Developing a pattern language for flow experiences in video games

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ABSTRACT
Pattern languages have gained widespread acceptance over the years in the design and computing communities. Thanks to the seminal work of Bjork and Holopainen they also have spread to the video game design community. In order to help game designers grasp fundamental aspects of human experiences, the author is developing a new breed of pattern language: a pattern language for experience design, and in particular, a pattern language for optimal experiences (or flow) in games.

The objective of this endeavor is to elaborate a generative modeling tool that will help designers understand, analyze and elaborate better games by taking into account human experiences and providing elements that will trigger and maintain the most positive and intense player experiences. The language presented here, following a dimensional model of experiences, describes patterns pertaining to the sensation, emotion, cognition, behavior and social domains. It can be applied to various types of games, should they be single player or not, online or not.

Author Keywords

Pattern language; video games; experiences; experience design; flow, optimal experience; methodology

INTRODUCTION

Practitioners of many disciplines have attempted to derive the fundamental building blocks of their domain and tried to formulate the rules that bind these blocks together. Poets, mathematicians, graphic artists, chefs, industrial designers and computer scientists, to name just a few, delved into this endeavor.

When Christopher Alexander [2] put forth his idea of a pattern language, although his work was originally applied to architecture, his approach represented a lingua franca for researchers and practitioners of various disciplines. By trying to define the basic constituents of a given field – thus codifying its fundamental knowledge – pattern languages allow to select, mix and match them to shape a poetic sentence, a south-east inspired recipe, a new illustration for a child book, a small-scale replica of a World War II plane, or a cheaper computer for the masses.

Patterns abound in natural and artificial worlds. Sequences (of numbers, of letters), cycles (of days and nights, of seasons) processes (of industrial manufacturing, of neurological transmissions), tendencies (of economical markets, of fashion), shapes (of cars, of trees) and probabilities (of winning at the casino, of an earthquake in Mexico) are kinds of patterns found in nature.

The multifaceted nature of patterns is also observable across literary sources. This polysemic concept is considered as [13]:

- a perceptual structure
- a customary way of operation or behavior
- a decorative or artistic work
- something regarded as a normative example
- a model considered worthy of imitation
- something intended as a guide for making something else

All connotations refer somehow to the idea of a certain amount of organization of elements, should they be perceptual (in lines, shapes, or physical elements), behavioral (doing things in a certain manner) or social (a shared, social recognized model). The recognition of a pattern often leads to use it as a guide, in order to perform certain actions (as a sewing pattern).

Patterns have not just been recognized in the natural or built world, but have also been used in several domains, such as architecture [2], software design [6, 16], economy [14] and more recently game design [4]. Its methodological development have mainly stemmed from the seminal work of Christopher Alexander and his colleagues. According to Alexander, each "pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice." [2]

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Patterns in the interactive community

The pattern language approach has its place among other user-centered methodologies [21, 7, 28] such as participatory designs, focus groups, task analysis, surveys, scenarios and system analysis. In software design and human computer interaction pattern languages enable designers to elaborate better interactive systems, by taking into account the human cognitive and behavioral intricacies, not just technical requirements. Pattern language projects include User interface design patterns [33, 5, 22], Patterns for speech dialogues for older adults [38], Pattern language for living communication [31], Visualization pattern language [37] and Patterns for Groupware [17]. They each represent interesting attempts to codify knowledge in different areas of the human-computer interaction. Some of these projects target either specific contexts of interaction, particular populations, elements of interaction (communication) or interface (dialog boxes, progression bars and the likes).

Patterns in the game design community

In game design the most notable endeavor was done by Björk and Holopainen [4]. Their pattern language focuses on gameplay, which they define as "the structure of player interaction with the game system and with the players in the game" (ibid, p. 3). They structure their approach according to four fundamental components: the *holistic*, *boundary*, *temporal* and *structural* components. The holistic component is concerned with "the aspects of a game that are relevant when one looks upon the activity of playing games as an undividable activity" (ibid, p. 9); included are items such as game instance, game session, play session and extra-game activities. Boundary components are "those that limit the activities of people playing games", that is, those that allow or restrain the players' activities (ibid, p. 14); these items are rules, modes of play and goals. The third component, temporal, is concerned with elements describing the evolution and causality of the game; these elements are the actions, events, closures, end conditions and evaluation function of the game. The fourth component, structural, deals with the "basic parts of the game being manipulated by the players and the systems" (ibid, p. 23); here are found the interface, game elements, players, game facilitator and game time items.

This language pattern is really impressive and surely encompasses the wide variety of games found today. However there is room for developing a complementary language, one that specifically focuses on the experiential aspects of the game. The resulting language may even be included as a fifth component to Bjork's and Holopainen's language. The objective of our project is to develop a generative, modeling tool that will help designers understand, analyze and design better games by taking into account human experiences.

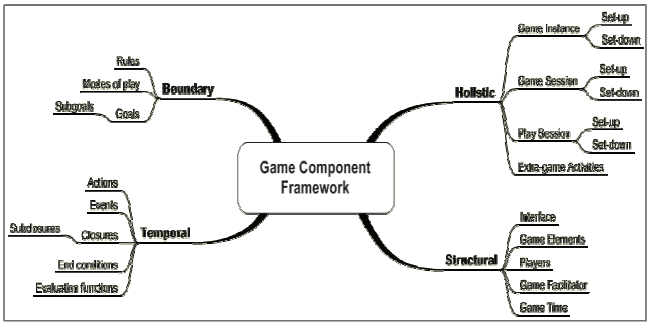

Figure1. Four components of patterns in game design

In the end the availability of patterns for experience design will have positive consequences, following Tidwell's consequences of pattern languages [33]:

1. gather knowledge of decades of psychological research into a coherent corpus;
2. share this corpus among designers originating from diverse backgrounds and even to wider non-initiated audience;
3. continue and even increase the focus on players' experiences in games;
4. organize the efforts of the game design community towards the influences of the virtual world upon experiences;
5. allow designers to select, combine and test those building blocks in imaginative generative ways.

THE FLOW OR OPTIMAL EXPERIENCE MODEL

What do people experience when they engage in an activity? Why do people do the things they do? How to study people's inner feelings? Many psychological theories exist that provide (tentative) explanations to these questions, such as psycho-analysis, behavioral, cognitive theories, evolutionary and the likes. To explain and even predict subjective feelings is quite a daunting task, the many intricacies of the mind greatly complicating the inquiry.

Psychologist M. Csikszentmihalyi studied for more than 25 years people's experiences when they engage in different kinds of activities and context: in their daily life (at work, at play), in many countries (including United States, Canada, Italy and Norway) and with different populations (teenagers, musicians, shepards). Research results constantly point to a convincing conclusion: activities that are the most intense and pleasurable are the ones which involve focused attention (largely because of clearly set goals) and challenging activities in balance with the person's skills.

Csikszentmihalyi labeled this particular state as flow or optimal experience, following comments of surveyed people who experienced this kind of state. Flow experiences

have been described as "... holistic sensation(s) that people feel when they act with total involvement" [10]. They are also called autotelic experiences" (auto=self and telic=goal), because they are pursued for their own sake, driven by self-directed goals and not external rewards.

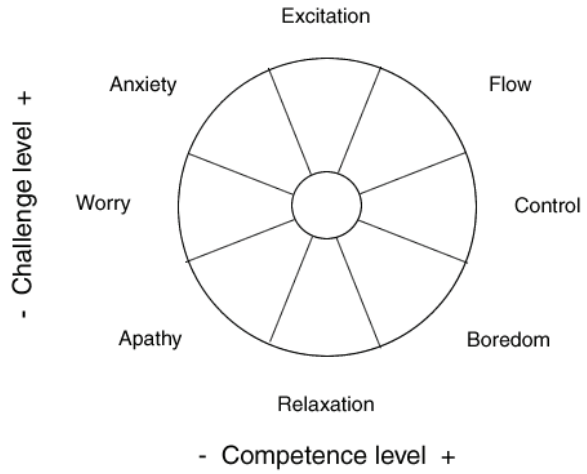

Figure 2. The model of optimal experiences

Researches on the foundations of pleasurable experiences have led Csikszentmihalyi to discover that two fundamental variables drive the type and intensity of experiences an individual feels during an activity: the level of perceived challenge in the situation and the level of skills one can rely on to cope with it. According to the level and balance of these two (subjectively evaluated) variables there are 9 experiences that can be felt – and predicted (figure 2):

apathy low challenge and low competence

worry average challenge and low competence

anxiety high challenge and low competence

relaxation low challenge and average competence

neutral average challenge and average competence

arousal high challenge and average competence

boredom low challenge and high competence

control average challenge and high competence

flow high challenge and high competence

Csikszentmihalyi [10] points out that,to experience flow, individuals' challenges and skills must not only be in balance, but also exceed levels that are typical for their daily experiences. Flow is thus facilitated when challenges and skills are in balance and above personal averages.

Conditions and characteristics of flow

Associated with this flow experience is a number of given characteristics often encountered. Csikszentmihalyi [3] subdivided them into two sets: characteristics of flow and conditions of flow. Characteristics refer to the experiential nature of the flow phenomenon itself (i.e., what people "feel" while in this state). Conditions, on the other hand, are circumstances and environments that are assumed to be conducive to flow experiences.

Conditions of flow

Clear goals An activity for which a goal is set in a clear and non-ambiguous way is a prerequisite for an optimal experience. It helps to focus attention on the necessary steps to achieve it and to discriminate between relevant and irrelevant information.

Immediate feedback The person must receive feedback from its material and social environment in order to know if some progress is made towards the accomplishment of the goal. The clearer and more immediate the feedback, the better it helps to shape the course of action.

Challenging activity matched with person's skills The undertaken activity must represent a certain challenge to the person (as subjectively perceived) and must be balanced with the person's skills to deal with it. Too much challenge for the skills leads to an experience of anxiety and not enough challenge for some skills induces boredom.

Characteristics of flow

Intense concentration The pursuit of some clearly set goals that challenge a person help him/her to gather the necessary psychic energy to face it, thus leading to greater concentration. As a result this concentration helps to focus on the goal.

Merging of action and awareness The intense involvement in the activity generates an embedded cycle of perception and action, where the focused attention on the activity, the feedback from the environment and the management of the consequences all seamlessly blend together.

Paradox of control Participants of the studies reported that when they reached the state of flow they felt both an incredible control on the activity and that they surrendered themselves to the process. They felt both in control and out of control (without worrying about it).

Loss of self consciousness Concomitant with the paradox of control, people reported that their consciousness was altered, blurring the line between the consciousness of their self and of their environment. They felt one with their surrounding.

Altered sense of time In such an intense state time no longer seems to pass the way it usually does.It sometimes seems to shrink, sometimes to expand. Hours seems like minutes, and vice-versa.

FLOW IN GAMES

Among the various psychological aspects discussed in the gaming community, fun, pleasure and enjoyment are the foremost elements. They probably define what a game is [29, 19]. Different models and typologies have been suggested to describe them present in games [23, 18, 15]. Perhaps what is considered the most intense and pervasive experience is the optimal experience, or flow.

Bernie de Koven [20] describes flow using the "Slanty Line" principle, Jenova Chen explains how it is embedded in games [9] and how pervasive it is in games and other interactive settings [8]. Even though games are often thought as the paradigmatic situation for the flow experience, few empirical researches were conducted using the underlying model.

Sweetser and Wyeth [32] elaborated a questionnaire based on the flow model and used it to compare how two games fared on the market and linked their outcomes on their capacity to generate flow on the players, as evaluated by experts. More findings like these are welcome in order to ground the model with real-world data.

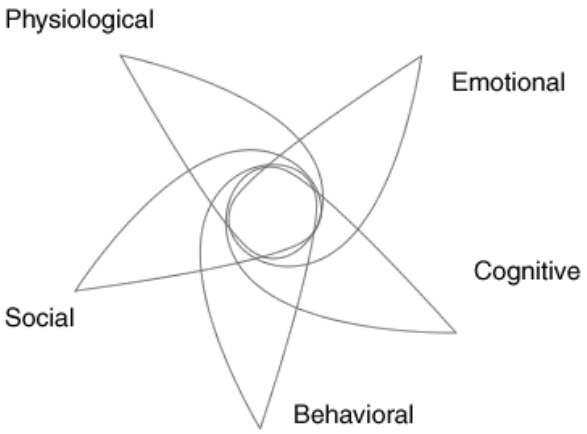

Figure 3. Five dimensions of experiences

In our researches we analyze experiences using a dimensional model [30, 11, 34], which includes the sensation, emotion, cognition, behavior and social aspects (see figure 3). These dimensions are embedded in a thorough systemic framework [24, 26, 12]. These five dimensions encompass the variety of human experiences and prove to be relevant to various design projects.

PATTERNS FOR FLOW EXPERIENCES

It seems then appropriate to use both field of investigation, pattern languages and the model of optimal experiences, and try to integrate them in to a coherent framework. The targeted outcome is the laying out of foundations that would provide guidelines for designing intensely pleasurable games that generate and maintain optimal experiences for their players. This paper summarizes the first steps undertaken to develop such language.

It appears to be rather important to distinguish two approaches to patterns and experiences: patterns of experiences and patterns for experiences. The former refers to the perceptual recognition of particular ways of experiencing; it is mostly the concern of psychologists and related human scientists. The latter refers to how designers could generate, maintain or transform particular experiences; it mostly is the concern of industrial, graphical, new media and of course game designers.

In the design process both types of patterns come into play. Figure 4 shows their interrelatedness. Different kinds of experiences are first recognized and analyzed by human scientists, which then will be described in patterns of experiences.

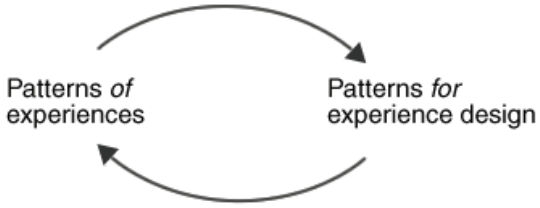

Figure 4. Patterns of/for experiences

Designers then try to elaborate systems that will trigger these experiences. Their resulting knowledge will then be codified in patterns for experiences. The resulting systems may induce various types of experiences, which in turn will be analyzed and described.

The pattern language elaboration was undertaken by asking ourselves fundamental questions such as: what elements may help generate or maintain flow experiences? That is, what patterns would be useful in creating the conditions of flow and then maintain the characteristics associated with it. Conversely we ask ourselves questions the other way around: what elements would hinder the emergence of flow experiences? By taking the opposite of the conditions of flow (fuzzy goals, delayed feedback and unbalanced challenges with respect to person's skills), we may uncover elements that designers should examine in order to avoid this kind of undesirable situation; these are called anti-patterns [36].

The current pattern language for optimal experiences in games is closely based on the characteristics of flow as described by Csikszentmihalyi. These characteristics are mostly related to the sensation, cognition and behavior dimensions, so are the first patterns to be described. The emotional dimension includes the four types of fun discussed by Lazarro [23], because of its relevance to a

general model of experience in games. But more thoughts have to be given in order to analyze the link between the emotional dimension and the flow experience in games.

Sensation Appropriate sensory channel; Right amount of stimulation; Appealing interface; Perceptible feedback; Sensory overload; Adequate physical interface; A responsive system;

Emotion Hard fun; Easy fun; Altered states; People fun;

Cognition Clear system functioning; Player's goal identification; System state representation; Non-disruptive interface; Adapted level of challenge; Path to more challenges;

Behavior Challenging tasks balanced with appropriate skills; Ease of use; Supportive and participative environment;

Social Shared goals; Cues for coopetition; Place for competition; Place for cooperation; Known norms; Fuzzy identity; Clear channels of communication

We now briefly present some of the patterns included in our pattern language for optimal experiences. We follow Alexander's template (alexandrian form) for presenting patterns, describing the pattern's name, problem statement, context, solution, forces affecting the problem and examples. It allows to understand the situation at stake and present available solutions to cope with it, enabling both analytical and pragmatical perspective in a condensed framework.

Patterns in these languages are deeply interwoven and form a densely interconnected network, having particular relationships with each others [2, 4]. A particular pattern may be hierarchically connected (either at a superior, identical or inferior level), modulating or modulated by, or conflicting with another pattern. As the complete collection of patterns is still under investigation the exact network of interconnections will be presented later on.

Pattern example 1
pattern name Challenging tasks balanced with appropriate skills

problem statement The level of challenge that a player perceives during a game is a crucial variable that modulates his/her experience of the situation. If too much challenge is perceived in the situation while s/he does not have enough competence to face it, the person is likely to experience some anxiety. On the opposite if s/he does not perceive enough challenge while s/he is very competent to cope with it, s/he is likely to feel some kind of boredom. Providing an adequate (balanced and high enough) level of challenge to meet the level of the player's skills is therefore a prerequisite for a pleasurable and intense experience.

context In any situation where some action is taking place, a player is faced with some stimuli that match – or not – his/her level of competence. The level of perceived challenge must be high enough to really engage the player and immerse him/her in the game.

solution A monitoring widget that continuously matches the level of challenge presented to the player, balanced according to his/her level of competence to cope with it.

forces affecting the problem Information overload and over-stimulation; distraction that diverts attention and break concentration; assessment of levels of challenge and skills; learning competence of the individual.

examples A video game is the archetypal example of this situation: when a player starts to play a game there might be a level of worry or slight anxiety because s/he has not all the necessary skills to play the games (does not know what to do, what are the controls, how to reach the next level of the game, etc). Then getting more familiar with the game makes the player more competent, which makes him/her feel greater control. But as soon as the reactions get better (more competence) challenges also increase according to his/her skills. Flow may then arises when these two variables are high and well-balanced. If challenges fail to rise to the player's level, boredom will prevail and the player will quit the game with a feeling of dissatisfaction.

Pattern example 2
pattern name Path to more challenges

problem statement Playing a game may lead to a phenomenon of habituation after a certain amount of time, where the player has learned how the game works and where his skills are no longer stimulated at his optimal level. This may lead to an experience of boredom.

context In any situation where a player is faced with some stimuli that fall below his/her level of competence. The level of perceived challenge is not enough to really engage the player and immerse him/her in the game.

solution Suggesting players some paths towards other tasks of greater challenge. This may include complexifying the procedures to attain goals (as in certain games), to reduce the amount of time to perform the task or suggesting similar but more difficult tasks or quests.

forces affecting the problem Goal identification; adequate level of stimulation; skills assessment; learning capabilities; sensory overload; challenge staging; tasks integration.

examples Most games should be eloquent examples of this pattern, where levels of increasing difficulties are proposed to keep the players in the game. Civilisation, Oblivion and World of Warcraft offer settings where players can face more fierce opponents, different regions that increase chances of encounters with other players, thus allowing more challenging exchanges and battles.

Pattern example3

pattern name Feedback from the environment

problem statement To gauge the effects of one's behavior, s/he must receive information from the environment related to the outcome of his/her actions. Failure to provide adequate feedback (in terms of timing and intensity) may generate a sense of disorientation to the player.

context For most tasks performed by a player, whatever the type of games. Depending on the type, the speed and timing of feedback may be more important, but its presence is always mandatory.

solution Ideally it would be necessary to know the player and its favorite/most efficient information processes.

forces affecting the problem The timing of the feedback; the type of information and the sensory channel transmitting the feedback; the complexity of the information; the information saturation of the environment.

examples All games provide some sort of feedback, should it be visual, auditory or kinesthetic, should it be on the screen or on the controller. It ranges from a nonverbal (wordless) interface such as Ubisoft's King Kong to an densely packed interface on Blizzard's World of Warcraft and other MMORPGs.

Pattern example4

pattern name A responsive system

problem statement The success of games crucially depends on the fine tuning of hardware performance. It is of course easier to achieve on consoles than on PC computers where developers have less control on the players' available computing resources. The physical system, through its interface, channels of communication (network) and the likes must be prompt enough to respond to players' input. Failure to deliver constant and immediate feedback is likely to slow down the perception-action cycle, leading to a break of concentration and provoking a sense of disorientation.

context In almost all games played, specially those which are more action driven.

solution Determining the relevant information that needs to be given as feedback to the players and measuring the typical response time of the system and matching it with the players' input.

forces affecting the problem The timing of the feedback; the type of information and the sensory channel transmitting the feedback; the complexity of the information; the information saturation of the environment.

examples The online version of Doom on Microsoft's Xbox Live Arcade is said to lag a lot and frustrates many people, thus earning bad reviews[1], while TOCA Race Driver is seen to have almost no such effect in its online mode [27]. The latter game is likely to produce more flow than the former.

CONCLUSION AND PERSPECTIVES

What we have shown here is the outline that shapes the elaboration of a complete pattern language that will help game designers take into account essential aspects for creating and maintaining optimal experiences in games. This fruitful approach for understanding and designing experiences – better experiences – is still in its infancy and other major investments are still necessary at both the conceptual and operational levels. First the corpus must be extended to include all facets and dimensions of the flow model. Then it must be validated in order to test its depth, breadth and relevance. And it must be put into practice throughout concrete design projects. Fortunately the challenging tasks that we see ahead trigger enormous amount of flow in us.

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