A Visual Ethnographic Study at Cultural Spaces to Identify Character Creation Opportunities

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ABSTRACT

Anthropology, defined as the scientific study of human development and societies, can play a critical role in the design of (video) game mechanics and aesthetics. Especially religion and culture are seen as fundamental components in building communities, societies, and human evolution. In this paper, we present (1) a case study using UX methods such as ethnography, grounded theory, participatory design, and user interviews to develop and evaluate design spaces generated from cultural spaces, (2) this design space in the form of paradigms and syntagms and (3) how this design space can assist in the construction of novel and culturally sensitive characters.

CCS CONCEPTS

• **Human-centered computing → Interaction paradigms**.

KEYWORDS

Game Design, Character Design, Narrative, Mythology, Culture

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1 INTRODUCTION

Designer's block is a phenomenon [56] in which designers are unable to come up with creative ideas. With the constant need to generate new characters, narratives, and artifacts for the game, the Designer's block phenomenon is also prevalent among the game design community [39]. There is established literature that claims that inspiration is one of the main factors in generating new ideas within game development and overcoming Designer's block [11, 35, 48, 61]. In this work, we present results from a proposed two-step generative process and a three-step evaluative process to construct and evaluate design spaces to serve as inspiration for character design. To our knowledge, this is the only work that converts the ethnography of cultural spaces into a video game design space that can be used for character and artifact construction.

Design can be treated as a paradigmatic and syntagmatic process [8]. First established in the field of literature, syntagms are a set of rules which define sentence structure (subject, verb, and object). Paradigms are a set of possible substitutions for each of the syntagmatic sequences. Other design domains [8, 32, 40] have discussed the efficacy of treating media design as a paradigmatic and syntagmatic problem. In the field of web/mobile design, there has been a rise in design toolkits, templates, and design guidelines that fit into the narrative of design being treated as a syntagmatic and paradigmatic process. Video games in the form of Character Creation Interfaces (CCI's) have presented a syntagmatic and paradigmatic design opportunity for players and designers [40]. Character Creation Interfaces establish a strict structure (syntagms) to character construction (face, limbs, automobiles, weapons, and other game artifacts). CCI's give users an opportunity to fill the structure with paradigms (including but not limited to color, texture, and choice of weapon). The set of syntagms and paradigms for character building, and artifact building, come from a developed design space. In the field of video game design, design spaces have often been established by studying existing games and video game communities [10, 16, 19, 30, 31, 34, 36, 51, 52]. This caps the design space to existing artifacts or elements which resonate with current gaming communities. To introduce new game design artifacts, in this paper, we conduct an ethnographic study in cultural spaces and use grounded theory to identify and present a set of syntagms and paradigms for character creation.

Video games have often referred to religion, culture, and mythology for character development [7, 37, 55, 57, 60]. Despite using elements from mythology and various cultures, game studios at times copied (transplanted) characters of cultural significance into their games. The finite set of gods creates an upper limit on the number of characters that can be borrowed [33] and has also received poor reception and protests from religious communities [1, 3, 33, 59]. Through ethnography (in Hindu temples) and grounded theory, we present a design space that allows designers to borrow elements without transplanting characters. The choice of visiting Hindu temples is (1) to open rich design space to popular western gaming studios (2) to provide alternatives to god transplantation [1, 3, 33, 59] (3)

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the Hindu population over proportionally grows the interest/target group (gaming community) and therefore it is important that their cultural sentiments are respected [53].

Based on our discussion in the preceding paragraphs, this paper aims to target the following research questions:

- **RQ1**: Can we apply UX research methods on cultural places to establish a game design space in the form of syntagms and paradigms?
- **RQ2**: What is the efficacy of established design spaces in terms of:
  - **RQ2.1**: Does the design space allow for the creation of new characters?
  - **RQ2.2**: Are the characters designed through this design space novel and unique?
  - **RQ2.3**: Are the characters designed through this design space culturally sensitive?

To address the above research questions, this paper provides the following contributions.

- **RQ1** -A two-step generative process to generate design spaces in the context of culture, mythology, and religion:
  - Step 1: An ethnographic study of Hindu places of worship to identify artifacts, mechanics, and characteristics that support character creation (Section 4).
  - Step 2: A grounded theory exercise on data points collected from the ethnographic study to identify syntagms and paradigms to establish a design space (Section 5 and Section 6).
- A three-step mixed-method evaluation:
  - **RQ2.1** - A participatory design study to validate character creation ability with the proposed design space (Section 7.1).
  - **RQ2.2** - A proposed quantitative framework to evaluate the novelty of characters created through the design space against currently transplanted gods into video games (Section 8.1)
  - **RQ2.3** - Qualitative user interviews from experts to validate the cultural sensitivity of characters generated through the design space against established benchmarks (Section 8.2)

2 RELATED WORK

2.1 Theology, New Media and Video Games

New media creators have often turned to culture and religion for inspiration in design [22]. Academics in the new media have discussed the cyclic relationship between religion and new media [9, 17, 24, 42, 43, 50].

Ferdig's framework classifies the implicit projection of religion in video games into 4 categories: game context, game content, game challenge, and game capital [21]. The way in which players perceive the implicit or explicit projection of religion and culture is studied by Radde-Antwieler *et al.* and Seif El-Nasr *et al.* [20, 43]. Seif El-Nasr *et al.* share accounts of how players perceive different religious artifacts presented in the form of game context and game content [21] in *Assassin's Creed*. The repercussions of this perception on modern religion and society are discussed by Radde-Antweiler *et al.* and Detweiler [17, 42] and Sisler [50]. For example, Sisler investigates how Islamic communities are often stereotyped as a result of their representation in video games [50]. Academic HCI and video game communities have paid attention to perception, consequences of religion in video games, and new media. On the flip side, there has been little discussion of how theology, religion, and culture can be leveraged as a design space. This paper aims to use UX methods such as ethnography and grounded theory to construct, discuss, and introduce a novel design space.

2.2 Design Spaces & Taxonomies for Video Games

In the field of video games, design taxonomies, design spaces, and frameworks organize granular components so that we can communicate design decisions more easily, construct artifacts, and gain design inspiration [5].

Games have multiple components, and researchers have worked to generate taxonomies and design spaces for various components, curtailing both design and technical implementations. Lewis *et al.* proposes a taxonomy of video game bugs that classify bugs that might arise during video game production [30]. Smith *et al.* develops a taxonomy that classifies player types [51]. Further, Smith *et al.* study and classify design strategies in various platformer games [52]. McCallum *et al.* and Dormann *et al.* generate game mechanics taxonomies to help design games for patients with dementia [19, 34]. Other design frameworks include game design principles for serious games [10], motion games [36], collaborative mechanics[31], respawning and death [16].

Previous work consisted of developing design protocols, rules, and taxonomies for effective game design, game mechanics, and artifacts [10, 16, 19, 30, 31, 34, 36, 51, 52]. Previous work tackles the creation of design spaces using a systematic review of video games and game logs. In this paper, we deviate from previous research on two aspects: (1) Instead of exploring existing games, we investigate real-life cultural spaces as a source of inspiration for character design. (2) Our paper investigates religion and culture as central topics for our design spaces, whereas previous work does not.

The work by Maram *et al.* is closest to us [33]. They develop a tabular taxonomy of design elements offered from cultural and religious texts. The tabular taxonomy splits the nomenclature of gods into the mechanics they offer. We deviate from their work on five measures (1) We use formal UX methods such as ethnography, grounded theory, participatory design, and user interviews for the construction and evaluation of the design space. (2) Maram *et al.* takes a deity-first approach and divides each deity (a cultural or religious figure) into the mechanics they offer. This causes repetition of mechanics and artifacts that is not eliminated in tabular taxonomy. (3) A tabular taxonomy requires the user to search every row for elements, while the syntagm and paradigm-based design space we present allows users to selectively search specific areas of the design space for required features. (4) Our evaluation of generated artifacts involves stakeholders with cultural expertise. (5) Maram *et al.* provide qualitative discussion on novelty and how characters are different from each other. In addition to qualitative interpretations, we expand by providing quantitative metrics to evaluate how characters differ from each other.

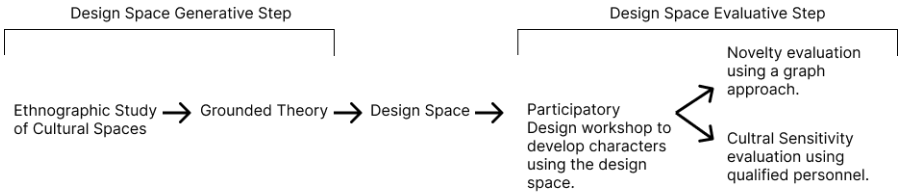

Figure 1: Methodology adopted to generate and evaluate the design space undertaken

2.3 Ethnography, Field Studies and Grounded Theory for Game Design

Ethnography and grounded theory are research methods that are often used in the research communities of HCI and video games. Game research has used ethnography in two ways (1) by studying a community to understand their behaviors and embed them in video games [2, 4, 12, 23, 29, 38, 44, 54, 58]. (2) Study of gaming communities to validate design decisions and player modeling [15, 25, 26, 28, 45, 46]. In this work, we focus on the first.

The abandonment of pain or mental distraction from serious illness has been a goal of serious game designers. Hamazh *et al.* conducted an ethnographic study in cancer hospitals to develop game mechanics that can be used to alleviate pain [23]. Alarcon *et al.* conducts an ethnographic study with autism educators to develop game mechanics for an effective autism intervention [2]. Other settings studied to generate game mechanics and design inspiration includes museums [54], Game studios [58], Virtual Worlds [38, 44]. Chan uses visual ethnography in which they capture images, and videos of traffic commuters, and identify game mechanics for serious games to teach traffic rules [12]. Unlike previous research, we perform visual ethnography in a cultural space, collecting a spectrum of information ranging from iconography, cultural practices, cultural artifacts, architecture, fashion, culinary experiences, and others. The information collected is categorized using grounded theory to support character creation.

3 METHODOLOGY

In this paper, we execute the generative steps and the evaluative steps as shown in Figure 1. The first generative step (Section 4) is the visual ethnographic process to collect data points. The second generative step is a grounded theory exercise (Section 5) in which researchers perform open, axial and selective coding of the data collected from the previous step. The coding allows us to establish a design space inspired from a particular cultural space in the form of syntagms and paradigms. We present and discuss this design space in Section 6. The fourth step in the pipeline (Section 7.1) is to conduct a participatory design workshop with game designers to verify whether the proposed design space supports character creation. Once the characters are created, as a last step, we evaluate the novelty (Section 8.1) and cultural sensitivity (Section 8.2) of the characters created. Each of the subsequent sections talks about all the steps discussed above and illustrated in Figure 1.

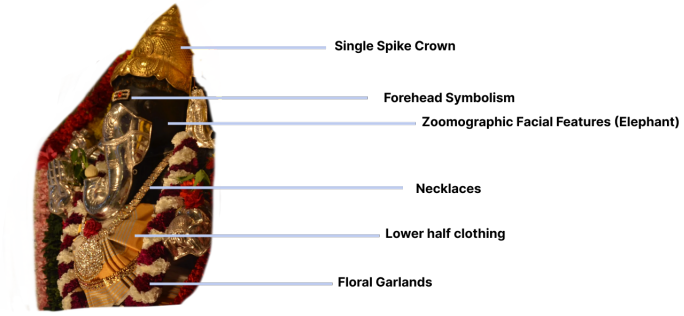

Figure 2: Illustration of Open Coding on a captured data point.

4 ETHNOGRAPHY STUDY: A VISIT TO HINDU TEMPLES

As part of the first step of the proposed pipeline shown in Figure 1, the researchers visited four temples located in Sunnyvale, California, USA. Temples were open to people of all religions, sex, and identities. Photography and videography were allowed in all temples, allowing researchers to capture important events and incidents. One of the authors adopted the position of *researcher-as-participant* and visited temples to participate in activities, and rituals, and capture important events in the form of videos and photographs.

4.1 Data

We collected a total of 429 images. The data consisted of images of idols in temples, and videos of rituals, and processions. Of the 429 images, 248 images were images of idols, 63 images consisted of ongoing rituals, and 45 images were miscellaneous objects.

5 GROUNDED THEORY

The second step in the proposed pipeline (Figure 1) was to use the grounded theory method (GTM) on the captured data points. In this paper, we adopt a constructivist grounded theory flavor [14]. In this approach to GTM, the researcher is crucial to developing meaning and context within the domain being inspected [13]. An illustration of open coding on a data point is shown in Figure 2. With the open codes generated, we performed axial coding to establish a set of emerging concepts and categories. We followed with a chain of discussions among researchers to execute selective coding and identify four key categories for our design space (for

further information on GTM and coding practices, see Appendix A.1). A summary of the open codes generated and the subsequent generated axial and selective codes is shown in Figure 3. We explain the generated design space in detail in Section 6.

6 SYNTAGMATIC AND PARADIGMATIC DESIGN SPACE

The generated design space has 141 open codes, categorized into 22 axial codes, and finally converging into four selective codes. Selective codes and axial codes provide a convenient [40] way for creating Character Creation Interfaces. This allows designers to search for specific elements they are looking for while designing their characters. The four selective codes include (1) Character Features (Section 6.1) (2) Weapon design (Section 6.2) (3) Fashion (Section 6.3) and (4) Game mechanics (Section 6.4).

6.1 Character Features

The character feature selective code includes elements that contribute to the physical characteristics of the character. This includes five axial codes (1) Facial features (2) Upper limbs (3) Lower limbs (4) Oral Cavities and (5) Forehead symbolism. Facial features are different types of faces that a character can take. Apart from regular human faces, the proposed design space allows the creation of characters with zoomorphic faces. Certain facial features presented to participants are illustrated in Figure 3. Similarly, the upper and lower limbs include various zoomorphic and anthropomorphic features, for example, Wings, animal legs, claws, tails, and others. The axial code oral cavity includes different styles in which the lips and jaws of a character can be presented. These included fanged teeth, puffed jaws, and regular lips, among others. Finally, the forehead symbols are a set of symbols (usually etched to the face) that can be used to show character personality and loyalty towards groups.

6.2 Weapon Space

Weapons provide agency to characters in terms of their abilities. Our visual ethnography and grounded theory open up a range of weapons that designers can equip their characters with. We axially code the weapon space into 4 categories (1) Ranged Weapons (2) Close contact weapons (3) Elemental powers (4) Mythical powers (5) Shields and (6) Musical weapons. Aerial weapons have a range (arrows, spears). Close-contact weapons include mace, tridents, and others; these can be used to help design characters involved in close combat. Our study also uncovers a wide range of musical instruments that can be used as a weapon space. In Figure 3 we show how we present certain weapons to designers.

6.3 Fashion

Clothing, jewelry and other elements of fashion play an important role in the expression of the qualities and abilities of a character. As a result of the visual ethnography and open coding we identified 26 fashion artifacts. When axially coded these include (1) Headgear (2) Jewelry (3) Torso clothing (4) Clothing for lower limbs and (5) Floral fashion elements (garlands, flowers in hair, fruit garlands). Clothing elements cover a range of textiles for different situations, parts of the body and terrains across all genders. Jewelry and Floral fashion elements offer decorative options for characters designed by designers.

6.4 Game Mechanics

In this selective code we identified various game mechanics which can be used in video games. Axial codes include (1) Voice as a game mechanic (2) Narrative (3) Transportation (4) Residences and houses (5) Gestures. Certain deities mounted animals and used them as transportation systems to support movement across terrains. Certain deities were placed in houses or landscapes covering various terrains and habitats. This opens up different backdrops for games. Majority of the open codes and axial codes in this section of the design space do not translate to character creation but are input modalities for video games. We omit those that are not useful for character creation in the subsequent evaluative study.

7 EVALUATION

Goal: In the mixed-method evaluation step, we: (1) Conduct a participatory design workshop to verify if the design space supports the creation of new characters. (2) Propose a quantitative evaluation method to discuss the novelty of the characters across various paradigms and syntagms.

(3) Conduct qualitative user interviews with scholarly personnel to assess the cultural sensitivity of the characters.

7.1 Participatory Design Workshop

Through an open call, we invited game designers from UCSC's Game Design and Development graduate program. Three designers volunteered to participate and create characters using the design space. The following protocol was used for the participatory design workshop.

- Participants were welcomed and asked to sign a consent form and complete their demographic details.
- Participants were presented with the design space (Section 6) laid out on a table as shown in Figure 3(b).
- Participants were asked to construct two characters that they believed could save a fictional planet from a violent alien invasion. The characters created are shown in Figure 4
- The participant and an artist worked together to add the desired modifications in terms of color and other aesthetics. The final characters are shown in Figure 5.
- Once the participant was satisfied with the character they created, they were thanked and free to leave the premises.

7.2 Novelty Evaluation

7.2.1 Creating Character Embeddings. In this section, we introduce how treating the design space as a syntagmatic and paradigmatic process allows us to present characters as vector embeddings.

We treat each character(C) as a vector embedding. Each entry in the vector is a syntagm. Designers build characters by choosing a particular syntagm(u) and arranging the syntagms as they envision it on their characters. Designers can also pick the same syntagm multiple times. For example, participants might have chosen more than a single pair of arms for their character. Each element in the vector corresponds to the frequency of a particular open code that has been selected. This is illustrated in Figure 6.

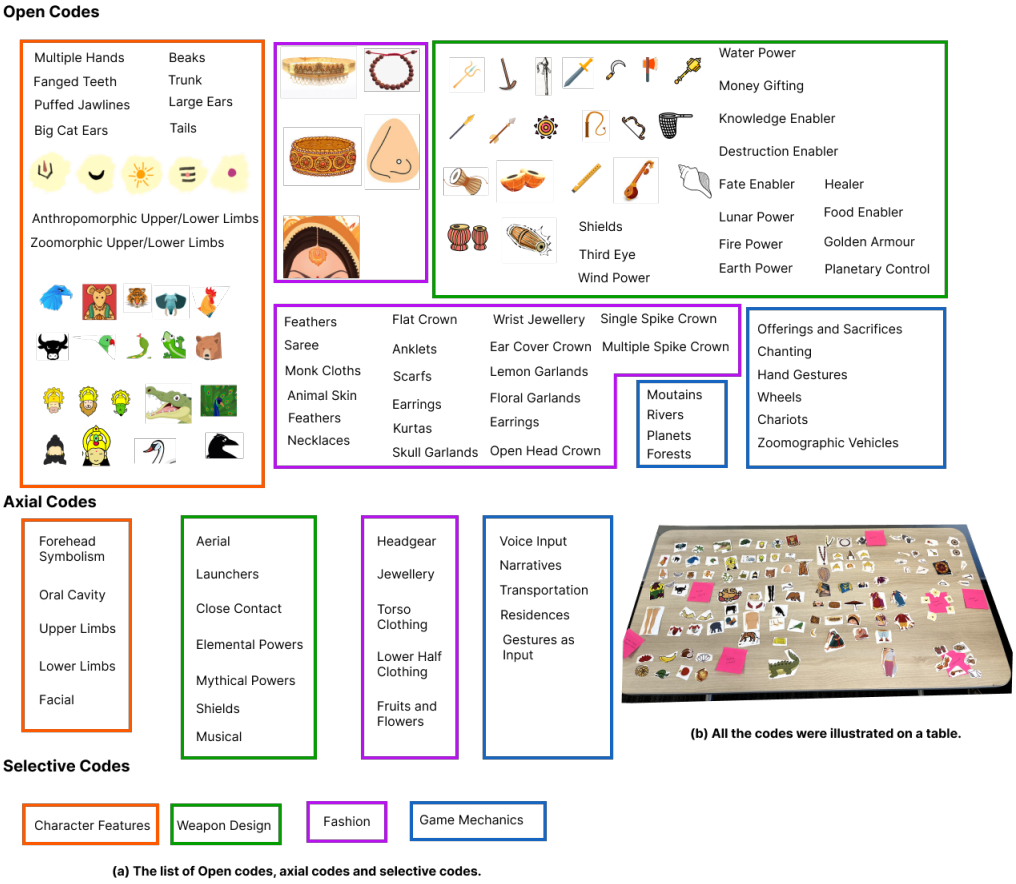

Figure 3: Open Codes, Axial Codes and Selective Codes from Constructionist Grounded Theory.

Figure 4: Raw Characters Created by Participants.

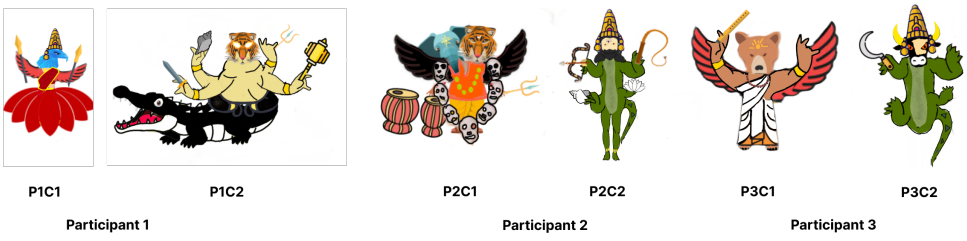

Figure 5: Characters Created by Participants and artist working together.

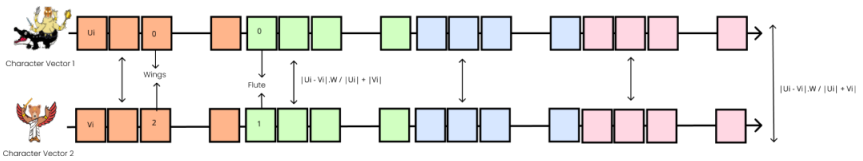

Figure 6: Visual illustration of Character Embeddings. Each set of colored cells corresponds to open codes from a particular selective code. This illustration also depicts how the distance between two character embeddings across selective codes is calculated.

7.2.2 Character Distances. Each character consists of four embeddings, one for each selective code. All four selective code embeddings together represent the character in the entire design space. This is illustrated in Figure 6. Generating a vector embedding for each character allows us to treat the character as a point in the design space, compute distances between characters, and study how they vary across various paradigms established in the design space.

To measure the distances between the characters across the selective codes and the overall distance between them, we use the Canberra distance metric shown in Figure 6 for our discussion. Our choice to use the Canberra distance lies in its ability to measure similarity and dissimilarity between groups for ordered categorical data [27]. Other metrics tested were Euclidean[18] and Manhattan [47] distances, and all align with the trends discussed in the results.

To illustrate that the design space enables the creation of novel characters, without the need of transplanting original gods from Hindu mythology, we compare the characters generated by participants with the characters in video games transplanted from Hindu mythology. The characters we choose are Kali, Ganesh, Rama, and Shiva from SMITE [57], Karna, Arjun, and Lakshmi from Fantasica [49], Krishna from Shin Megami Tensei IV: Final Krishna [6], Hanuman from Hanuman the Boy warrior [7], Nagas from Unrest [41]. We also include a basic male character and a basic female character in the group of characters. These characters were overlaid on the design space to generate vector embeddings. We choose the character with the least number of elements as the origin. We compare characters against various selective codes and the entire design space. In the results section (Section 8.1), we discuss the trends between the character generated by the participants and the original gods used in video games.

7.3 Sensitivity Evaluation

Previous instances of characters being copied from mythology have received backlash [1, 3, 33, 59]. Maram *et al.* also mention how characters designed with culture, and mythology as inspiration can benefit from evaluation by scholarly experts to prevent backlash. As part of the proposed pipeline shown in Figure 1, the final step is to evaluate the characters through qualified personnel. To do this, we recruited three evaluators. Two of the evaluators (Evaluators 1 and 3) were priests in Hindu temples (age 52 and 48). The other evaluator (Evaluator 2) has a diploma in Hindu scriptures (Age 24). All the evaluators could speak, read and write English. During the interviews, the evaluators switched between English, Telugu, and Hindi. All languages were native to the researcher and raised no issues with transcription.

To benchmark against existing characters in games, the evaluators along with participant-generated characters were also presented with the Hindu characters Kali[1] from SMITE, Krishna from Shin Megami Tensei IV: Final Krishna [6], Hanuman from Hanuman the Boy Warrior [7].

The protocol followed in the sensitivity evaluation step was as follows:

- The evaluator and the researchers connected through online video/voice calls. The evaluators were briefed about the goal of the project.
- The evaluator was informed that a series of characters would be shown and a set of questions would be asked.
- The evaluator was presented one character at a time (unless they requested to see all the characters before commenting) randomly from the pool of characters in Figure 5, Kali from SMITE [57], Krishna from Shin Megami Tensei IV: Final Krishna [6], Hanuman from Hanuman the Boy Warrior [7]. For the character/s presented they were requested to answer the following:
  - Based on your first look at the character/s, share your thoughts.
  - Do you find this offensive? If so, what about this character makes it inappropriate or offensive? If not, what about this character makes it appropriate?

In Section 8.2, we present the insights of the evaluators while comparing characters generated by participants and original gods used in video games.

8 RESULTS AND DISCUSSION

In this section, we discuss the results of the procedures and protocols mentioned above to evaluate the novelty and sensitivity of the characters generated by the participants.

8.1 Novelty Evaluation Results

To evaluate the novelty of characters, we establish the following:

- **Origin**: The basic male character as the origin, since it is constructed by the least number of elements from the design space.
- We define two character groups, indicated in Figure 7:

[1] an image of Kali from SMITE is shown here: https://www.engadget.com/2012-06-27-religious-group-calls-for-removal-of-hindu-deities-from-hi-rezs.html

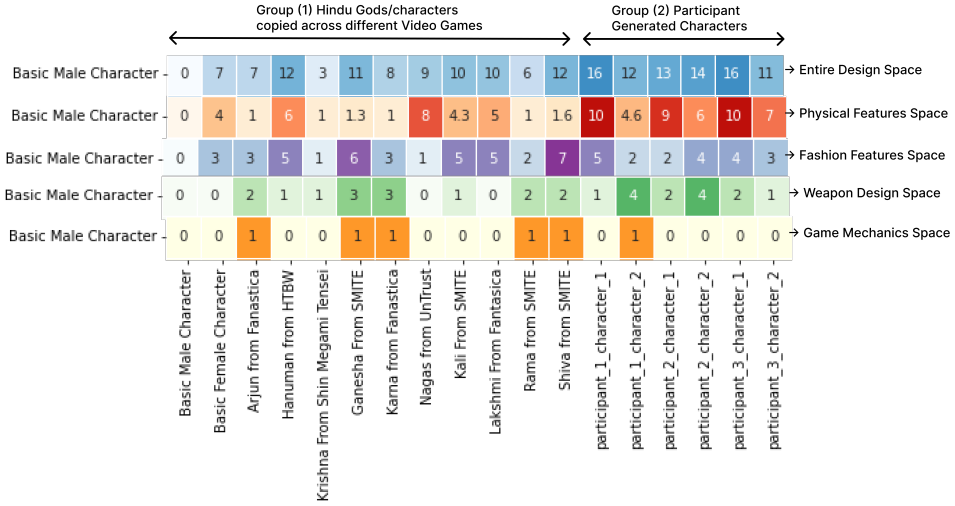

Figure 7: The distances of embodied gods in different games and participant-generated characters from the origin character throughout the design space and different selective codes.

- **Group 1**- Characters copied from Hindu mythology and used in various video games.
- **Group 2**- Characters designed by the participants.

- **Distance Computing**- Compute distances between the origin character and all the characters against the entire design space and the selective codes. These distances are shown in Figure 7. To visualize trends, we present a radar chart in Figure 8.

The dark blue line in Figure 8 corresponds to the distance between the origin and the character throughout the design space (all selective codes). The other lines correspond to the distance between the origin and the character being inspected across a particular selective code. We report the following statistical interpretations and researcher's interpretation of the trends.

8.1.1 *Character Physical Features Space.*

- **Statistical Interpretation**- Using Welch's t-test for unequal variances on Group 1 ($M = 2.8$, $SD = 2.4$) and Group 2 ($M = 7.8$, $SD = 1.9$) for distance measured across the selective code of physical characteristics (shown in Figure 7-Physical Features) we report $p < 0.05$ and Cohen's $d = 1.8$. The large effect size $d > 0.8$ indicates that participant-generated characters significantly differ from the origin compared to copied gods from Hindu mythology when measured across the physical features space.
- **Qualitative Interpretation**-Participant-generated characters have a combination of zoomorphic features and anthropomorphic features. In contrast, original characters (gods) are anthropomorphic in majority. This results in greater visual distinction and variety in participant-generated characters.

8.1.2 *Weapon Features Space.*

- **Statistical Interpretation**- Using Welch's t-test for unequal variances on Group 1 ($M = 1.24$, $SD = 1.08$) and Group 2 ($M = 2.6$, $SD = 1.2$) for distance measured across the selective code of weapon (shown in Figure 7-Weapon Space) we report $p < 0.05$ and Cohen's $d = 1.1$. The large effect size $d > 0.8$ indicates that participant-generated characters have a diverse weapon choices compared to copied gods from Hindu mythology when measured across the weapon space.
- **Qualitative Interpretation**-Participant-generated characters have a combination of multiple weapons compared to existing characters copied from mythologies, who generally use a single primary weapon. The zoomorphic nature of participant-generated characters leads to characters having multiple arms, allowing participant-generated characters to carry more weapons.

8.1.3 *Fashion Features Space.*

- **Statistical Interpretation**- Using Welch's t-test for unequal variances on Group 1 ($M = 3.4$, $SD = 2.0$) and Group 2 ($M = 3.0$, $SD = 0.8$) for distance measured across the selective code of fashion (shown in Figure 7-Fashion Features) we report $p > 0.05$. This indicates that participant-generated characters and original gods have fewer distinctions when measured across the fashion-selective code.
- **Qualitative Interpretation**- Group 1 consists of gods which come from a royal backdrop or identify as female. These gods are adorned with jewelry and clothing. This results in original gods in games covering a wider range of fashion artifacts. We also notice that characters in both groups restrict themselves to using crowns, anklets, and garments, but do not use or combine other elements from the fashion space.

8.1.4 *Game Mechanics Features Space.*

- **Statistical Interpretation**- Using Welch's t-test for unequal variances on Group 1 ($M = 0.4$, $SD = 0.49$) and Group 2 ($M = 0.2$, $SD = 0.49$) for the distance measured across the selective code of Game Mechanics (shown in

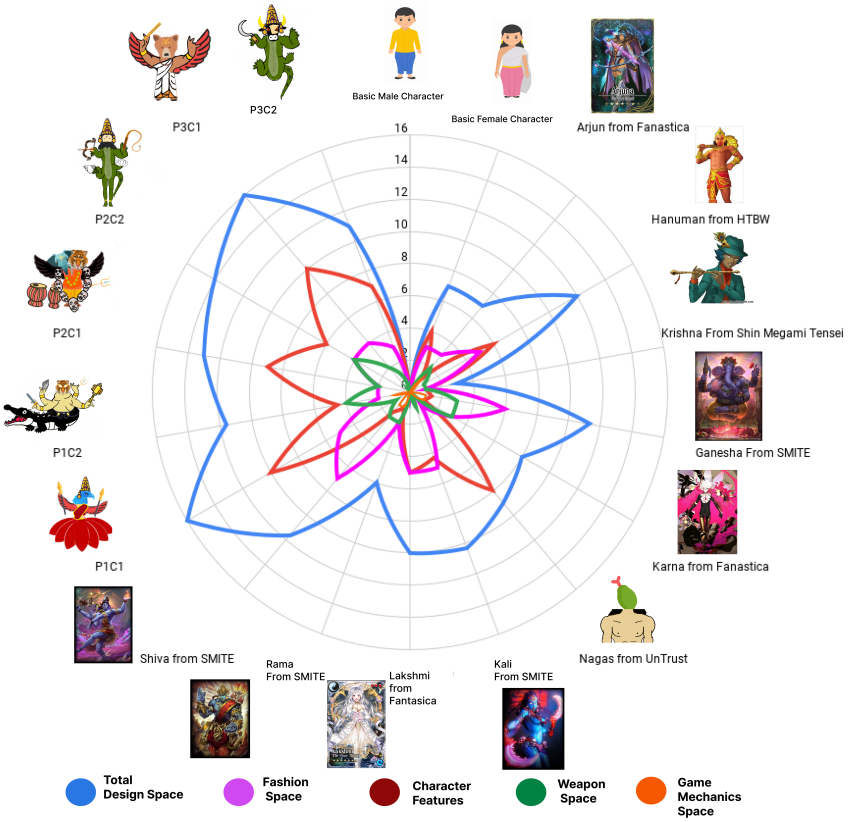

Figure 8: Radar Chart showing the distance between characters and a baseline character across different Selective Codes.

Figure 7-Game Mechanics) we report $p > 0.05$. This indicates that participant-generated characters and original gods have fewer distinctions when measured across the game mechanics-selective code.
The game mechanic selective code is less visual aesthetic driven but input modality and game loop driven, hence the low the lower means for both participant generated characters and Hindu gods in video games. Also evident in Figure 7 most characters do not have any element of this selective code resulting in $p > 0.05$

- **Qualitative Interpretation**- Original gods are anthropomorphic and mount animals (zoomorphic) for transportation or use chariots for fast transportation. On the flip side, participant-generated characters are zoomorphic in nature and do not use any modes of transportation.

8.1.5 *Total Design Space.*

- **Statistical Interpretation**- Using Welch's t-test for unequal variances on Group 1 ($M = 7.9$, $SD = 3.4$) and Group 2 ($M = 13.12$, $SD = 1.7$) for distance measured across the entire design space (as shown in Figure 7-Entire Design space) we report $p < 0.05$ and Cohen's $d = 1.57$. The large effect size $d > 0.8$ indicates that participant-generated characters are significantly distant from the origin compared to copied gods when measured across the entire design space.

The above interpretations indicate how participant-generated characters are visually novel and offer more combat agency compared to gods copied by designers in video games. Even when measure against the entire design space have a larger mean distance from the origin character and the large effect side $d > 0.8$ indicate how both groups have minimal overlap supporting how the design space allows the creation novel and creative characters.

We indicate how the design space provides a large set of fashion features that can be used for character design by designers in the future. We also believe that the proposed quantitative framework to represent characters allows designers to reflect on their design choices and artifact selection to create engaging and relatable characters. The presented quantitative evaluation also allows us to compare how gods copied from different mythologies by designers deviate from the actual cultural representation of the gods. In order to scope this research paper, we do not discuss this comparison.

For interested readers, Figure 9 in the Appendix provides detailed pairwise distance matrices to show distances between characters when each character is chosen as the origin.

8.2 Sensitivity Evaluation Results

To illustrate and compare cultural acceptability of participant-generated characters and original gods copied from Hindu mythology in video games, we present condensed results of the qualitative evaluation based on the protocol shared in Section 7.3.

"These gods are an identity for lots of us, Devi (Kali) is my primary deity and it is upsetting to see her reduced to such an representation." is what Evaluator 1 (Age 52, Temple Priest) shared while commenting on Kali from SMITE. This comment throws insight into how the evaluator relates to the character and is upset with the portrayal. Evaluator 3 (Age 48, Temple Priest) also shares comments on similar lines ***"We often refer Kali as Maa (mother) now this presentation is not what I would prefer. Same with Krishna, in Hindu mythology, he is seen as the upholder of Dharma (justice), but here you are conveniently fighting him up."*** The ability to relate to the character and having the character being presented or performing actions that are not relatable or even offensive is a point of concern that was shared by the evaluators.

However, when presented with characters generated by participants, evaluator 2 was able to identify elements borrowed from Hindu mythology and create an association with modern media artifacts and continues to share ***"I understand why you would be concerned if game characters can offend people, but think these are not my gods or any gods that anyone would identify or worship."*** This reinforces how despite being relatable in terms of design elements, how the generated characters do not resemble or mimic the original gods, which was the primary concern shared in the previous paragraph. The fact in which the participant-generated characters deviate from the original Hindu gods in terms of visual aesthetics is iterated again by evaluator 1 ***" I cannot blatantly rule any of the ones you showed out like the previous ones, since it is not a deity which I know."***

How characters through their actions in video games deviate from original narratives, tales, and beliefs was a concern shared by evaluators. Evaluator 3 shares how the core principles of Hinduism are distorted by video games that copy characters ***"Hindus believe in laying their fate and destiny in the hands of gods. Now forget controlling these gods, you are also having them get hit."*** Evaluator 1 mentions ***"Krishna is almighty and invincible, and in this game, he is shown as a bad guy, and you fight against him. Imagine what the next generation of kids will think and learn."***

Evaluators maintained consistency on how they would not be concerned with the generated participant and what they do in the games. This is attributed to how they have no cultural experiences, tales, or beliefs associated with these characters even though elements are relatable. Evaluator 3 mentions ***"These creatures are a combination of things borrowed. Items they hold might have cultural value, but as creatures, I am not worried about what they do, or what happens to the character. "***. Evaluator 1 supports this by simply quoting ***"The reason I might be okay with it is, it does not touch the source gods."***. Evaluator 2 reinforces this argument and mentions ***"*I do not see myself worshiping them, because there is no mythological story or god that exists with which I can relate or resonate."**

The qualitative discussion mentioned above with the expert evaluators indicates how the participant-generated characters through the design space are culturally acceptable.

9 IMPLICATIONS

From Section 8.1 and Section 8.2 we claim that cultural spaces can inspire the development of design spaces. These design spaces, when expressed in the form of syntagms and paradigms, can support the creation of novel, yet culturally sensitive characters. The agency of the design space to support create novel yet culturally sensitive characters enables game studios to take inspiration for character creation instead of transplanting existing gods into their games and landing in controversies. The following support the above-mentioned argument:

- UX research methods such as ethnography and grounded theory were successful in generating a syntagm and paradigm design space. New characters were created during the participatory design study using the design space.
- The quantitative novelty evaluation illustrates how the design space supports the creation of creative and unique characters compared to gods copied from Hindu mythology.
- The scholarly evaluators were able to identify cultural artifacts and relate to characters designed by the participants, yet did not find them offensive.

10 LIMITATIONS AND FUTURE WORK

Giving equal weight to all elements in character embeddings is one of a drawback of this paper. In this paper, we treat a difference in jewelry equivalent to a difference in facial features, i.e., a difference in a necklace is given equal weightage to a different head. However, ideally, a different facial feature is more distinctive and should be given more importance when performing vector calculations. To combat this drawback as part of future work, we want to introduce weighted vectors to determine the influence of each element on distance calculations. As a first step in Figure 6 we introduce the weighted vector "W" while in this study the weighted vector is an identity vector.

In this work, we avoid meta-data for elements chosen by participatory design participants, i.e., we do not add distance between a red-colored saree (a form of dress) and a blue-colored saree. In the future, we want to leverage 3D vector spaces to capture meta-data, to provide even accurate representations of characters in design spaces.

Through the participatory design study, we illustrate that character creation is possible through the proposed design space. In this study, it was not studied how effectively the design space encouraged designers to overcome designer block (if present). In the future, we plan to conduct an A/B test with designers to understand how and why the design space might have been effective in overcoming designers' block and to learn more about designers' experience with the design space. In addition, we plan to study how the proposed quantitative framework can help designers validate and reflect on their design choices by demonstrating how the characters designers develop fare with existing characters.

In this work, we focus on Hindu mythology; although this is not a drawback, we would love to explore other cultural sites for

developing design inspiration. As part of future work, we want to explore the merging of design spaces across cultures and study the resulting characters.

11 CONCLUSION

In this paper, we present a visual ethnographic study and grounded theory approach to develop a design space to provide inspiration for character design. Our developed design space takes a syntagm and paradigm approach. We conducted a participatory design study with participants and the developed design space to validate whether the design space allows for the generation of new characters. To evaluate novelty, we use the syntagm and paradigm approach to generate character embeddings and provide a discussion of quantitative metrics on how participant-generated characters differ from existing Hindu gods used in mythology. To assess sensitivity, we take a qualitative approach and conduct user interviews with experts in the field of mythology, culture, and religion. As part of user interviews, we validate the acceptance and sensitivity of the characters generated by the participants. The outcomes of these evaluations and discussions support our hypothesis of using UX reserach methods to develop design spaces, generating characters using a syntagm and paradigm approach allowing the creation and evaluation of novel and sensitive characters for video games. We believe that this paper opens up a discussion for further research on the intersection of culture and avatar creation, using UX research methods for character creation and mixed method evaluations to compare and study avatars.

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A APPENDIX

A.1 What is Open, Axial, Selective Coding?

A.2 Open Coding

Williams *et al.* defines open coding [62] as "Open coding is the first level of coding. In open coding, the researcher is identifying distinct concepts and themes for categorization. The first level of data is organized by creating initial broad thematic domains for data assemblage."

A.3 Axial Coding

Williams *et al.* define axial coding [62] as "Axial coding is the second level of coding. In contrast to open coding, which focuses on identifying emergent themes, axial coding further refines, aligns, and categorizes the themes. With the completion of open coding and transition to axial coding, collected data can be sifted, refined, and categorized with the goal of creating distinct thematic categories in preparation for selective coding."

A.4 Selective Coding

Williams *et al.* define selective coding [62] as "Selective coding is the third level of coding. It enables the researcher to select and integrate categories of organized data from axial coding in cohesive and meaning-filled expressions."

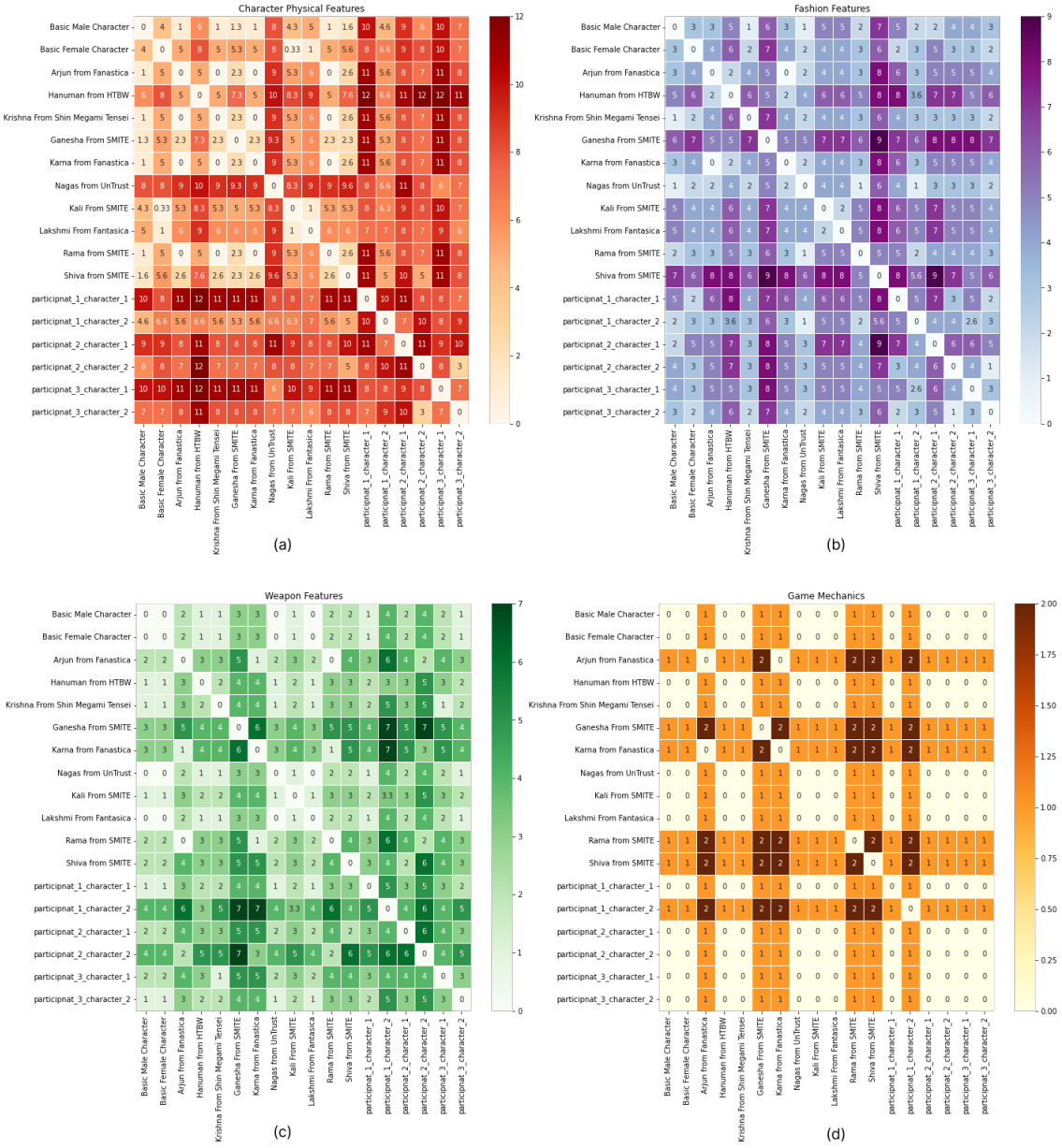

Figure 9: Pairwise Distance (Canberra) Matrix showing distance between characters across (a) Character physical feature selective code (b) Fashion selective code (c) Weapon selective code (d) Game mechanics selective code.