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Full Length Research Paper

Integrating codesign into new product innovation: Consumer-driven online game optiomization design

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This article issues an introductory argument that codesign techniques can bridge theory and practice for online game designs, by providing content and methodological knowledge that guides the design process. To address the complexity and challenges of online game designs, a game designer should adopt new approach that is suitable for individual consumers and rely on consumer codesign efforts to transform users' perceptions into online game elements. This study suggests a unique method that enables managers to understand new online game service codesign structures and make service design decisions that integrate optimum individualized designs.

Key words: Codesign, online games, innovation, massive multiplayer online role-playing games (MMORPGs).

INTRODUCTION

Consumers can play key roles in shaping the development of new products. For example, an increasingly popular method involves consumers in the early stages of the new product development (NPD) process by inviting them to suggest ideas for innovative products and services (Kristensson et al., 2008). Consumers increasingly appreciate the opportunity to design their own products and express their self-images more effectively, which increases consumption value. However, most product specification processes suffer from one key weakness: the design team lacks an adequate understanding of the customer (Reinertsen, 1997). Most manufacturers create a new technology and then attempt to find markets for it, which means that they ignore what customers want from a new product or service. Through collaborative co-design, a manufacturer might instead, establish a dialog with customers, help them express their needs, and identify precise products that fulfill those needs.

The codesign concept requires manufacturers to interact with consumers to obtain specific information that they can use to define and translate consumers' needs and desires into concrete product specifications (Berger et al., 2005). In adaptive codesign, consumers act as designers, creating unique products from an array of design options presented by the product manufacturer. In this case, firm–customer interaction and adaptation, add value. Codesign thus constitutes a foundation of a new kind of value creation that adopts the paradigm of customer integration (Piller et al., 2003). Yet, most studies of consumer codesign focus on managerial practices that support the partnership (Berger et al., 2005; Spina et al., 2002; Zirpoli and Caputo, 2002) or identify prerequisites for the successful involvement of suppliers in NPD activities (Jayaram, 2008; Petersen et al., 2003; Valk and Wynstra, 2005; Song and Di Benedetto, 2008). However, to the extent that these processes integrate consumers' preferences and demands with the innovative ideas created by professional designers, they might achieve a two-way communication path with greater utility. In collaborative design processes, customers enter the value creation process by defining, configuring, matching, or modifying an individual solution (Chen and Tseng, 2007). When codesign activities occur on dedicated interfaces, they also allow for the joint development of products and solutions, as demonstrated in studies that focus specifically on product development (Chen and Tseng, 2007; Spina et al., 2002; Zirpoli and Caputo, 2002).

In this context, the interactive nature of the internet enables consumers to make informed service choices more conveniently through service heterogeneity in online environments, presents a challenge, because consumers want to create unique designs that meet their own specific needs. The customer-driven development of new services is crucial for initiating new online game

markets for example. Because the nature of information and communication services that support online games varies greatly, different service designs meet different consumer needs, and the required customer may centricity prompt designers to turn to customer codesign. Accordingly, industrial customers often regard designers as sources of customized innovation.

Take the online gaming context as another example. The popularity of massive multiplayer online role-playing games (MMORPGs) has increased dramatically (Meredith et al., 2009). In these genres, a vast number of players interact in a fully developed multiplayer universe that exists in an advanced, detailed virtual game world (Wikipedia, 2010). However, little research investigates these online gaming communities, despite some prelimnary insights from various perspectives such as psychological, sociological, and economic research (Griffiths et al., 2004). This study aims to analyze how consumers' needs may drive the development of a special class of innovative designs, namely, online game services.

The design of a MMORPG, though not necessarily exceptional compared with general ideas about service design, offers several peculiarities that are worth investigating. For example, as a dynamic developer of new service features, an MMORPG must confront fierce competition, demand for complex services, and a virtually unmatched need for constant refinement and innovation. To succeed, the MMORPG must be relatively easy for consumers to use and easily integrate transformed processes to attain and maintain a competitive advantage. These attributes reveal that a unified discussion of the design and production of MMORPG is inherently challenging. Because of differences in players, delivery media, and expected production values, the production of online games also is an expensive, time-consuming, and technically nontrivial undertaking (Dudley, 2003). Game designers who rely on current technology must employ a design model that limits the scope, quality, quantity, and complexity of interactivity among players. This boundary circumscribes both the type of games designers can create and the resultant game's market penetration (D'Amora et al., 2006). Yet, design efforts persist, without the benefit of a thorough understanding of how designers might obtain and employ various types of consumer information in their current and future processes (May-Plumlee and Little, 2006). As customers continue to demand increasing levels of performance, functionality, and customization, firms can turn to them as sources of both components and innovation. Because consumers are interested in more options and personalized services, the use of collaborative codesign might enable a firm to establish communication with individual consumers, such that they can express their needs and identify precise services that would fulfill them.

Finally, this study suggests the use of conjoint analysis (CA) during the innovation process to determine optimal designs. This approach can identify consumers' beliefs about the relative contribution of certain attributes and preference orderings for objects that represent various attribute combinations. With CA, every combination of attributes is a kind of service idea, and the tester is the stimulus; these combinations provoke the overall assessment values consumers have for a certain stimulus (Liao and Lee, 2010). Therefore, the game designer generates innovative ideas and puts them into practice in the shortest possible time, then, consumers base their evaluations on the combination of product attributes and choose services that will offer them the maximum benefit. This study of codesign technology attempts to understand consumers' preferences for online games to enhance consumer effectiveness and help designers meet individual consumer demands.

LITERATURE REVIEW

The role of codesign in new product development

Even the most ingenious invention fails if it does not meet the needs of customers. Most firms assign a few employees to work closely with customers, cocreate, and innovate, particularly in customized designs of products built for particular customers (Seybold, 2006). Few companies have made customer codesign a core competency or the starting point for all their new business initiatives, though customer-led innovation remains one of the most predictably successful NPD processes. Therefore, firms need a better understanding of the process by which designers transform information about customer requirements into final design specifications (Bailetti and Litva, 1995). Korsakienė (2009) argues that customers should be cocreators and coproducers, because they are more creative and valued, and offer more easily implemented NPD ideas (Kristensson et al., 2008). Therefore, designers should collaborate with and learn from customers, as well as adapt to their individual and dynamic needs.

The purpose of codesign is to make it easy for customers to design their own ideal solutions, such that they leverage their own knowledge and learn what is possible. When the customer participates in the production of a good or service, its end value increases, because the customer can tailor the service. Such codesigns appear increasingly popular in innovation (Vargo and Lusch, 2004); however, a paucity of research considers the theory and practice underlying consumer codesign, for either new products or new services. In particular, the theoretical foundations of codesign success (for example, methodology, critical processes) are uncertain.

Traditional approaches to innovation assume that subject matter experts, invent, and design innovative products to meet needs that customers may not have even realized (Seybold, 2006). Codesign instead, encourages

consumers to participate with the trained designer and use different components to construct personal products. In turn, it has spread across industries (Berger et al., 2005; Spina et al., 2002). For example, codesigning online games may lead to more memorable experiences that entice customers. They expect to cocreate game service, just as they codesign the virtual worlds they inhabit while playing the game. Through trial and error, players build a model of the underlying game based on empirical evidence (Wright, 2006). As they refine this model, they begin to master the game world. Thus, players create value simply by spending time in virtual worlds.

The codesign process studied herein includes service design options and computer modeling to help customers select the options they prefer, which should foster an engaging experience because it involves novelty, creative expression, and an advanced technology interface. An online game design process that relies on conjoint analysis can also enable the consumer to choose the game's drama, scenes, character roles, incidental music, player-versus-player options, armor, and skills. To ensure maximum efficiency, the analysis also reveals which realistic service attributes may be codesigned and communicated more easily for realistic evaluations.

Online game service attributes and evaluative criteria

Customer assessments of service products comprise two dimensions: core and supplementary (Anderson and Narus, 1995). The core elements represent responses to the customer's need for a basic benefit; for example, online games offer user interfaces, hotels offer lodging, and credit cards offer revolving credit. The supplementary service instead refers to the features that promote the core service (for example, an online game provides an invoice archive, and secures payment methods). Customers primarily purchase the core services; the supplementary services enhance their receipt of that core service by adding value. Through synergy between the core and supplementary services, the provider increases overall value for customers (Goyal, 2004). Therefore, services should represent a strong consideration for online designers, in that consumers assess services according to what they consider most important.

Online games' core services include essential characteristics (for example, game drama, scene, arms, character roles, game rules), whereas, the supplementary services refer to player-versus-player options, small maps, and so forth. Luo et al. (2006) also identify attributes that correlate with online game services: character role, equipment, trade history, players' historical request records, account information retrieval, rules, and coin trading. In addition, Chen et al. (2007) show that consumer' preferences for online game items depend on the joint influence of several product attributes: visual image, community communication, control form, uniqueness, stability, interest, incidental music, and duration. Therefore, the joint effects of various service attributes on the final decision to use a specific service item require consideration. When consumers use an online game, according to Griffiths et al. (2004), they consider profession and deity alignment, help guides, forums, combat, character roles, magic, exploring, strategic thinking, player-versus-player options, and social contact with others. These services become manifest in preferences, expectations, and quality assumptions that may be ingrained or generalized as product prejudices. Although, various studies use aspects of excessive and addictive online gaming, as well as demographic factors of specific online games (Meredith et al., 2009), few consider customer codesign, which prevents them from including more attributes. Furthermore, most existing studies imply that consumers value core and supplementary services, consistent with services research. Therefore, this study addresses the combined influence of the following services during the codesign process: game drama, scene, task, character role, arms, player-versus-player option, skill, armor, incidental music, and small maps.

METHODS

Conjoint analysis (CA) is a systematic, solution-oriented experimentation process that designs, tests, and modifies alternative ideas, products, or services. It assumes that a product can be described in terms of a set of multidimensional attribute profiles and that consumers' decisions reflect their preferences for and overall judgment of that set of profiles (Huang and Fu, 1995). To make decisions, consumers must make trade-offs, because one product does not contain all their favored attributes. The results of a CA thus include a hypothetical product, or a particular combination of attributes and levels, most preferred by consumers, which can be especially useful for developing new products that mimic a hypothetical "best" product. Most conjoint studies thus pertain to new product design (Beane and Ennis, 1987; Green and Srinivasan, 1990), and many commercial applications derive from early CA, mostly in the form of new product or concept evaluations, repositioning, competitive analyses, and market segmentation.

Conjoint analyses alter the structural design of a certain factor to create different combinations of multiple attribute standards. Therefore, every combination is a product idea, and the tester is the stimulus. The combinations provoke overall assessments of value for a certain stimulus. When the respondent evaluates the systematically varied stimulus, the use of adaptive modeling, using part-worth models, can reveal how much each element contributes to the overall stimulus ratings. Thus, the total utility of any defined stimulus equals the sum of its parts, formulated as:

$$Z_j = \sum_{i=1}^{P} f_i(y_{ji}) \text{ ; for } j = 1,2,....,n, \quad (1)$$

Where Z_j is the consumer's preference rating for the *j*th stimulus; f_i is a function that represents the part-worth of each of *j* different levels of the stimulus object y_{ji} for the *i*th attribute; and y_{ji} is the level of the *i*th attribute for the *j*th stimulus object. In practice,

$f_i(y_{ji})$ can be estimated for only a few levels of y_{ji}, depending on the research design, and the part-worths for intermediate levels of y_{ji} can be obtained through linear interpolation.

The part-worth function is represented by a piecewise linear curve that approximates any arbitrary shape of the preference function. Furthermore, X denotes a particular alternative that can be described as an ordered p-tuple of *p* attributes, such that $X = (X_1, X_2, ..., X_p)$, where $X_i (i = 1,2,\ldots, p)$ represents the level of the alternative X on the *i*th attribute. The component utility of X_i, $U_i(X_i)$ then can be defined as:

$$U_i(X_i) = U_i(X_{i1}) + U_i(X_{i2}) + ... + U_i(X_{ik}), \quad (2)$$

Where $U_i(X_{im})$, m = 1, 2, …, k, is the utility of X with respect to the *m*th level of the *i*th attribute. The additive model posits that the total utility for an alternative X, U(X), can be expressed as:

$$U(X) = U_1(X_1) + U_2(X_2) + U_3(X_3) + ... + U_p(X_p) \quad (3)$$

Equation (1) provides a means to estimate the importance and contribution of each attribute to the total utility of an alternative, as expressed in Equation (3). Large utilities reflect the most preferred levels, and small utilities get assigned to the least preferred levels. The attributes with the largest utilities are the most important for predicting preference and represent the optimum product design.

EMPIRICAL APPLICATION

The empirical process consists of four steps: (1) determine the attributes and levels, (2) compile the stimuli (profiles of attributes) to present to respondents, (3) create the sampling design, and (4) determine reliability and validity.

Selecting and defining factors and levels

With regard to the selection of service factors and levels, this study considers several key principles. First, the factors and levels must be communicated easily to support a realistic evaluation. Second, the factors and levels must be realistic, meaning that the attributes should be distinct and represent a concept that can be implemented (Hair et al., 2006). Third, all selected factors must have high levels of consumer attribute recognition and cover a broad spectrum, to introduce sufficient potential heterogeneity into the factor choice.

Therefore, this study first conducted focus group interviews with consumers, who detailed the accessories and evaluation standards they considered when assessing online games. Three focus groups with different consumers (N = 38 total) also revealed primary attributes. Next, interviews with several professional designers, who had significant MMORPG design experience and worked for game brands, indicated design directions for MMORPG accessories. Therefore, this study identifies important service attributes that affect usage decisions associated with MMORPGs in Table 1. For each attribute, the specific levels represent the characteristics of service differentiations available in the market. The respondents also considered the importance of each attribute in their evaluation criteria. For each specific attribute, respondents indicated its degree of importance, in their opinion (1 = very unimportant, 7 = very important).

Table 1. Attributes and levels for the conjoint analysis.

Attributes	Levels
Drama	War Action Science fiction
Scene	Battlefield Grassland Forest Village
Task	Assassination Treasure Adventure Combat
Character role	Warrior Elf Angel Assassin
Arms	Gun/sword Bow and arrow Hammer Staff
Player-versus-player option	Open Faction
Skill	Defense Flight Attack
Armor	Shield Metal armor
Small map	Present Absent
Incidental music	Rock music Light music Dance music

Design stimuli

An innovative service design must contain the service's critical attributes. This study addresses 10 important attributes of MMORPGs; using the technology provided by the designer, consumers can select the levels of attributes that would result in an optimum

Figure 1. Example of evaluation form, describing possible MMORPG profiles; a) drama: War. Scene: Village. Task: Treasure. Character role: Angel. Arms: Staff. Player-versus-player option: Faction. Skill: Defense. Armor: Metal Armor. Small Map: Present. Incidental music: Light music; b) drama: Science fiction. Scene: Forest. Task: Assassination. Character role: Warrior. Arms: Bow and arrow. Player-versus-player option: Open. Skill: Defense. Armor: Metal Armor. Small Map: Present. Incidental music: Rock music.

service. For the experimental design, this study adopts an orthogonal array method, as developed by Bose and Bush (1952), to identify a subset of stimuli that then structure the interviews. Orthogonal arrays build on the Greco-Latin square notion and develop even more highly fractionated designs, in which all main effects can be estimated on an un-confounded basis, assuming interaction effects can be neglected. An orthogonal array also identifies a subset of 28 stimuli that provide the structure for the data collection interviews (partition stimuli appear in Figure 1). Therefore, the respondents evaluate 28 MMORPG profiles, which consisted of the 10 attributes in Table 1, and each attribute had one correspondent level. If respondents assigned 10 points to a profile, they would likely select this MMORPG in their next choice. If respondents assigned 0 points, they would probably never select the MMORPG.

Sampling design

The data collection relied on survey questionnaires. The sample consisted of 320 undergraduate students. To ensure that questionnaire items were clearly articulated, a pilot test of the survey instrument included 30 MMORPG players; their responses suggested several minor modifications to the survey questions. Of the 480 questionnaires distributed through a convenience sampling method, 340 were returned, though 20 invalid questionnaires had to be eliminated, leaving 320 valid questionnaires. The retrieval rate was 70.8%, and the valid return rate was 66.7%. As the respondent characteristics in Table 2 reveal, approximately 70% of the respon-dents were women, and more than 39.4% of the sample spent 1 to 3 h daily online. They were very familiar with online games: 23.8% of the respondents indicated they had at least four years of experience with these games, and 76.6% used online games at home.

Table 2. Characteristics of Respondent MMORPGs.

Measure	Items	Percent (%)
Gender	Male	30
	Female	70
Age(years)	<15	0.9
	15-18	65.9
	19-23	31.9
	>23	1.3
Place of playing online games	Home	76.6
	Internet Cafe	20.3
	Friend's	3.1
Years of online game experience	<1	22.2
	1-3	22.8
	4-5	23.8
	>5	31.2
Hours per day playing online games	<1	27.5
	1-3	39.4
	4-5	17.5
	>5	15.6

Reliability and validity

The reliability measure relies on the Cronbach's α coefficient, calculated for all items to assess the internal consistency of the model variables. According to Price and Mueller (1986), a standard coefficient α of 0.60 or higher is generally acceptable. The value of the Cronbach's α for the observed stimuli is 0.947, which indicates that this study achieves good consistency. The validity test considers both external and predictive validity (Cattin and Wittink, 1982). In conjoint studies, internal validity usually pertains to the strength of the model, which represents the utility prediction tool for the system. External validity relates to the model's strength, in terms of the extent to which it applies to and across populations outside the system (Hu, 1994). Using holdout stimuli to compare the actual and predicted preference judgments, this study reveals that most survey respondents (262) achieve sufficient measures of validity. Predictive validity, computed independently for each respondent, relies on a preference model of the product–moment correlations between each respondent's 28 calibration profile evaluations and the predictions, according to the calibration model of interest and the mean for each preference model across the 320 respondents. The mean correlation shows the conjoint model is the most effective in terms of predictive ability (r = 0.926).

ANALYSIS AND RESULTS

The means for the MMORPG attributes for all ten items are in Table 3. All respondents attach relatively high levels of importance to the ten product attribute variables. With respect to drama, they prefer "style," "challenge," and "appearance." On the scene attribute, they all prefer "appearance" and "factuality." For the character role (or arms), they choose "appearance" and "function," and for the player-versus-player option, they prefer "social contact," "factuality," and "function." "Function" is the most often selected skill; for the armor attribute, they reveal a preference for "function," "appearance," and "factuality." With regard to the small map (or incidental music), respondents prefer "function" and "factuality," and for the task, they want "challenge" and "factuality."

Attributes and evaluation criterion fit analysis

To identify the main evaluation criterion on which respondents base their perceptions of attributes, this exploratory research identifies eight relevant attributes of six evaluative criteria. A group of respondents rated, on a seven-point scale, each of the attributes according to the six evaluative criteria. The position of each attribute in the perceptual space then represented the average factor score for that attribute. The vectors inserted into the reduced perception space, which depicts both the attribute group centroids and overlaps among groups, enable the researcher to project group means on each vector to reflect the relative prominence of the predictor variable for that group. This perceptual map then reveals that each attribute gets projected onto each evaluative criterion vector, which reveals the degree of similarity and quality direction of a particular evaluative criterion, as illustrated in Figure 2. Dimension 1 contains three attribute vectors—challenge, style, and social contact—that

Table 3. Summary statistics of the MMORPG service attributes.

Attribute E.C	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	Drama		Scene		Task		Character role		Arms	
Factuality	4.76	2.13	5.34	1.83	4.78	1.82	5.19	1.95	5.18	1.96
Function	4.74	1.84	4.85	1.82	5.13	1.71	5.47	1.82	5.88	1.60
Appearance	5.34	1.80	5.63	1.69	4.59	1.91	5.92	1.64	5.62	1.70
Style	5.55	1.78	5.16	1.74	5.61	1.67	4.95	1.92	5.20	1.88
Challenge	5.54	1.70	5.0	1.86	5.69	1.64	5.17	1.78	5.27	1.88
Social contact	4.92	1.87	4.83	1.92	4.81	1.94	5.14	1.95	4.36	2.06
	Player-versus-player option		Skill		Armor		Small map		Incidental music	
Factuality	5.33	1.82	5.30	1.92	5.22	1.87	5.10	2.03	5.01	2.02
Function	5.17	1.89	5.78	1.63	5.70	1.67	5.28	1.95	4.69	2.08
Appearance	4.67	1.96	5.45	1.68	5.40	1.77	5.04	1.85	4.19	2.13
Style	4.63	1.93	5.35	1.82	4.93	1.96	4.13	2.07	4.52	2.09
Challenge	4.75	1.92	5.36	1.87	5.04	1.89	4.03	2.07	4.23	2.13
Social contact	5.27	1.93	4.47	2.05	4.30	2.03	3.91	2.12	3.80	2.22

Note: E.C.= evaluation criterion.

cluster relatively closely together. The dimension thus can be designated the sense-seeking group. Dimension 2 focuses mainly on the attribute vector of appearance, function, and factuality; it represents sensibility preferences.

The map in Figure 2 clearly indicates that consumers regard task as the best element if they reside in the sense-seeking group. It has high attribute popularity, challenge, good social contact, and excellent style. The next most popular attributes are appearance, function, and factuality. The other attributes are distant from the direction of this evaluative criterion vector, so they are considered of inferior quality and constitute the group that is more similar. That is, consumers believe the other attributes do not achieve sufficient value with respect to the three evaluation criteria, so they issue negative evaluations.

Conjoint analysis

As noted, CA reveals the best design for personalization, and it converts preference ratings into utilities for hypothetical products. Utilities can be divided into the part-worth utilities associated with each attribute level of the service, such that the utility value represents a respondent's overall preference for a particular service profile. A part-worth indicates the preference or utility associated with a specific level of an attribute, estimated for each respondent in a conjoint study. The utilities then are the values predicted by the regression, and the part-worth utilities are the regression coefficients. In this way, CA reveals the relative importance of each attribute by considering how much difference each attribute makes to the total utility of a product. In addition to assisting in the development of new services, these results can assist the design of personalized MMORPG services. For example, as Table 4 shows, the most suitable personalized service for respondent 1 is game 1 (science drama; village scene and combat tasks; elf, staff arms; open; with flight skill; shield armor; small map; rock music), according to this person's following attribute values: drama (9.65), scene (25.60), task (18.70), role (6.19), arms (7.69), player-versus-player option (2.04), skill (13.24), armor (0.51), map (2.78), and music (13.55). Scene is the most important attribute for predicting the preferences of respondent 1 but appears as less important for most other respondents.

Although CA features individual respondents, the goal generally is to summarize across a group to obtain output similar to that in Table 5. The procedure represents the partial utility values for each level of each attribute and a percentage measure of their importance at both individual and aggregate levels. Such a summary thus shows that the most important overall attribute is game scene (15.31%), followed by game arms (13.83%), task (13.30%), and role (12.93%). Intermediate importance marks music (11.06%), drama (9.19%), skill (8.58%), small map (6.58%), player-versus-player option (4.65%), and armor (4.52%). According to Table 5, the most preferred combination of attributes across all respondents is a science blended drama MMORPG that uses a forest scene, features an adventure task and assassin role, has guns/swords, is open to interactions, includes flight skills in the MMORPG design, and provides a small map. This combination gives consumers the highest total value.

Table 4. Utilities for subject 1.

Online games	Utility	Drama	Scene	Task	Character role	Arms	Player-versus-player option	Skill	Armor	Small Map	Incidental music
1	6.41	Science	Village	Combat	Elf	Staff	Open	Flight	Shield	Present	Rock
2	6.40	Action	Grassland	Combat	Warrior	Gun/Sword	Faction	Defense	Metal Armor	Absent	Light
3	5.97	Action	Grassland	Adventure	Elf	Bow and arrow	Open	Defense	Metal Armor	Absent	Light
4	5.71	Science	Battlefield	Treasure	Elf	Gun/Sword	Faction	Flight	Metal Armor	Absent	Rock
5	5.56	Action	Village	Adventure	Elf	Bow and arrow	Faction	Attack	Metal Armor	Absent	Light
6	5.54	Action	Forest	Combat	Assassin	Hammer	Open	Flight	Metal Armor	Present	Light
7	5.19	War	Forest	Treasure	Elf	Gun/Sword	Open	Attack	Shield	Present	Light
8	5.05	Action	Village	Adventure	Angel	Gun/Sword	Open	Defense	Shield	Absent	Rock
9	4.89	War	Grassland	Assassination	Assassin	Staff	Open	Attack	Metal Armor	Absent	Rock
10	4.82	Science	Forest	Assassination	Warrior	Bow and arrow	Open	Defense	Metal Armor	Present	Rock
11	4.81	Science	Village	Treasure	Angel	Bow and arrow	Open	Defense	Shield	Present	Light
12	4.76	War	Grassland	Adventure	Warrior	Bow and arrow	Faction	Flight	Shield	Present	Rock
13	4.75	Science	Forest	Assassination	Angel	Staff	Open	Flight	Metal Armor	Absent	Rock
14	4.73	War	Battlefield	Assassination	Angel	Hammer	Open	Flight	Shield	Absent	Light
15	4.50	War	Forest	Combat	Angel	Hammer	Faction	Attack	Metal Armor	Absent	Rock
16	4.41	Action	Grassland	Treasure	Angel	Bow and arrow	Open	Flight	Metal Armor	Absent	Dance
17	4.29	Science	Forest	Adventure	Assassin	Staff	Faction	Flight	Shield	Absent	Light
18	4.06	Science	Village	Assassination	Angel	Hammer	Open	Flight	Shield	Absent	Dance
19	4.05	Action	Battlefield	Treasure	Assassin	Hammer	Faction	Defense	Shield	Present	Rock
20	3.91	Science	Village	Treasure	Warrior	Hammer	Faction	Attack	Shield	Absent	Dance
21	3.87	Action	Forest	Assassination	Elf	Staff	Faction	Defense	Shield	Absent	Dance
22	3.85	War	Battlefield	Combat	Assassin	Bow and arrow	Open	Defense	Shield	Absent	Dance
23	3.69	War	Village	Treasure	Angel	Staff	Faction	Defense	Metal	Present	Light
24	3.56	Science	Battlefield	Assassination	Angel	Bow and arrow	Faction	Attack	Shield	Present	Light
25	3.35	War	Village	Assassination	Assassin	Gun/Sword	Faction	Flight	Metal Armor	Present	Dance
26	3.27	Science	Grassland	Combat	Angel	Gun/Sword	Faction	Attack	Shield	Present	Dance
27	3.23	Science	Grassland	Adventure	Elf	Hammer	Open	Defense	Metal Armor	Present	Dance
28	2.07	Action	Battlefield	Adventure	Warrior	Staff	Open	Attack	Metal Armor	Present	Dance

DISCUSSION

Many designers believe that MMORPG innovation begins with a new service idea; in turn, most innovation studies focus on new concept generation. Yet the diversification of demand, increasing speed of innovation, and proliferation of choice appears to require codesign between consumers and service designers. Designers recognize that consumers with great purchasing power increasingly attempt to express their personalities through their service designs. By extending the scope of attribute research and combining it with conjoint analysis techniques, this study provides an effective service codesign method that can help designers understand the nature of their own services, as well as the preferences and demands of their consumers.

Table 5. Utilities for subject 1

Online games	Utility	Prayer-versus-prayer option	Skill	Armor	Small map	Incidental music
1	6.41	Open	Flight	Shield	Present	Rock
2	6.40	Faction	Defense	Metal armor	Absent	Light
3	5.97	Open	Defense	Metal armor	Absent	Light
4	5.71	Faction	Flight	Metal armor	Absent	Rock
5	5.56	Faction	Attack	Metal armor	Absent	Light
6	5.54	Open	Flight	Metal armor	Absent	Light
7	5.19	Open	Attack	Shield	Present	Light
8	5.01	Open	Defense	Shield	Absent	Rock
9	4.89	Open	Attack	Metal armor	Absent	Rock
10	4.82	Open	Defense	Metal armor	Present	Rock
11	4.81	Open	Defense	Shield	Present	Light
12	4.76	Faction	Flight	Shield	Present	Rock
13	4.75	Open	Flight	Metal armor	Absent	Rock
14	4.73	Open	Flight	Shield	Absent	Light
15	4.50	Faction	Attack	Metal armor	Absent	Rock
16	4.41	Open	Flight	Metal armor	Absent	Dance
17	4.29	Faction	Flight	Shield	Absent	Light
18	4.06	Open	Flight	Shield	Absent	Dance
19	4.05	Faction	Defense	Shield	Present	Light
20	3.91	Faction	Attack	Shield	Absent	Dance
21	3.87	Faction	Defense	Shield	Absent	Dance
22	3.85	Open	Defense	Shield	Absent	Dance
23	3.69	Faction	Defense	Metal armor	Present	Light
24	3.56	Faction	Attack	Shield	Present	Light
25	3.35	Faction	Flight	Metal armor	Present	Dance
26	3.27	Faction	Attack	Shield	Present	Dance
27	3.23	Open	Defense	Metal armor	Present	Dance
28	2.07	Open	Attack	Metal armor	Present	Dance

The important attributes to consider when designing MMORPGs include drama, scene, task, character role, arms, player-versus-player options, skill, armor, small maps, and incidental music. With regard to the drama, it is important that consumers perceive a unique style when playing the game, that it provides special challenge, and that they consider the appearance of the game attractive. The scene should be bright and aesthetically pleasing. The task design should emphasize a challenge, and its style should be centralized and unique. Regarding the character role attribute, consumers demand that the game and their images fit perfectly, such that the game covers their images in full and provides an attractive appearance, as well as centralized, firm factuality and individual capability functions. The design of the arms should focus on function, whereas the player-versus-player option should be fast in terms of factuality and social contact. With regard to skills, players should be able to combat the enemy effectively and adopt different actions, with flashy moves that can attract others' attention. The games should also offer armor functionality that provides different forms of protection while still appearing attractive. Finally, the design of the small map should ensure a location function, and the incidental music should be dulcet and inspire functions. Users regard these attributes of game design as particularly important, and designers should exploit them to improve their game offerings.

An online game service–centered view of the exchange also implies that the goal is to customize offerings, recognize the consumer as a constant co-producer, and strive to maximize consumer involvement to better fit his or her needs. In codesign, ideas provide useful sources of information to game designers, who should use customization to design the best services for individual consumers, decrease the risk of design failure, and promote consumer loyalty to and satisfaction with the product. This study provides a unique idea for understanding the new service customization structure and making online game design decisions integrated with optimum individualized design. Designers should carefully consider the level of consumer involvement and

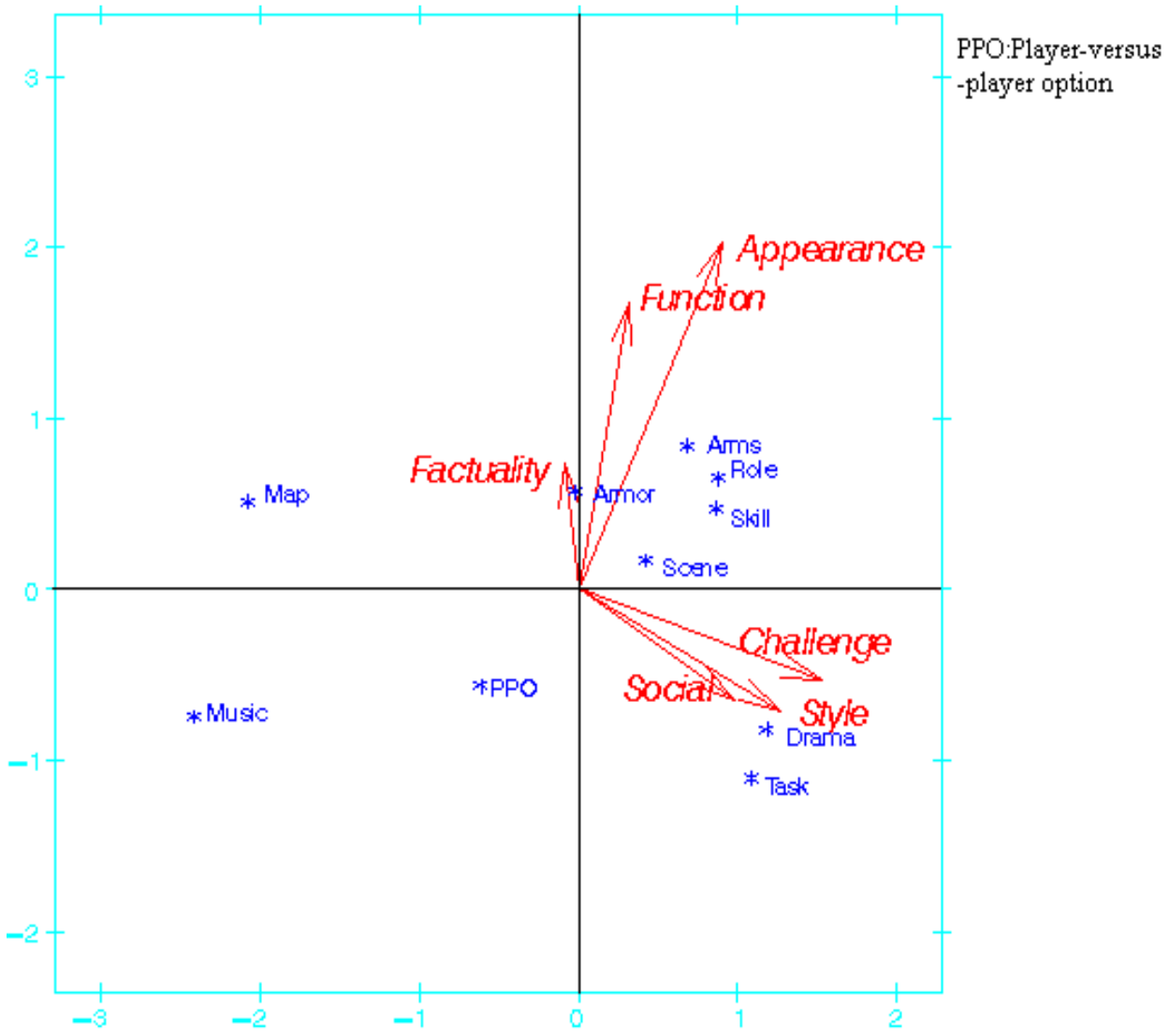

Figure 2. Perceptual maps of online game attribute sets.

control over the final service; this study provides an initial blueprint for understanding the potential implementation of customer codesign for the game industry.

LIMITATIONS AND FURTHER RESEARCH

This study involves only one type of online game (MMORPG), so the findings may not be valid for other types. Another concern is that the self-selected group of respondents consists of more serious and engaged players, who may not reflect the MMORPG population in general. However, customer codesign provides an appropriate approach to study new modes of cooperation that are relevant well beyond specific NPD niches. Because the codesign process involves a high level of consumer input and stimulation, some participants expressed concern about their ability to act as designers and put together an online design on their own. Further understanding therefore requires codesign research that not only considers collaborative methods but also the psychology underlying them and their behavioral outcomes.

Online games tend to be characterized by high player turnover, great similarity within game forms, and a poor understanding of the need for relationships. As a result, game designers need to develop incentive models and install design models to move from innovation attributes to the provision of more integrated, customized solutions. In conjoint analysis, the relatively significant data requirements for estimating individual utilities become increasingly burdensome for respondents. A hybrid model approach might offer a simple but robust approach that uses self-explicated data to obtain a preliminary set of individualized part-worths for each respondent. Research should continue to use hybrid models as practical alternatives to traditional conjoint.

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