Augmenting Remote Trading Card Play with Virtual Characters used in Animation and Game Stories

- Towards Persuasive and Ambient Transmedia Storytelling -

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***Abstract*—Using well-known virtual characters is a promising approach to enhance information services, since such characters provoke people's empathetic feelings easily, and it is also easy for people to recall the leitmotif of the character's fictional stories. In Japan, recently, it has become a popular culture to use famous virtual characters of animations and games in various services, and this has even become a main business activity for some companies. In the real world, our daily life consists of various social activities, and virtual characters offer the possibility to enhance these activities. For example, our current social activities might be gamified by replacing unknown people with our favorite virtual characters or might be augmented by the characters' stories.**

In this paper, we present *Augmented Trading Card Game* that enhances remote trading card game play with virtual characters used in the fictional stories of popular animations and games. We show our observations about the way players use the system, realizing the game, and what their feelings and impressions about the game are. We believe the obtained results would be useful to consider how to use empathetic virtual characters and the fictional story that the characters are used in, in the real world activities for future information services. We also discuss how our approach can be extended to design a new type of transmedia storytelling by considering *Augmented Trading Card Game* as one form of transmedia storytelling.

Keywords - Empathetic virtual characters; Game design; Augmented reality; Trading card game; Ideological metaphor; Animation and game stories; Physical tangibility; Transmedia storytelling

I. INTRODUCTION

Virtual characters are widely used in our daily life, recently. For example, famous Disney characters like *Mickey Mouse* and *Donald Duck* provoke our empathetic feelings easily anytime and anywhere, and *Kitty* and *Pokémon* are now found all over the world [1]. In animations and games, each virtual character has its own personality and story, which can be used as a medium to convey special information and messages to people. If people are familiar with the fictional story of an animation or a game, then the story's characters are able to recall the leitmotif of the story easily without much additional information but by just performing some action/interaction with the story's character. Specifically, many Japanese animation and game stories contain serious ideological messages that are important to make our daily life more desirable. We believe that this observation is very important when considering how to use virtual characters in various future information services in the real world. Recently, our daily life is becoming more and more complex, and we need to process a lot of information everyday. In our modern society, there are many real social problems that need to be solved urgently. However, it is hard to convey important ideological messages to people without presenting a large amount of additional information to them. For example, education is a traditional heavy-weighted method to teach the importance of ideological messages without long learning time.

In the contemporary Japanese society, several posters for public service announcements have adopted the idea to use virtual characters from recent popular animation stories. For example, *K-ON!* has been used for promoting a national survey in Japan [24]. In the story of *K-ON!*, high school girls try to realize their dreams with cooperative efforts among them. This becomes a persuasive message conveying the idea that everyone's participation is important for the national survey. Also, NFGD that promotes guide dogs' training has created two posters using popular characters from *Puella Magi Madoka Magica* [26]. The girl that has been used in one of the posters is rebellious, but very considerate to her friends. The girl used in the other poster is very close to her friend and keeps thinking and caring of her friend even when they are far from each other. Many young girls admire these two girls, nowadays. If people want to imitate these magic girls, then the posters contain the implicit, strong persuasive message that becoming a puppy walker is one of the ways to become like them. These examples show the effectiveness of using virtual characters that have their background stories to attract people. Moreover, they are a good evidence that virtual characters could be used to convey ideological messages that might play significant role in changing people's current attitude. In Japan, the majority of young people have been enjoying animation and game stories for a long time and they know the popular animation and game characters and their stories very well. This we believe is a good prerequisite for using virtual characters to enhance emotional feelings and successfully convey ideological messages through the characters' stories.

This paper presents *Augmented Trading Card Game* (*Augmented TCG*) for playing the *Yu-Gi-Oh! Trading Card*

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Game (*Yu-Gi-Oh! TCG*) between two players who are located in different places. The system, realizing the game, supports the remote trading card game play with virtual characters. We consider two possibilities to use virtual characters in the game. The first one is to show a virtual character representing the opponent player, where the movement of this character is synchronized with the current real movement of the opponent player. We believe that this movement synchronization gives the character more reality, which allows us to easily remind the players the leitmotif of the characters' stories containing some ideological messages. The second idea is to include another virtual character, which is actually the virtual character of the character depicted on one of the player's cards. This character would encourage the player to win during the game. Some *Yu-Gi-Oh! TCG* players are very keen on collecting cards and they feel strong empathy with their cards. Moreover, they even feel the characters illustrated on their cards as their close friends. Therefore, the communication with the characters during the play would have a very strong influence on the players.

In *Augmented TCG*, we use popular virtual characters that have been used in Japanese animations and games. Specifically, the *Yu-Gi-Oh! TCG* has been originally introduced in the *Yu-Gi-Oh!* comic and animation. One of the reasons why *Yu-Gi-Oh! TCG* is popular in Japan is the fact that almost all young people have first enjoyed the comic and the animation story and then learnt how to play the game from that story. The story also teaches some important ideological concepts such as the importance of justice, friendship, bravery, positivity, and thoughtfulness. That is why we believe that the characters of the *Yu-Gi-Oh! animation* story can be used to enhance the playing style of the game through the stories they carry and recall. In this research we are interested in investigating the impact of the presence and behavior of the 3D virtual characters on the players' emotions and feelings, and the play style of the game. For that purpose we conducted a user study in which we observed the participants' attitude during the play, and interviewed them after that. Furthermore, we discuss that *Augmented TCG* is considered as one form of transmedia storytelling. Transmedia storytelling is the technique of telling a single story or story experience across multiple platforms and formats using current digital technologies [4]. Our approach enhances an original fictional story in corporation with a real world game or social information service to create a new story that a player of the game or a user of the social information service participates in. We also extract the basic concepts from *Augmented TCG*, and present a design framework for designing a new form of transmedia storytelling, and as a next step we would like to investigate the effect of using virtual characters from animation and game stories in our daily activities.

The remaining sections are structured as follows. Section II shows an overview of *Yu-Gi-Oh! TCG*. Section III presents some issues for designing remote trading card play. In Section IV, we present *Augmented TCG* and describe its experiments. Section V discusses that *Augmented TCG* is considered as a new form of transmedia storytelling and our design framework for designing a new form of transmedia storytelling. In Section VI, we show some related work of *Augmented TCG*. Finally, Section VII concludes the paper.

II. YU-GI-OH! TRADING CARD GAME

The *Yu-Gi-Oh! TCG* [29] is a trading card game based on the Duel Monsters game that is portrayed in the popular *Yu-Gi-Oh! comic*. *Yu-Gi-Oh! cards* are categorized into three types: *Monster*, *Spell* and *Trap* cards. A *Yu-Gi-Oh! TCG*'s player structures his/her own original deck by selecting his/her favorite cards from the several thousands *Yu-Gi-Oh! cards*, currently released. This leads to each user having his/her own unique and original deck that reflects his/her own personality and taste.

Figure 1. Playing Trading Card Game.

Yu-Gi-Oh! TCG is a turn-based game, which is played in a one-to- one or two-to-two manner as shown in Fig. 1. We call the battle with *Yu-Gi-Oh!* cards a *duel*. Each player starts the game with a certain number of points called *life points* and performs the duel by summoning his/her monsters, battling against the opponent with his/her monsters or using spells and traps. Depending on the action taken and the outcome of it, the *life points* decrease or increase. If the *life points* of one of the players become zero or he/she cannot draw cards from his/her own deck, then that player loses the duel and the game ends.

The *Yu-Gi-Oh! TCG* involves various sources of enjoyment, besides just playing the game, such as completing collections of cards, structuring decks, communicating with the opponent players, trading, battling, as well as establishing different links to *Yu-Gi-Oh! TV animations* and *Yu-Gi-Oh! comics*. Moreover, although computerization has advanced a lot currently, the traditional version of *Yu-Gi-Oh! TCG* that does not use a computer but paper cards is still very popular among players.

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III. REMOTE TRADING CARD PLAY

In Japan, as already described, trading card games like *Yu-Gi-Oh! TCG* are very popular among children, but most of them stop playing the games when they become adults since they have no time to meet and play with other people any more. However, because of the complicated rules and interesting strategies, trading card games are still very attractive and popular among adults. That is why playing a trading card game with a remote opponent player has become a typical play style in the busy modern society. In many other games like *Go*, *Chess, Poker* and *Mah-jong*, the remote play style becomes more and more popular as well. In this section we describe some problems and limitations related to the existing remote trading card play.

There are already several systems that support remote trading card play. *Yu-Gi-Oh! TCG* on *Nintendo DS* uses *Wi-Fi* to connect remote players. However, in this version, the trading cards are digitally represented and thus, players do not have the sense of the physical tangibility of the cards, which decreases significantly the pleasure and enjoyment of the game for some of them [16]. Specifically, the physical tangibility of the cards is essential to make players feel empathy with their cards. *Yu-Gi-Oh! Online* also offers a similar play style on personal computers, and suffers from the same flaw. Therefore in order to improve the described limitation of the existing systems, in *Augmented TCG*, we allow players to use their own, already collected physical paper cards.

As described in [16], we have found that some players would feel uncomfortable communicating directly with a real opponent player when the opponent player is a stranger for them. However, using just an avatar to represent the opponent player, as in the existing online trading card games, does not offer enough reality for the opponent player. We believe that using virtual characters from animation and game stories to represent the opponent players, whose behavior is synchronized with the behavior of the opponent player, would offer more reality than the avatars used in the current online trading card games. Also, trading card games in Japan are very closely related to comic, animation and game stories, in which the trading card games are part of the stories. That is why players usually relate to these stories and their characters while playing the game, which makes the game even more enjoyable for them.

In the current online trading card games, some players tend to disconnect from the game if they are going to lose. Specifically, it is a typical behavior of players whose only goal is winning the game. Such players feel pleasure and satisfaction only when winning the game and do not just enjoy the gaming process. This “unfair play” becomes one of the reasons for many trading card game players to dislike playing the online versions of the trading card games [16]. However, even unfair players know the comic, animation and game stories well. As described before, the characters in these stories convey ideological messages like the importance of friendship and the pleasure of honest and fair play. Involving these characters in the game would remind the players these ideological messages and encourage their desirable fair play style.

Many Japanese young adults admire animation and game stories and this strong worship has started and developed since they were children. If some of the hurdles to use remote trading card play vanish by solving the problems described in this section, many people will continue playing the game even when they become adults. If young adults keep their passion on the Japanese modern culture, this will become a power to successfully change our current undesirable social situations.

IV. AUGMENTED TRADING CARD GAME

A. Overview of Augmented Trading Card Game and its Experiment

Augmented TCG enhances the remote trading card play performed by two persons. The basic design approach is similar to the one of the augmented reality games introduced in [19], which integrates physical items and virtual items. As shown in Fig. 2, the two players are located in different places. Each player’s cards, in his/her duel field on the table in front of him/her, are captured by a camera and projected on the opponent player’s table.

Also, each player is represented by the 3D model of a virtual character used in popular animations and games, and this character is shown to the opponent player. In the current implementation, *MikuMikuDance* [25] is used to show the 3D models of the virtual characters. *MikuMikuDance* is free software for creating 3D movies by using virtual characters. The virtual character is controlled using *MS Kinect* and its movement is synchronized with the movement of the opponent player. In the current *Augmented TCG*, a player can choose one of three virtual characters that are *Yugi* and *Kaiba* from the *Yu-Gi-Oh!* animation story, and *Link* from The *Legend of Zelda* [27]. In the *Yu-Gi-Oh!* animation story, *Yugi* is always surrounded by many friends and his winning success is a result of his strong bonds with his friends who love the trading card game. *Kaiba* is a lonely hero and he always seeks the strength in the game, but he does not accept other people’s help even if he is in a critical situation. However, in the story he also finally understands the importance of friendship. Most young boys want to follow either of these two characters because of their typical, very attractive and ideal personalities. The reason to choose *Link* as the third character in our experiment is that we would like to investigate how a popular character from another unrelated to TCG story affects the attitude of a player.

Furthermore, while playing the game, another virtual character, that has been depicted on one of the player’s cards in advance, appears on a small display near the player once that card is drawn out of the deck, and supports and encourages him/her to win the game until the end of the game.

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Moreover, the two players can communicate with each other via Skype if desired, and thus it is possible for them to introduce each other directly instead of using virtual characters. This option will allow us to compare the case of direct communication and the case of communication through virtual characters between the players.

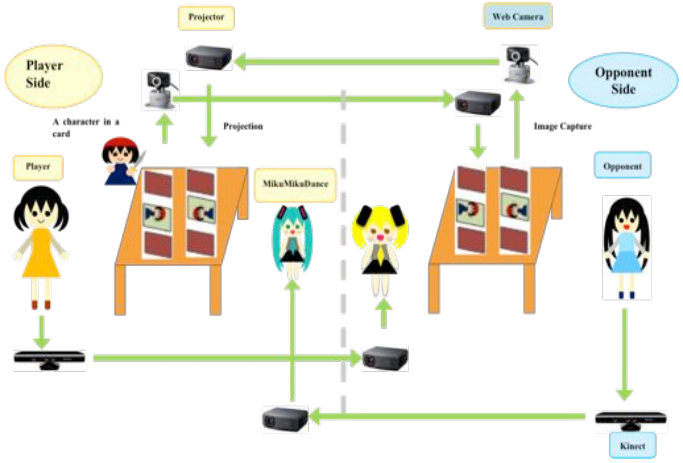

Figure 2. Augmented Trading Card Game System.

For the experiments, described in the paper, the rules of the game have been simplified for making the duels shorter and special predefined decks of cards have been used. The decks have been prepared by one of the authors who has more than 10 years experience in *Yu-Gi-Oh! TCG* and has more than few thousands *Yu-Gi-Oh! trading cards*. She is very familiar with the TCG animation story, and knows well how each character structures the deck and uses the cards in the animation. Therefore, for each possible virtual character to be chosen by a participant to represent him/her in the game, a suitable deck consistent with the animation story situation has been prepared. In the current version of *Augmented TCG*, the virtual character's behavior does not reflect the real behavior of the player precisely, but the behavior is exaggerated and overreacted according to the current play situation. One of the reasons for this is the fact that our system's functionality implementation is not currently completely finished. That is why in the current system another person exaggerates and overreacts the behavior of the player and the movement of the virtual character, representing the player is synchronized with that behavior using MS Kinect. This is also done in order to make the movement and behavior of the virtual character closer to the actual character's behavior in the animation.

Fig. 3 shows the current prototype configuration for a participant. On a large display, a virtual character, which movement is synchronized with the movement of the person who imitates the opponent player, is shown. A camera is setup behind the small display near the participant, and captures the image of the cards. The opponent player's cards are projected on the table by a projector. A small display shows the other virtual character that is depicted on one of the player's cards, which in this case is one of the most powerful cards in the participant's deck.

We recruited five participants for our experiments, and they all performed the duels in the experiments against one of the authors of the paper, who has deep knowledge about the TCG and could lead and control the experiment so that all participants play the game under the same conditions. Most of the participants had more than three years experience in *Yu-Gi-Oh! TCG* and they knew the characters in the animation stories very well. Before the experiments players could not talk to each other and none of them knew about *Augmented TCG*. Also, they were told how the rules were simplified right before the experiment. During the experiments, we observed each participant's play and conducted interviews with him/her after the play based on the contextual inquiry method [3]. The experiments are described in details in the following two subsections.

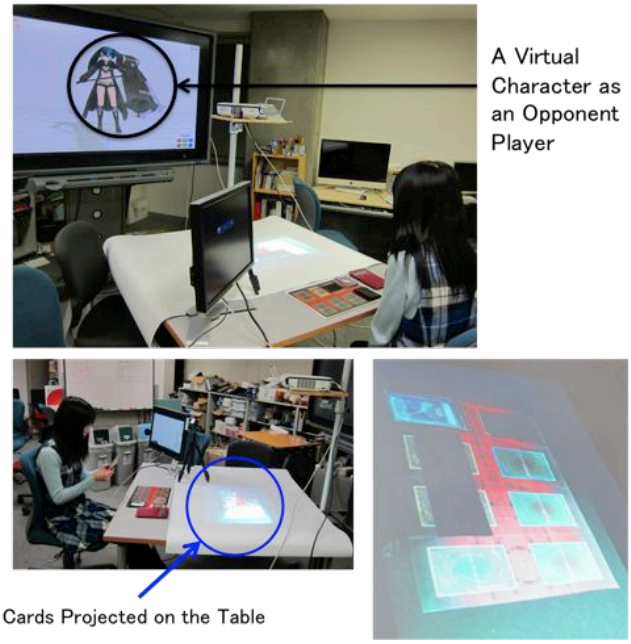

Figure 3. Current Prototype Configuration.

B. *Playing against a Virtual Character*

We did two experiments for playing *Augmented TCG* against a virtual character representing the opponent player.

In the first experiment, participants could choose either *Yugi* or *Kaiba* for their own character according to their preferences. After the play, we interviewed the participants about their impressions about the virtual character representing their opponent. One of them said: *"I could feel I am playing against Yugi, but Yugi used in the experiment does not offer enough reality"*. Especially, the movement of the character was sometimes not like the real movement of *Yugi as in the animation story*. He also said: *"I will definitely enjoy more the game against Yugi, and would like to win the game if the movement is more realistic"*. Another participant said: *"The face expression of the character is*

poor and it is a very important issue while playing a game against a real person". Also, one of the players told us: *"The voice should be the same as the actor's voice of the character in the animation story"*. Moreover, if the opponent player was a female, some participants felt strange since both *Yugi* and *Kaiba* were male characters.

In the animation story, players usually play *Yu-Gi-Oh! TCG* standing, that is why we chose that the characters were always standing during the play, but in the real situation, players usually play sitting. Some participants felt the unreality on the behavior of the characters, but if the characters just sat down all the time, the participants also felt the inconsistency with the *Yugi* and *Kaiba*'s personality.

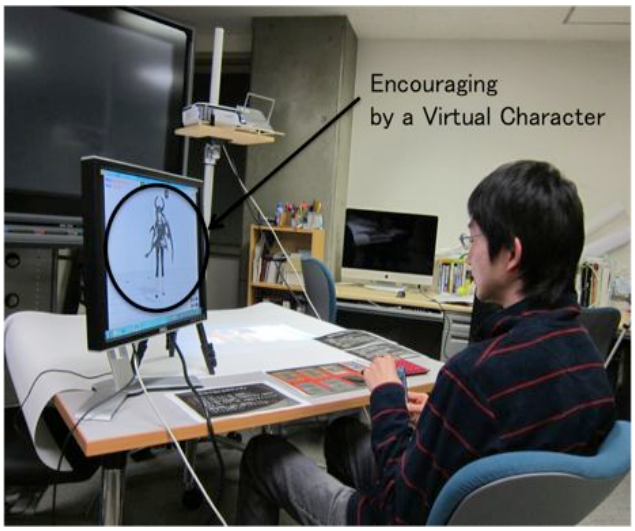

Figure 4. Encouraging a Player by a Virtual Character.

In the second experiment, *Link* from *The Legend of Zelda* was used as a character representing the opponent player. The results in this case were completely different depending on whether the participants liked this character or not. If the participants were not interested in *Link*, they usually did not care about the presence of *Link*, but if *Link* was their favorite character, then they found playing the game against *Link* more enjoyable. One of the male participants also told us: *"If the character is a pretty girl, I may be more excited to play the game"*. Also, a female participant told us: *"I feel that Link is my boy friend, so playing against him increases my pleasure and positivity"*.

C. Encouraging a Player by a Virtual Character

In this experiment, a small display on the table showed the virtual character depicted in advance on one of the cards used by the participant, as shown in Fig. 4. We have selected *Dead Master* from *Black★Rock Shooter* [20] as a character to be depicted on the card because we feel that the character does not contradict with or violate the atmosphere of *Yu-Gi-Oh!*. *Black★Rock Shooter* has two worlds. *Dead Master* is an enemy of *Black★Rock Shooter* in another dimension world, but in the daily world, they are very close friends. This becomes a persuasive message conveying the meaning that players need to keep and develop their friendship even if they fight seriously in a game.

As already described, in this experiment a special deck was structured in advance for each participant depending on the character he/she chose to play with. Then, in the duel, the participant always drew out of the deck the card depicting *Dead Master* at the beginning of the game. Once that card had been drawn out, a small display next to the player kept showing *Dead Master* until the end of the duel. *Dead Master* supported and encouraged the player during the game by using encouraging body gestures and its movement was controlled by a person who operated *MS Kinect*.

After the experiment one of the participants said: *"It is desirable that the card depicting Dead Master does not lose from the attack of the opponent player"*. However, another player who was not interested in the character told us: *"It is more enjoyable if the participant's favorite character encourages him"*. One of the other participants said: *"I feel that the character does not encourage me enough using only gestures. It is better that the character talks or advises me"*. He also told us: *"It is desirable that the character behaves like a cheerleader"*. *Dead Master* is a serious character, so if that character just behaves as a cheerleader, some players who know the animation story of *Dead Master* may feel the unreality due to the loss of the consistency with the story. Also, another participant told us: *"The encouragement should be like the one in the animation story"*. Most participants said: *"The presence of the character increases the pleasure, but it is hard to consider winning the game just from that encouragement"*. The participants' comments showed that they were aware that exactly the character depicted on one of their cards appeared on the small display without them being informed in advance about this feature of the system.

D. Discussions

The experiments described in the previous subsections have shown that using virtual characters affects positively the play style and enjoyment of the game. However, they also show that reality is an important issue in order to successfully include virtual characters and as a byproduct to recall the leitmotif of their stories in the play. In this subsection we give a discussion on some observations obtained from the *Augmented TCG* experiments.

As already mentioned, most of the participants, who have watched the *Yu-Gi-Oh! animation* story, feel that adding popular virtual characters from the animation to the game makes it more enjoyable and exciting. The desire to follow these characters becomes also an incentive for the users to change their behavior. A negative feedback may be used to achieve moral play, but changing a user's attitude in general is not easy [13]. The most important insight is that there is a possibility to use a virtual character as a metaphor that recalls the story of the character in the player's mind while gaming, and in this way the story may convey the leitmotif

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containing ideological concepts like the importance of friendship, honesty, thoughtfulness and so on. This approach would have the power to change the player's attitude.

During the experiments most of the participants enjoyed playing a game against a virtual character, and being encouraged by a virtual character. However, as already mentioned from the experiments and the interviews with the participants we have found that the reality of the characters, such as facial expressions, movement and behavior, is essential to increase the enjoyment of the game. Reality is an important criterion to evaluate a design [15]. In our case, the virtual character's behavior should be consistent with the character's behavior in the animation story and this is important to feel the reality in the game. For example, cards that are not used by the character in the animation should not be used in the game as well, and the movement of the virtual character should be consistent with its typical movement in the animation. The number of cards owned by the character should be consistent with the real game situation as well. A gap between the reality and the virtuality may cause the *uncanny valley* problem [10]. In the second experiment described in Section IV.C, the participants are not very familiar with the chosen virtual character but it may cause a feeling of incongruity in the players while playing *Yu-Gi-Oh! TCG* if they are aware that the character appears in another animation story that is unrelated to TCG.

The story behind the characters gives some influence on players' attitude as well. Since the influence of the story behind the character is especially interesting in our research, we discuss the issue in more details below.

All participants in the experiments could easily recall the *Yu-Gi-Oh!* animation story during their plays. The *Yu-Gi-Oh!* animation story contains some ideological ideas, such as the importance of the competition and cooperation among friends for their growth, but the current story may not be enough powerful to remind its ideological idea to players during their play because the growth of the main hero due to the competition and cooperation among friends is rather implicit in the story. However, the story is able to increase the positive attitude while playing the game, and to increase the self-efficacy to win the game. We believe that this factor is important to enhance our approach. In our daily life, people may not feel self-efficacy to change undesirable attitude and behavior because our daily life becomes more and more complicated, and we do not have enough time to consider the importance of the desirable behavior. We also need to consider how the representation form of the stories affects the conveying of ideological idea in the near future. In Japan, the same story is represented in different forms such as animation, manga, game, and novel.

In [13], several persuasive services have been reported to change people's undesirable behavior. Although these services successfully change people's undesirable behavior temporally, it is not easy to change their attitude to maintain their desirable behavior for a long time. Using virtual characters and their stories offers a new possibility to enhance the previous approaches by enhancing the human positivity.

Most people, especially Japanese, like fictional stories that bring them positive feelings with the fact that people feel able to do whatever they want in the fictional stories by using hidden magic abilities in the fictional world. If a game becomes more pervasive into our daily life, the boundary between the real world and the fictional world would become more blurred. Therefore, fictional stories can be used to enhance our daily activities. Using the stories increases the human positivity in the real world, and enhances people's self-efficacy to do what they want because through the games they can have the illusion of having special extraordinary abilities that exist in the fictional world. This is really true for all Japanese young people who have grown up with fictional stories like game, animation and fictional stories that use special effects. Positivity is an important fact to increase people's self-efficacy as proved in the positive psychology research [8]. The positivity is very useful to make our life more meaningful [11], and the positivity is essential for the success in our life. Our approach is one possible powerful way to enhance people's positivity.

Specificlly, many Japanese animation and game stories emphasize on the importance of positivity. Thus, the characters in the stories can be used as metaphors to increase human's positivity while playing a game. It will become one of the most important roles of a game to teach solutions to typical serious problems in life.

Another worth mentioning observation is that in the current experiment players could not see their own virtual character during the play, but only the opponent player's character. We consider that adding this feature to the game would increase the pleasure and the reality of the play since users will be able to control naturally the behavior of their own virtual characters.

V. TOWARDS PERSUASIVE AND AMBIENT TRANSMEDIA STORYTELLING

A. Augmented TCG as Transmedia Storytelling

Enhancing games played in the real world like TCG with fictional stories is a promising direction to design a new form of transmedia. In this section, we discuss some design implications of *Augmented TCG* that will be considered as one form of future transmedia storytelling [4].

In the current *Augmented TCG*, its animation and game story is explicitly not shown during the play. A player needs to recall the story during his/her play. More tight integration of the game play, and the animation and game story offers a new possibility to design transmedia. The movement of a virtual character from the virtual world to the real world offers a tight integration between the fictional story and the

TCG game play. Transversal interfaces [2] offer a way to move between the worlds seamlessly. The approach offers a stronger association between a fictional story in the virtual world and the real world through a virtual character than the current approaches, and the boundary between the two worlds becomes more blurred.

We believe that a participant would be more excited to play the game if a character drawn on a card from his/her favorite deck is shown to encourage him/her. Cards are considered as one piece of transmedia to construct a fictional story. However, the preferences for that character are different according to the player's gender. A female player usually likes a card depicting a pretty girl. In this case, encouraging cheerfully the player with gestures by that character would be natural and meaningful. On the other hand, a male player usually likes a powerful card that may depict a strong monster. In such a case, the encouragement by the character should be more powerful and adding special effects to show the superior ability of the character would be more suitable and more effective to motivate the player. Thus, if the character is one of the player's favorite characters, then the encouragement would be a powerful tool to increase the player's motivation and excitement of the game.

When playing with a virtual character from animation and game story, the player also tries to mimic the character's behavior in the animation story. This can be a very useful and successful approach to teach players how to improve their gaming skills. If players follow the skillful character's way of playing in the story, then they can learn new skills and techniques from that character's experience in the animation. Of course, a skillful friend is a good coach for improving a player's skills, but if there is no good coach available around the player, then he/she needs to learn by himself/herself and doing it following the experience of the character would be a promising and exciting approach to exploit future transmedia storytelling.

In our experiments, we could not find the rigorous evidence that the stories of the virtual characters could always strongly affect the attitude of the players. One of the reasons is that in our current research we focus on a game. For most people, the purpose of a game is just for fun. Of course, the duel against *Yugi* and *Kaiba* makes players play the game more seriously, but it is hard to make players braver when *Link* is shown as an opponent player. *Link* is a character in an RPG game, and a male player considers that the character is just like his avatar in the game, so his story does not have strong ideological messages in the game. Also, the presence of *Dead Master* does not have a strong impact on a player, since the character itself is very popular, but its story is not so well known yet. This means that well known stories that contain strong ideological messages and characters that have powerful and distinctive personalities are important to make virtual characters be used as metaphors. We also consider that the music used in the popular stories could also become a metaphor for the stories because in Japanese animations, their music sometimes becomes more popular than their characters. We believe that designing metaphors that use the popular stories in animations and games is a promising future direction to convey complex ideological messages to people without presenting a large amount of information to them.

One of the problems in using virtual characters is their copyright. There are many free 3D models for *MikuMikuDance*, but some of them are deleted on the Web due to the copyright issues. However, freely available models offer new possibilities to enhance games because the models can be easily customized. In Japan, it is a popular culture to create new characters and stories from existing ones. Using a customizable virtual character in *Augmented TCG* may create a new playing style of TCG, and the new stories of the character can be used to enhance its role as a metaphor.

As already described, virtual characters used in animations and game stories are widely used in multiple media channels. In *Pokémon,* a synergy among games, movies, and TV programs is used to make the *Pokémon* story more popular, and make the story pervasive in its fan's daily life. Also, in the *Yu-Gi-Oh! animation* story, the animation story teaches its game players how to play the TCG game and why the game is attractive while they are watching the animation story. Using multiple channels to communicate messages among people is a very effective way to convey the messages among people because each channel can convey the message in a special partial way. This is also a typical approach in the current advertisement because only one medium cannot deliver the advertisement to a large audience of people.

B. Value-Based Design Framework

Fig. 5 shows a framework for designing persuasive and ambient transmedia storytelling. In [15, 17], we extracted the values that are useful to design attractive services and products from our previous case studies. The classification of the values is extended for designing persuasive and ambient trasmedia. Our framework consists of two components. The first component is a fictional story, and the second component is a pervasive game or social information service. It offers its own goal for a player. For example, in *Augmented TCG*, the goal is to win a duel, to collect TCG cards, or to enjoy a duel with friends [16]. The four values depicted in Fig. 5, informative value, empathetic value, economic value and aesthetic value are used to increase both extrinsic and intrinsic motivation to achieve the goal of the pervasive game. The fictional story also offers the four values that are the same as in the pervasive game, but it also offers two more values, a positive value and ideological value. The positive value in the fictional story offers people a feeling that increases their positivity. This finally increases the self-efficacy to aim the achievement of the goal identified in the ideological value. Many Japanese game and animation stories depict the

heroes' or heroines' final success. In the stories, they never give up until achieving their goals, so it increases human positivity. The ideological value offers the important insights to consider people's life. For example, Japanese games and animation stories like to teach us various ideological concepts such as justice, human growth and development, co-existence with human and nature, love, and friendship. Incorporating the ideological value in the stories makes it possible to educate people to understand the importance to sympathize the stories' goals, and motivate them to try to achieve the goal.

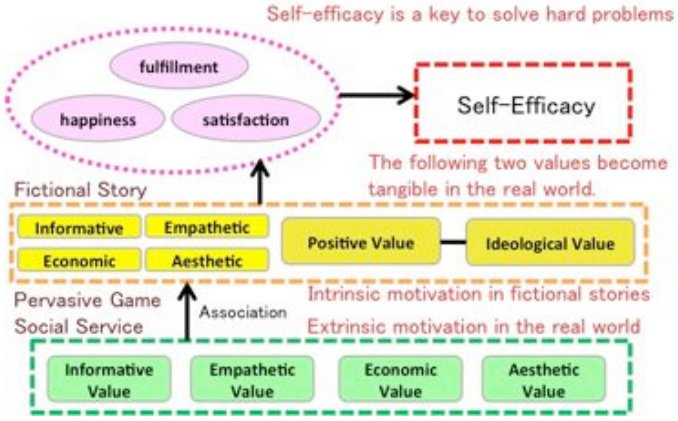

Figure 5. Value-Based Design Framework for Designing Persuasive and Ambient Transmedia Storytelling.

In our framework, we are considering two types of storytelling. In the first type, the ideological value in the fictional story becomes a main issue in the storytelling. For example, *Augmented TCG* adopted this type's storytelling. The pervasive TCG game offers four values to make a user achieve the goal of the game by increasing his/her intrinsic and extrinsic motivation. As describe above, a fictional story offers the positive value and the ideological value. While a player is playing a game, the game offers some metaphors of the fictional story to remind the story to the player. In *Augmented TCG*, using *Yugi* and *Kaiba* as an opponent player reminds the player the *Yu-Gi-Oh* fictional story. The virtual characters create associations between the four values offered by the pervasive TCG game and the fictional story. The association makes a player feel the fictional story as a more realistic story in the real world. Thus, he/she considers that the positive value and the ideological value in the fictional story also exist in our real world. The ideological value that is tangible in the real world helps a player to recall the importance of the ideological concept presented in the fictional story, and motivates him/her to achieve the goal identified in the story. For example, in *Augmented TCG,* a player recalls the importance of justice and friendship, and then he/she considers playing the TCG game more fairly, and growing as a noble person. Also, the tangible positive value in the real world makes a player increase his/her self-efficacy to have enough confidence for achieving the goal of understanding the importance of the ideological concept. This approach offers possibilities to solve complicated social problems and to implement various public policies [30].

In the second type of storytelling, the goal defined in the pervasive game or social information service is more important. The most important aspect of this type is to define the goal that is not related to the ideological values incorporated in the fictional story. For example, we can establish the goal of the pervasive game or social information service to be to encourage people to visit a certain restaurant more frequently. In this case, the four values offered by the pervasive game or social information service become extrinsic motivation to achieve the goal. We can use some metaphors of the fictional story, such as a virtual character from it, as an association to remind the story to the player while playing the game. Then, the positive value in the fictional story would make a player feel self-efficacy to achieve the goal in the pervasive game or social information service. Finally, the ideological value makes people feel that the goal is more desirable and increase the priority to achieve the goal in their daily life.

VI. RELATED WORK

There are several other systems that support remote TCG play. *Duel Accelerator* [22] is an online-based *Yu-Gi-Oh! TCG* where each player chooses his/her avatar and virtual trading cards with special effects shown on them during the duel, are used. The special effects become emotional stimulus for the player and thus the pleasure of the play is increased. However, virtual cards loose the sense of the physical tangibility of the cards, and it is hard to motivate a player to enjoy collecting cards. *The Eye of Judgment* [23] uses augmented reality technologies to show special effects on the real trading cards. It allows players to use real physical cards and special effects can be shown on them. In *Augmented TCG*, it is easy to add special effects to the cards projected on the table in front of a player. Also, the *Skype duel* uses Skype to show each player's cards on the opposite player's display and the voice communication between the two players is possible as well. *Augmented TCG* uses 3D virtual characters that are shown to the players and the characters move according to the opponent player's current behavior.

In *CyberOne* [21], which is a new TCG, each paper card has a sequence number. When the number is input in the system, the corresponding virtual card appears in the online TCG. The player can exploit the tangibility of the cards, but he/she can also enjoy additional special effects, which is an example of the advantages of the virtual cards. Once the set of cards in the player's deck are input in the system, the duel is performed automatically without the player doing anything and the final result of the duel is returned to the player, showing the strength of his/her deck selection. However, the enjoyment of constructing an original deck still remains for the player. Moreover, the two players do

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not need to play the game at the same time because they just need to construct their decks.

Augmented reality techniques may be used to enhance existing games. For example, in [19], several augmented reality games, that enhance traditional games to integrate physical items and virtual items, are reported. *Augmented Go* is an example of a promising approach to maintain the advantages of the physicality, but to add virtuality to the Go board game. Also, in [6], a card game is enhanced by embedding RFIDs in the cards to identify which card is currently used, and offer appropriate information to players.

Designing a user's experience [7] is related to the value based design framework. In the current approach, we extracted and analyzed values from a newly designed artifact, but it may be desirable to investigate how the values are emerged by analyzing a user's activities. Since designing values strongly depends on a user's experience, in the next step, it is an important research question to explore how values affect the user's experience, and how the values designed in the artifacts interact with the values emerged in the user's experience.

Popular Japanese role playing games such as *the Legend of Zelda* and *Kid Icarus* offer rich fictional stories incorporating the positive and ideological value. However, the games cannot make the values tangible in the real world because the games do not offer associations between the real world and the virtual world.

The Alternative Reality Game (ARG) [12, 18] is a promising approach to convey messages to people using multiple channels. Fictional stories are embedded into a pervasive game that can use multiple channels. The channels offered in the game are used to exploit the game's fictional story. For example, in Perplex City [28], trading cards are used to introduce its characters and story. Web sites, emails, phone calls, and SMS messages are cooperatively used to solve riddles in the mystery story. Our approach is also a useful way to design the transmedia story telling [4]. Especially, the form to represent a story affects how an ideological message is conveyed to a user. The transmedia storytelling divides a story across multiple media so that it is a possibility to choose the most suitable form to attract a user and to convey a message to a user.

"Seichi Junrei" is a typical geek culture in Japan, especially related to Japanese animation, manga and game, in which people tend to visit famous locations from animation, manga and game. *"Seichi"* means "*Holy Land*", *"Junrei"* means "*Pilgrimage*". Anime fans arrive at that location, and take pictures with the same screen/angle of the animation, and upload them to their blogs. The most important aspect of *"Seichi Junrei"* is to bring something from the fictional story to the real world. The fans create new stories with these pictures and the virtual characters appearing in the fictional stories, and co-construct the stories to share them within their communities. This is a very interesting phenomenon to harmonize the real world and the fictional world. We believe that interactive pervasive games or social information services based on fictional stories are very promising tools to increase the reality of the fictional world, and the tools enhance the *"Seichi Junrei"* phenomena by realizing more tight integration between the fictional world and the real world. The experiences described in the paper will offer useful insights to design tools that will realize new types of transmedia storytelling.

There are several psychological theories that are useful to design attractive persuasive and ambient transmedia storytelling that influences a user's behavior and attitude [14]. Burrhus F. Skinner's behavior science makes it possible to change people's behavior and attitude unconsciously. *Operant conditioning* is a form of learning during which an individual modifies the occurrence and form of its own behavior due to the reinforcement of consequences of the behavior. Positive reinforcements and negative reinforcements construct a feedback loop to control human behavior and attitude systematically. Most games use the approach to fascinate people to play games. The *elaboration likelihood model* explains the importance for the dual routes to persuasion. The central route offers heavily cognitive information to change the user's attitude, and the peripheral route enables the user to change his/her attitude through emotionally influential information. The *transtheoretical model* proposes five stages as a process involving the progress to change the user's undesirable behavior. In earlier stages, the user prefers emotional reinforcement not to give up his current efforts. On the other hand, for the user who is in a near final stage, enough information for making a better decision through rational thinking is more suitable. The *feeling as information theory* is useful to consider how information technologies evoke the user's emotion. The theory indicates that it is difficult to think rationally during a positive feeling. On the other hand, the user tends to think rationally when she feels to be in a negative situation. The results indicate that positive stimuli are effective in early stages, but in latter stages, negative stimuli are desirable under the *transtheoretical model*. *A theory of unconscious thought* shows that heuristic thinking is not always bad. Giving more information may lead a wrong decision. When we become conscious, our heuristics is biased according to the current frame. However, as described in the theory, when our thought is unconscious, heuristic thinking may lead to a right decision.

VII. CONCLUSION AND FUTURE DIRECTIONS

This paper presents some observations on the usage and the design of *Augmented TCG* that enhances remote trading card game play with virtual characters used in animation and game stories. We have shown some experiments of *Augmented TCG*, and presented its design implications.

Currently, we are considering the following three future research directions. The first one is related to the physical tangibility. In *Augmented TCG*, the physicality of cards is one of the most important design decision, since virtual

cards lead to the loss of the reality in *Yu-Gi-Oh!* TCG. Also, physical tangibility is important to offer more pleasure to a player [5]. However, virtual cards have some advantages over real paper cards such as the possibility to easily add special effects to the card. In the current *Augmented TCG*, a player needs to manually teach the system which cards he/she would like to use. If the system could automatically detect the player's cards, the usability of the system would be dramatically improved. The automatic detection of cards can be easily realized by inserting RFID in each card similarly to the approach described in [6]. In our current system it is sometimes hard to see clearly the opponent player's card and in such case a player needs to explain which card he/she is using and what effect the card has. If the detailed information about the card is automatically shown on the duel field, players do not need such extra communication by using a voice communication system or a chat system. Also in *Augmented TCG*, it is easy to detect that a player mistakes the usage of a card, which is very helpful since sometimes it is hard to understand the complex rules of a game even for a semi-expert player. The tangible interaction approach is very promising for improving the disadvantages of the virtuality [9], and makes it possible to combine successfully the advantages of virtual cards with the advantages of the real paper cards.

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