to the FCT research for distributed family interaction as reasoned earlier and further justified by the fact that more challenges lie ahead in designing technology for this sort of family [17].

There is a consensus from the literature that bonding concepts can be broadly categorized into three main areas as illustrated in Table 1.

Table 1 Bonding concepts in interaction design

Theme	Design Concepts
Context of use	Settings [18]
Design Issues	Reciprocity [19], Privacy [20] Shared context/Common ground [21]
	Emotional / Affective [22], Expression [23]
User experience	Togetherness / Unity [22] Closeness / Propinquity [24]
	Love [25] Group attraction [6]

Firstly, bonding could be mediated in the context of use. Second, bonding may involve during technology in use affecting the ways family members interacting with particular design features, and finally, bonding could potentially be transferred from the technology to the members, given the inter-action results with the emergence of group property that bind the interacting members. In other words, the latter views mediated bonding as emotional properties emerged from interaction. However, in here we only present one example of theoretical background provided in related literature for each concept. The summarized concepts highlights common aspects and concerns when designing FCT interface which are surfaced across literature. In order to identify a set of relevant and observable mediated bonding design features, we adapt Interaction Ritual theory (abbreviated as "IR" hereafter) [26], family ritual [27], [28], together with associational and affectual bonding [29] as sensitizing lens to illuminate the link between human act and interaction design concepts informed by earlier work [12].

3.2 Mapping Interaction Ritual to Digital Ritualized Interaction

In essence, IR theory outlines four main ingredients or initiating conditions of its execution: 1) Two or more people are physically assembled in the same place, so that they affect each other by their bodily presence, whether it is in the foreground of their conscious attention or not, 2) the existence of boundaries to outsiders so that participants have a sense of who is taking part and who is excluded, 3) people focus their attention upon a common object or activity, and by communicating this focus to each other, participants become mutually aware of each other's focus of attention, and 4) they share a common mood or emotional experience. The main outcomes of the interaction rituals depend to the extent that the ingredients are successfully combined and built up to high levels of mutually focused and emotionally shared attention or labelled as collective effervescence.

The digital ritualized interaction inhere is interpreted as the symbolic form of interaction carried out over the FCT, owing to bonding-related experience that users (family members) encounter through its repetition, is enacted in variable manner overtime. Sensitized by IR theory, two dimensions of digital ritualized interaction with corresponding mapping of its concepts to design concepts of digital ritualized interaction are discussed. The interpretation is made with caution in a way that conveys the bonding experience emerges from digital ritualized interaction will be the interplay between interface objects and family members (users) within particular setting or environment [30]. The following section discusses these two dimensions whereas an overview of the conception is tabulated in Table 2.

3.2.1 Bonding Constituent

This dimension serves as initiating conditions of mediated bonding. The four constituents are: 1) *Virtual family assembly* that requires two or more family members virtually gather in the similar space affecting each other that can be translated to the **shared context** that provides a common ground for users to be together as reflected in the design of Wayve [24]. The shared scrolling screen allows the interactants to play together and reflect on responses from others based on what have been sketched or

shared which consequently encourage others to be more involved in other's life. 2) *Virtual boundary* requires the existence of virtual boundary to outsiders that is aligned with **privacy** feature which allows participating family members have a sense who is included and who is excluded. Study on the design of Family Portal [20] for example has revealed that members of a family feel free to share any intended messages even to specific member on the shared space. This signifies confidentiality and trustworthy in sharing practice within family circle whom they recognize. Additionally, it provides certain level of control and assurance to users about confidentiality on their sharing materials. 3) *Mutual focus of attention* describes how family members focus their attention upon a shared object or event so that they become mutually aware of each other's focus of attention. **Reciprocity** concept fits this portrayal by establishing continuous prompts and replies signifying their focus and attention. And 4) *Shared emotion* that allows family members share a common mood by continuously exchange diverse forms of media elements that embody family members' emotion so as to convey feelings. **Expression** appears to be more aligned with the description as illustrated in the design of the Collage [31]. Family members valued the sharing of real family history and story-telling through digital photo and text which became the object and subject of mediated bonding encounters.

3.2.2 Bonding-Related Experience

This dimension serves as bonding indicators portraying the emergence of mediated bonding during interaction that may be characterized by the sense of closeness and group attraction – the sense of rightness in adhering to the group, experienced by individual family members. On the contrary, sense of togetherness or feeling being resided in the same space with the distant others is experienced by the family cluster. Whenever they emerge during online encounter, these experience is postulated to indicate mediated bonding occurrence.

Table 2. Mapping of interaction ritual and digital ritualized interaction

Interaction Ritual Theory		Digital Ritualized Interaction	
Dimension	Concept	Dimension	Concept
Ingredient	Group assembly	Bonding constituents	Shared Context
	Barrier to outsiders		Privacy
	Mutual focus of attention		Reciprocity
	Shared feelings		Expression
Outcome	Group bonding	Bonding-related experience	Togetherness (Family cluster)
	Individual emotional energy		Closeness (Individual member)
	Feelings of morality		Group attraction (Individual member)

3.3 Mapping Bonding Eliciting Design Features

Interaction ritual appears to be relevant in manifestation of mediated bonding in a form of digital ritualized interaction that consequently trigger specific user experience. In order to further understand such accomplishment through design, it is essential that we grasp the characteristics for each mediated bonding element as shown in Table 3. Framework of family ritual together with associational and affectual bonding has shed lights on this mapping.

Familial bonding is indeed a multidimensional concept [32] encompassing different facets of family life. One of the bonding theory that has received great attention in the literature has outlined six dimensions of bonding taxonomy comprising of associational, affectual, normative, consensual, functional and structural bonding [33]. However, this article focuses exclusively on the formation of bonding through *associational bonding* due to our specific interest in *interaction* although other dimension such as affectual bonding can be implicated indirectly. This accords with Jansen's work that suggestively observe bonding "in whatever ways it is manifest in the interacting between the members of families" [3]. He highlights that merely engage in joint activity does not necessarily bind family members together in the sense of diminishing the social distance, rather, bonding occurs in the *specific types of interaction* between family members; and of these interaction, patterned interaction as a subset of family ritual is commonly

enacted [28]. Interestingly, family ritual holds particular significance to bonding as it may capture important regularities [34]. Despite of being considered as the least standardized family ritual and the most variable over time, the nature of such interaction which demands the least deliberated efforts from family member has warranted its frequent enactment [28]. Two major elements of ritual are the settings describing where ritual occurs, and the dimensions referring to behaviors in performing them [27]. This basic knowledge serves as useful lens to establish understanding on mediated bonding which provides explanations underpinning such interaction.

Transferring this knowledge to the HCI studies, the notion of mediated bonding implies that sense of closeness, togetherness and group attraction experienced by family members depends on the right blend of interaction with particular design features. Such senses will influence the subsequent staging of digital ritualized interaction for bonding the members technologically. For instance, the captured memorable scene from the big family co-present event like a wedding could be restated, dissected and reinterpreted through manipulation of design features. This encourages the inclusion of others (involvement) who were physically absent during the event. At this point, another sort of family gathering is taken place within virtual space restricted by privacy enactment (framing). This allows members to discuss their mutual past actions (setting) with people they recognize as family members (recognition). Others could show their anticipation for the oncoming family event which lead to the mutual reciprocity. Such mutuality is described by the establishment of continuous prompt-and-reply from members in ritualized interaction characterized by the focus and engagement. This intensifying reciprocity signifies the shared reflection within common mood expressed through myriad emotions embodied in various forms such as emoticons, emoji, photo, audio, video clips, and text.

As a results of such interaction, bonding-related experience will emerge that influence the staging of another family digital ritualized interaction. It may occur in a variety of settings which partially form the shared context. The settings ranging from uniquely family online activity, such as event planning and coordination to culture-specific activity, such as disseminating religious materials that reflect the collaborative aspect of digital ritualized interaction.

Table 3 Bonding eliciting design features

Element	Characteristic	Observation
(*Virtual family assembly*) Shared Context	Type of settings [22]	What it is that users do together
	Continuance [35]	Repetition of occurrence
	Involvement [24]	Representation of user's attendance
(*Virtual boundary*) Privacy	Framing [20]	The environment in which the events are carried out
	Recognition [6]	Users' capability to recognize others
(*Mutual focus of attention*) Reciprocity	Engagement [6]	Users' temporal patterns of action within experience to show their commitment
	Focus [24]	What is the focus of their social actions intended to be.
(*Shared emotion*) Expression	Affectual [22]	What is the common mood
	Shared reflection [35]	How users express coordinated mood

4.0 CONCLUSION

It is realized that strong familial bond is prevalent across cultures in collectivist countries such as Malaysia and China but, even in countries where individualized societies are prominent still this family value is paramount and regaining its importance nowadays. However, demands on career and education advancement have forced people to migrate, creating a scenario of contemporary families that lead hectic lifestyles. FCT helps bring family members together by providing a platform for bonding them together. Current bonding-related research in HCI is challenged by inconsistency in bonding indicators and is further confused with overlapping conceptualization of mediated bonding due to the diversity of current research focus. It seems that for the time being, fundamental understanding on technology mediated familial bonding is relatively heterogeneous leading in various often unrelated directions. Therefore, instead of reinventing the wheel in investigating the same design issues and concepts that might arise surrounding this family (human)-technology interaction, a model which describes an underlying mechanism of connecting technology in mediating familial bonding has become increasingly necessary and apparent. The model contributes to

the CSCW area in particular HCI field as a new foundation to understanding mediated familial bonding as a form of digital ritualized interaction. Besides, it provides initial pointers to future investigation of mediated bonding across domains and contexts. To the practice, they may use it as a guidance in designing interface of FCTs that could warrant mediated bonding which yield relevant experience upon interaction. Thus, it can reduce the design time and effort through providing justified understanding of particular design decision. This will benefit the families as well by securing their relationships mostly for those who are geographically separated.

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