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# A Persuasive Game for Social Development of Children in Indian Cultural Context

## -A Human Computer Interaction design approach

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***Abstract*— In this paper, we present a Human centered Human Computer Interaction design approach for conceptualization of Persuasive games relevant to Indian cultural context. Core of the protocol process adopted involved semi-structured interviews with nineteen Indian families, where parents have reported certain behaviors, which they wished to change in their children in a positive way. On qualitative evaluation of parents' responses using Fogg's behavior model as the basis, it was found that "diffidence" or "shyness" is one such behavior that demands most from the children in order to bring a positive change using the medium of digital games. The game units such as characters, objects, and environment were derived from the analysis of field notes of the semi-structured interviews. We have used a method analogue to "Grow-A-Game" technique to generate the game concept.**

**Ultimately, we present a final persuasive game concept which is intended to bring about positive changes in children' diffidence and shyness behaviors.**

***Index Terms*— Persuasive Technology, Digital games, Qualitative Research**

## I. INTRODUCTION

With rapid advances in technology, especially in the field of Human Computer Interaction, the practice of game designing has gone beyond mere entertainment. Today's gaming market is rife with plethora of games, which not only entertain their users, but also have some intention of training or positively influencing their users for special purposes. Such games are termed as serious games[1]. Serious games can be further classified into Persuasive games, games that unconsciously influence their gamers. This is in line with the most widely accepted definition of persuasive technologies: Technologies intended to change attitudes or behaviors[2].

Therefore, Persuasive games can be classified as sub-domains of persuasive technologies, which change the attitudes or behaviors through a gaming experience. Researchers have explored various genres of behaviors that can be targeted using the findings from persuasive technology. For example, Human well-being[3, 8], Environmental attitudes[4], Energy conservation [5], Attitudes towards climatic changes[6], Trusting behaviors[7] , reading and writing behaviors[9] et cetera are various potential human behaviors which have been addressed and examined by the researchers active in this domain. Barr et. al[10] in their paper have reflected upon the persuasive power of several non-serious games (games designed only for entertainment) such as "Half-life2", "Fable", "Grand theft" et cetera. Their research supports Fogg's[2] suggestion of games as powerful persuasion tools. If non-serious games have such a considerable amount of innate persuasiveness in them, we believe that when such games are designed with an intention of persuading their gamers, their effect will be considerably higher.

There are several persuasive games currently available in the market, which have proved themselves as successful products. These games have targeted simple behaviors such as persuading gamers to exercise as in case of the game "Wii Fit"[11], influencing them for food distribution as proposed by the game "Food Force"[12], similarly, persuasive games have proved their potential in influencing and bringing about positive changes in much more complex and uncommon behaviors. For example, the game "America's Army" is intended to persuade young Americans to join American army[13]. Similarly, "Amnesty the Game" aims at persuading people to stand against the practice of death penalties[14].

Although, the proliferating number of persuasive games certainly signifies an active research work going on in this stream, it is observed by the authors of this paper that most of the available persuasive games have been designed only in the context of western culture. As evident from the research by Khaled et. al.[15], persuasive power of a persuasive game is highly dependent on culture of the message recipient and to the best of our knowledge persuasive games have not been designed in Indian cultural context. In this research, we intend to explore the potential of persuasive games within Indian Culture context. This paper presents a game design process using a HCI design approach in the designing of a persuasive game for Indian users.

## II. USER RESEARCH

In designing effective persuasive technologies, the eight-step design process by B.J.Fogg[16] has been adopted. The eight steps of the process include choosing a simple behavior to target, selection of receptive users, identifying the hindrances to the target behavior, finding appropriate technology media, finding relevant examples, imitating the examples and testing & iterations[16]. In this section, we will be discussing about the first two major steps namely: identifying the target behavior and receptive audience. Fogg in

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his research also suggests that the sequence of the first four steps can be varied depending upon the requirements of the project.

Although games allure people from all walks of life, from adults to children, senior citizens to working youth, survey reports suggest that the considerable portion of the market segment is constituted of children[17]. In this research, we have chosen children as our target users. In order to identify the target behavior for our game, we have conducted semi-structured interviews with children and their parents. The reason we have selected both parents and children is that the attitude and decision making by parents and children when buying a toy or a game is found to be almost the same[18]. Statistical reports also suggest that in most of the cases parents are present with the child while purchasing a game[17]. We have conducted these interviews (45 minutes to 1 hour long) with 19 families residing at the campus of Indian Institute of Technology Guwahati, India. There were around nine families with male child and ten families with female child. All the children interviewed were school going and had English as a medium of instruction in those schools. The age groups of these children ranged from six to twelve years. The goals of the user-research were:

1. Identifying certain behaviors in children, which their parents wished to change positively.
2. Various factors from the daily life of children, which motivate or encourage them to do certain tasks.

The purpose of the first goal was to identify the target behavior to persuade using the persuasive game. The second goal was to identify factors contributing to the creation of game entities such as game characters, environmental assets and positive reinforces.

The semi-structured interviews were divided into two sections. The first section was a simple question & answer session, where parents were asked basic questions about their children' daily routine, habits, likes and dislikes. The observations and responses during the question/answer session were recorded in the form of field notes. In the second section, parents were presented with five assumptive games. The authors conceptualized these assumptive games by randomly selecting the images of existing games and knitting a hypothetical persuasive game concept. The interviewer informed parents that these games were designed with a special purpose of changing certain behaviors in children. Interviewer then asked the parents to rate these games in order of their preference. In addition, they were asked to provide their own suggestions on specific changes they wish the game to have, if it were designed for their own child. Since, the assumptive games presented were from different genres namely action, adventure, puzzle, sports et cetera; this task gave us a glimpse of parents' preferences of game genres, which they find suitable for their children. Furthermore, when parents were asked to give certain feedback on the presented assumptive games, their responses yielded a concrete idea about the behaviors they wanted to change in their children. For example, one of the parents when presented with these games voiced his opinion against them because; the games did not address the improvement in moral behavior. Similarly, all the interviewed parents have expressed some aspect of their children' behavior which they wished to change positively. This way we have collected information pertaining to the goals of the user research. Since the recorded information was in the form of field notes from the interviews, we have used the method of repetition as advised by Bernhard & Ryan[19] to identify the recognizable themes from the responses. Figures 1, 2 and 3 summarize the results of the user-research.

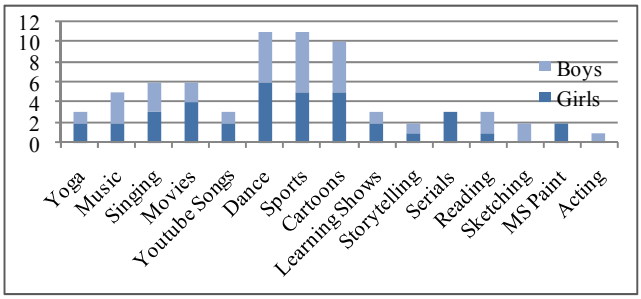


Fig.1. Gaming preferences of the interviewed children

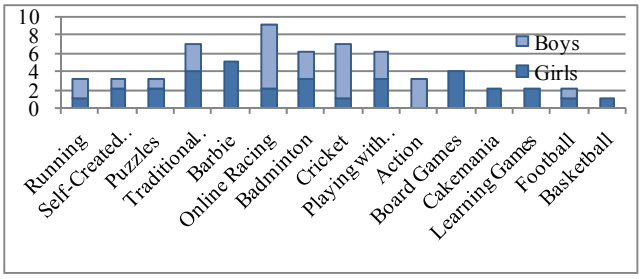


Fig.2. Gaming and sporting preferences of the interviewed children

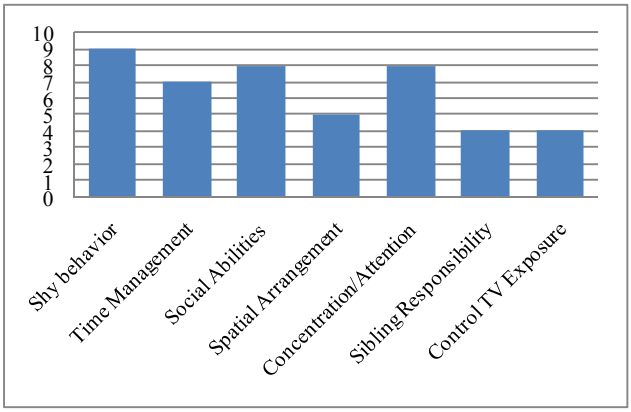


Fig.3. Various Identified behaviors from the interviews

The vertical axes of these figures represent the number of responses corresponding to the interview questions. Pertaining to the first goal of our user research, we have identified seven behaviors, which have appeared repeatedly in the responses of the families interviewed (see Fig3). These behaviors are: 1) Shy behavior- social anxiety and diffidence in talking to new people, 2) Time management- doing things

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on time and managing the daily schedule, 3) Social abilities- helping others and having empathy for other people, 4) Spatial arrangement of personals- arranging personal belongings in place, 5) Concentration and attention- concentrating on a given task, 6) Sibling responsibilities- Taking care of their siblings with responsibility, and 7) Controlled T.V exposure- spending less time on television. Nine out of nineteen families have expressed "shy behavior" as a behavior they wished to change in their children. Figure1 & Figure2 show the results of our second goal of user-research. We have identified that dance; sports and music are highly favored by both the genders. Similarly, we have gathered data about their gaming preferences. The results suggest that boys have more inclination towards cricket, online racing and action games whereas girls have shown their interests majorly in traditional, simulation and board games.

## III. Identifying the Target Behavior to Persuade

Fogg's[16] eight-step design process for persuasive technologies heavily emphasizes on targeting simple behaviors to persuade. Since, we had a pool of behaviors from our user research, which the parents wanted to change positively in their wards; we had to select one of those behaviors, which is most severely identified by the parents. In order to find out the exact target behavior, we have adopted Fogg's behavior model[20]. Fogg's behavior model states that behavior change is dependent on three fundamental elements: motivation, ability and trigger. That means if for a particular behavior, the parameters motivation, ability and trigger are higher, the chances of positive changes in that behavior are higher. Fogg's model can be summarized by the equation:

$$B=m*a*t$$

*(At the same moment)[20]*

In this equation, B= Behavior change, m= motivation, a= ability and t = trigger. It is important to note that the values of motivation, ability and trigger should be of the same moment at which behavior change is anticipated. According to Fogg, motivation here is governed by three main factors sensation, anticipation and social cohesion. Sensation represents the pleasure/pain dipole, anticipation represents hope/fear dipole and similarly social cohesion represents social acceptance/rejection dipole. Ability in Fogg's behavior model is the strength of the user (children in our case) in bringing the behavior change. That means higher the ability, easier is the behavior change. Trigger represents the affordances, cues or signals present in the environment at the very moment of the behavior change. Figure 4 gives a pictorial presentation of Fogg's behavior model.

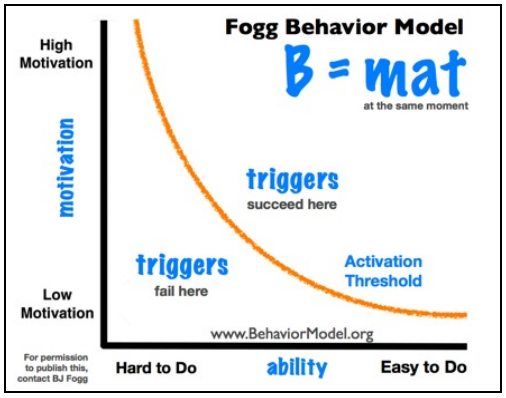


Fig.4. Fogg's behavior model (adopted from Behaviormodel.org with permission to reproduce)[19]

We have qualitatively evaluated the behaviors obtained from the user research using Fogg's behavior model. In this evaluation, we have evaluated each behavior using three factors motivation, ability and trigger. From the observations of our semi-structured interviews with parents and their children, we have assigned "low", either "medium" or "high" to each of the three factors motivation, ability and trigger. For example, if a particular behavior change is highly exacting in nature for our interviewed children then the ability factor gets a value "low". Similarly, if the environment is not motivating enough to bring that behavior change then motivation factor gets a value "low", since both ability and motivation are low, referring to the Fig4, trigger should also be "low". Table1 illustrates the results of the qualitative evaluation of the seven behaviors using Fogg's behavior model.

TABLE I. RESULTS OF EVALUATION OF IDENTIFIED BEHAVIORS USING FOGG'S BEHAVIOR MODEL

| Social development skill (Target behavior) | Motivation | Ability | Trigger |
|---|---|---|---|
| Shyness | L | L | L |
| Time management | M | L | L |
| Spatial arrangements of personal resources | M | L | L |
| Social abilities | L | L | L |
| Concentration and attention | H | L | M |
| Sibling responsibility | M | L | L |
| Controlled T.V. exposure | L | M | M |

In Table 1, "L" represents low, "M" medium and "H" high. Using this evaluation, we have established that "shyness" is one such behavior that really needs to be changed positively in children, as well as it corroborates the results from our field notes taken in the semi-structured interviews, where majority of the parents have expressed the need to make their children more sociable.

In later sections, we will be discussing the conceptualization process of our game using the insights from Fogg's behavior model.

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## IV. Conceptualization of the Persuasive Game

According to Fogg's behavior model, high ability, high motivation and appropriate triggers govern the behavior change at that moment. Therefore, in our game, we intend to increase the values of these three governing factors. In order to bring a behavior change at a moment in the game, we decided to increase player's ability or strength of doing the task. Similarly, we will be incorporating certain reinforcements to enhance player's motivation. The increased ability and motivation will lead to clear signals or triggers for the player to go for a behavior change. Furthermore, Persuasive technology literature suggests that effective persuasive gaming is achieved by incorporating three fundamental strategies namely "conditioning"-positively reinforcing the target behavior performance, "Self-monitoring"- enabling the player to scrutinize his/her own performance, and "tunneling"-directing the player through a pre-conceived storyline[2]. Using this as a chassis for the game, we proceed to the concept generation.

In the concept generation phase, we have first enlisted the basic constructs of our game namely Game genre, Target objective of the behavior, existing game played by the children and the motivational factors that encourage children to do certain tasks. All these constructs were derived from the results of our user research. Later, we populated the individual constructs with as many examples as possible. However, the examples were ensured to be relevant to the children interviewed. For example, existing games were derived from the games that were popular amongst the children interviewed in our user-research. Similarly, the target behavior "shyness" was further categorized into the sub-targets namely expressiveness, involvement in discussions, openness in classroom et cetera. To generate a concept out of the pool of data, we have adopted a technique analogue to "Grow-A-Game" method coined by Belman et al. [21]. In this method, we have selected random keywords from the aforementioned populated lists of game constructs and then using the four keywords, we have generated an abstract game concept. That means, if the number of items in the four lists of constructs were L1,L2,L3,L4 respectively then the total number of abstract concepts generated will be L1*L2*L3*L4. For instance, in one such concept, we have randomly selected 'action' as the game genre, 'openness in classroom' as a target behavior and 'playing with friends' as a motivational goal from user-research. On knitting these elements together, we arrived at the concept of an adventure game, where player has to find certain objects taking the help from other game players. In this way, we have generated fifteen abstract concepts out of which, three were selected for the final concept. Based on the difficulty levels of the concepts, they were accommodated in the different levels of the game. Figure 5 gives a schematic illustration of the idea generation technique used in this game design process.

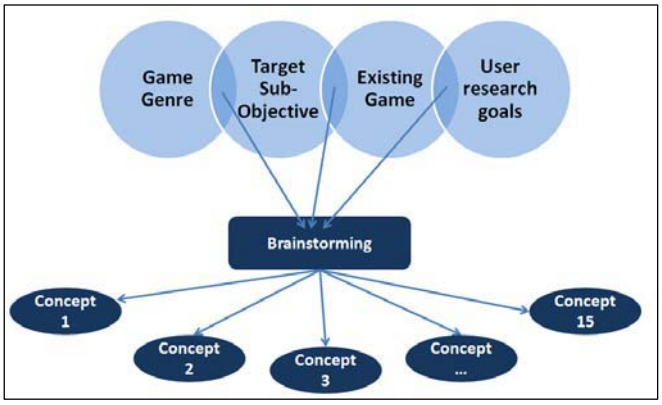


Fig.5. The technique used to generate instant abstract game concepts

## V. The Final Game Concept

The final concept, which is a digital game to be played on a personal computer, composed of three levels of difficulty for the gamer to clear. These three levels were the extended versions of the three abstract concepts selected from the idea generation technique. Keeping in mind "shyness" as our target behavior, we have sketched the game's protagonist as a newcomer in a school. The aim of the game is to clear all the levels by establishing an interaction with the other characters of the game (school students in our case). Therefore, in a holistic view, the game aims at persuading its users to interact with more and more people and to be more sociable by shedding their diffidence. Although, the game has been designed for both the genders of gamers, for the sake of readability, we are only addressing the male protagonists in this paper.

In level one, the bullies in the school bus torment the protagonist. Since he is a newcomer, he is not familiar with any of his schoolmates. Therefore, in order to play the level, he can either make new friends to fight against the bullies collaboratively or else, he can attack the bullies himself/herself. However, if the he chooses to interact with the school students, he can clear the level faster than without interacting with any of the schoolmates. To keep a track of player's performance in the game, we have provided a control panel for all three levels. The control panel for the first level consists of player's strength, number of friends made and number of bullies knocked down. Player has to click on the game characters, to activate an interaction. If the player confirms to the way the other person expects him to interact, then the friendship strength on the control panel increases, which in turn increases the overall strength of the player. This pattern of interaction is incorporated in all the three levels of the game.

In level two, the bullies vexed by their defeat in the first level, hide all the personal belongings of the protagonist. In this case, the player has an option of either finding the objects himself or again make some new friends and take their help in finding their personals. Again, in the latter case, he can ace the level in lesser time than attempting to clear the level himself.

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In the last level, protagonist has to face the hegemony of cartoon television antagonists, which pop out of the television sets. In this scene, he is alone at home. In line with the previous levels, he has to interact with the kids in the neighborhood in order to make a stronger team, which can fight against the television monsters. With each level, the difficulty level of interacting with new characters increases, therefore, making the game more engaging and exposing the player to various circumstances where shedding diffidence has its advantages.

The variables of Fogg's behavior model ability, motivation and trigger have been manipulated in the game in all three levels. The motivation of the players is increased by using affordances for the possible rewards of certain decisions made during the game. The increased friendship strength and overall strength enhances player's ability to go for a behavior change. Since in the beginning of the game, the player cannot be expected to have information about the actions that lead to a better performance, the player's ability initially is increased by providing textual cues in the interface. The presence of such cues in the interface also acts as initial triggers for the behavior change. Figure 6 given below presents the User-Interfaces of the final game concept to be played on a personal computer.

**Level 1.**
The bus scene: The control panel consists of clock, player's life, his/her level of friendship with the stranger and number of bullies knocked down. The textual cue at the top of the interface acts as the initial trigger for behavior change.

**Level 2.**
The classroom scene, where bullies hide all the belongings of the protagonist. Here the additional entities in the control panel are found objects, number of locker keys gained and number of new friends made.

**Level 3.**
The home scene, where protagonist has to fight the television monsters. The control panel in this scene consists of amount of food gained, number of new friends made, number of monsters killed and amount of paper balls left to attack.

Fig.6. The User-Interface of the final game concept (Level 1, Level 2 and Level 3)

In addition, we have included some customization features in the game such as selection of the gender of the protagonist and language selection (Hindi and English). These features have been incorporated keeping in mind the possibility of both male and female gamers.

## VI. Conclusions

In this paper, we have discussed about the human centered design approach of designing a persuasive game for Indian children. We have presented various crucial stages in a persuasive game design process. The user-research phase highlights the potential of semi-structured interviews as a data-gathering tool for the game design in Indian cultural context. We have extensively used Fogg's Behavior Model, which has shown to be useful in justifying the qualitative analysis of our semi-structured interviews. Particularly, it has helped us in establishing 'shyness' as the most appropriate behavior to be targeted by the final game. The conceptualization phase of the game explores the use of techniques similar to "Grow-a-game" to generate abstract game ideas instantly and using these ideas in detailing out the game story and levels. Finally, this paper presents the concept of a persuasive game that is intended to persuade Indian children to be more sociable and interactive with people.

We posit that persuasive games do have a strong potential to bring positive behavior changes in Indian children. Looking at the dearth of such games in Indian market, we believe that there is a considerable scope of research and development in this domain of serious gaming. This research intends to dispel the notion that parents have regarding digital games being alien to Indian culture & being more of a nuisance useless value from which to protect their children from.

## VII. Limitations

Although, this paper presents a thorough design process of a persuasive game concept, there are certain limitations in the process. In this research, we have interviewed only 19 families. Even though the interviews typically lasted for 45 minutes to 1 hour, we still believe that conducting such interviews with more number of families will fortify our results. Moreover, the evaluation done using Fogg's model is purely qualitative in nature, therefore, researchers should also explore the quantitative methods of using such models for identifying the target behavior in the process of creating persuasive technologies, especially persuasive games.

The game concept presented in this paper has not been tested for persuasion yet. However, in our current continuing studies we are conducting experiments to test the persuasive power of such games in Indian cultural context. We believe that testing this game for persuasion will give us more insights on the human-centered approach to design persuasive games.

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parents who have actively participated in our interview sessions.

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