

# EXPLORATIONS IN PLAYER MOTIVATIONS : GAME MECHANICS

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## ABSTRACT

This article, assuming that player motivations are the outcome of continuous player-environment interactions, applies the needs framework of Murray (1938) to a computer game and investigates the relations between each individual need and the driving game mechanics behind them. It is shown that the restrictions imposed by the game mechanics significantly reduce the number of player needs satisfied by a game, thereby trapping the player within the common motivational cycle of *Achievement*, *Aggression*, *Harmavoidance* and *Acquisition*.

This motivational study on gaming experience should facilitate the design of computer games that satisfy a broader range of player needs by providing ways to investigate the matching actions for each individual need while identifying the common patterns imposed by game mechanics. Analysis of player motivations on action level should also open up new frontiers in the player profiling process in interactive gaming experiences that should ideally appeal to many types of players. This discussion is framed in terms of the user-environment relations of a recently released popular computer role-playing game (RPG). It is stressed that the gaming experience provided by this genre is analogous to real life and thus has the potential to satisfy a broader range of player motivations.

**Keywords:** Player Motivations, Gameplay Experience

## PLAYER MOTIVATIONS

Maximizing player enjoyment is one of the primary concerns of game designers, but classical theories about the individuals' motivation to use entertainment products for enjoyment are not applicable to computer gaming. This is because players are not passive witnesses of the virtual world but are active participants in an imaginary setting where interaction and immersion play a crucial role. Maximizing enjoyment in these interactive virtual environments is possible by analyzing player psychology which is affected by his/her personal factors such as needs, motives and goals, as also by situational factors such as opportunities and possible incentives provided by the environment.

Most researchers analyzing the psychology of the player are concerned with the educational value of computer games (Provenzo 1991; Stewart 1997; Appleman & Goldsworthy 1999; Prensky 2001, 2002; Squire 2003; Squire and Jenkins 2003; Gee 2003, 2005; Egenfeldt-Nielsen 2007; Shelton and Wiley 2007) or the negative effects of gaming and violence in video games (Anderson and Ford 1986; Cooper and

Mackie 1986; Anderson and Bushman 2001; Sherry, 2001; Anderson 2004; Gentile et al. 2004; Bartholow et al. 2006; Weber et al. 2006; Anderson et al. 2007). Besides the intrinsic motivations taxonomy of Malone and Lepper (1987) and the flow framework of Csikszentmihalyi (1990) have already been applied to computer gaming (Sweetser and Wyeth 2005; Kellar et al. 2005), research on player motivations include a variety of other approaches too: using TAM (technology acceptance model) in conjunction with flow framework (Hsu and Lu 2004); analyzing motivations of MMORPG players in the context of Bartle's (2004) playstyles (Yee 2006); applying SDT (self-determination theory) to computer gaming (Ryan et al. 2006); applying MRL (motivated reinforcement learning) to model motivations of non-player characters (Merrick 2007); and analyzing the relationship between MMORPG game structures such as character design, narrative environment, etc. and intrinsic motivations (Dickey 2007).

However there are only a handful of studies that analyze the relationship between individual motivations and the gaming experience. Applying Maslow's hierarchy of needs to computer gaming, Joyner and TerKeurst (2003) questioned why people play computer games but they were not concerned with the in-game motivations of players. De Sevin and Thalmann (2005) focus on the action selection process and use motivational variables such as hunger, thirst, resting, sleeping, cooking, cleaning, etc., some of which are physiological in nature, and some not motivations but daily activities. Assuming that human motivation is triggered by the psychological needs of the organism, this article analyzes in-game needs of game players in relation to their actions within the virtual environment.

## Psychological Needs

A need refers to a potentiality or readiness to respond in a certain way under given conditions and each need is characterized by a certain effect or the occurrence of a certain trend (Murray, 1938). The most popular study on human needs is conducted by Maslow (1943; 1968) who identifies a hierarchy of needs in man ranging from the lower-order physiological drives to higher-order psychological motivations. McDougall (1908) made the pioneering attempt to define the whole human behavior in terms of innate psychophysical dispositions (instincts), but it was Murray (1938) who formalized the study of needs. His three-year study at the Harvard Psychological Clinic was conducted by 28 psychologists of various schools, among whom were three physicians and five psychoanalysts. The psychogenic needs of Murray, which are psychological in nature, are not static entities but the result of both internal and external forces, and are concerned with mental and emotional states of a person. 27 psychogenic needs of this

framework have already been analyzed by (Bostan 2009) in relation to the gaming situations of a RPG. This article attempts to take this study one step further by analyzing the common fusions of individual needs and by defining the driving game mechanics behind them.

Although similar classifications of needs (Mayer, 2007; Carver and Scheier, 2000) exist, this study focuses on the six categories of needs defined by (Bostan 2009). In summary, there are four materialistic needs representing Acquisitive, Constructive, Orderly, Retentive attitude, six power needs representing Aggressive, Blamavoidant, Counteractive, Defendant, Deferent, Dominative attitude, five affiliation needs representing Abasive, Affiliative, Nurturant, Rejective, Succorant attitude, six achievement needs representing Achievant, Autonomous, Fearful, Infavoidant, Self-forwarding, Exhibitionistic attitude, three information needs representing Inquiring, Informing, Intellectual attitude, and three sensual needs representing Playful, Sentient, Erotic attitude. Discussing the specifics of each variable is beyond the scope of this article, but those interested in them can consult (Bostan 2009) who analyzed these needs with matching gaming situations.

Table 1: Psychogenic Needs of Murray (1938)

<p><b><u>Materialistic Needs</u></b>  <i>nAcq</i>: Acquisition  <i>nCons</i>: Construction  <i>nOrd</i>: Order  <i>nRet</i>: Retention</p>	<p><b><u>Power Needs</u></b>  <i>nAgg</i>: Aggression  <i>nBlam</i>: Blamavoidance  <i>nCnt</i>: Counteraction  <i>nDfd</i>: Defendance  <i>nDef</i>: Deference  <i>nDom</i>: Dominance</p>
<p><b><u>Affiliation Needs</u></b>  <i>nAba</i>: Abasement  <i>nAff</i>: Affiliation  <i>nNur</i>: Nurturance  <i>nRej</i>: Rejection  <i>nSuc</i>: Succorance</p>	<p><b><u>Achievement Needs</u></b>  <i>nAch</i>: Achievement  <i>nAuto</i>: Autonomy  <i>nHarm</i>: Harmavoidance  <i>nInf</i>: Infavoidance  <i>nRec</i>: Recognition  <i>nExh</i>: Exhibition</p>
<p><b><u>Information Needs</u></b>  <i>nCog</i>: Cognizance  <i>nExp</i>: Exposition  <i>nUnd</i>: Understanding</p>	<p><b><u>Sensual Needs</u></b>  <i>nPlay</i>: Play  <i>nSen</i>: Sentience  <i>nSex</i>: Sex</p>

Murray (1938) defined each need with appropriate desires and effects, matching feelings, emotions, personality traits, and common relationships with other needs such as fusions, conflicts, and subsidiations. A single action pattern may satisfy two or more needs (fusions), one or more needs may be activated in the service of another need (subsidiation of needs) and the needs may conflict with each other. These interrelations, which depend heavily on the game mechanics and how they are used, may exhibit very complex combinations in the game world. For example, Player A may wear the same guild badge as does Player B, because he/she does not wish to make a bad impression

(Infavoidance) and instead wishes to win B's friendship (Affiliation), so that he/she will learn the secret location (Cognizance) of the guild treasury and loot it for acquiring the famous dragonlance (Acquisition) and using it to attack (Aggression) the legendary red dragon living in the mountains and thus level up (Achievement) (nInf, nAff, nCog, nAcq, nAgg, nAch fusion). To identify the common patterns behind these complex interrelations, the next section is devoted to analyze Murray's needs in relation to the game mechanics of an RPG.

## A DECOMPOSITION OF GAME MECHANICS

The needs framework of Murray (1938) can theoretically be applied to computer game of any genre, but the range of needs satisfied by a computer game is usually limited by its content and rules of play. For example, information needs are prominent in adventure games where players focus on exploration and puzzle-solving within a narrative framework, whereas social simulation games, such as *The Sims*, are built on the theme of affiliation. In this regard, role playing games are perfect candidates for analyzing the motivational aspects of a gaming experience, because they satisfy a wider range of psychological needs.

The RPG selected for this study is *Fallout 3* which was developed and released by Bethesda Softworks in October 2008. Besides the many awards it won, the game was adjudged the best game of 2008 at the annual Game Developers Conference (GDC 09). *Fallout 3* is set in the backdrop of post-apocalyptic Washington D.C., 200 years after the Great War in 2077, where nuclear bombardment ravaged the earth's surface for two hours. The game depicts a post-nuclear world in great detail with dreary and desperate overtones. Besides the features common to the games of this genre, such as being an interactive and social world populated by autonomous virtual characters, the game also has an open-ended structure that allows the players to freely roam in a virtual environment with high visual and behavioral realism.



Figure 1: Washington Monument as seen from Capital Mall.

Discussing different definitions of game mechanics is not the primary objective of this article. An elaborate discussion of previous definitions of game mechanics has already been presented by Sicart (2008). What interests this article is something more similar to the core game mechanic as defined by Salen and Zimmerman (2004). A core game mechanic, which represents patterns of behavior or building blocks of player interactivity, may be a single action or a set of interrelated actions which form the essential play activity that is repeated throughout a game. This article aims at analyzing these single actions or sets of interrelated actions to delineate the motivations behind each of them. Motivational variables are represented with polarity, such as +nAgg which motivates aggressive behavior (situations with positive incentive for aggression) or -nAgg which motivates the avoidance of aggressive behavior (situations with negative incentive for aggression).

### Basic Game Mechanics of Fallout 3

Every character in *Fallout 3* has seven primary statistics: Strength, Perception, Endurance, Charisma, Intelligence, Agility, and Luck. Extracted from these are the derived statistics which define the basic game mechanics. Skills represent a variety of abilities, each governed by an attribute, which provide the player a means for interacting with the virtual world. Characters are also given perks (special abilities) which are extensions of the skills possessed by a player. Showing similar characteristics with AD&D table-top role playing games, character progression in *Fallout 3* is governed by experience points (XP) earned by completing a quest, defeating a monster, learning a secret, convincing an NPC to help, solving a puzzle, etc.

It needs to be noted that game players are already familiar with the game mechanics of *Fallout 3*, because it is the sequel of three titles with the same name (*Fallout*, *Fallout 2* and *Fallout Tactics: Brotherhood of Steel*) and also its game rules are similar to AD&D game rules frequently utilized in RPGs. Only a few derived statistics from the previous titles, such as armor class, healing rate, poison resistance, etc. have been deleted in *Fallout 3*, and a few minor changes made in skills, such as moving parts of throwing skill to explosives skill, merging doctor and first aid skills with the medicine skill, splitting traps skill into explosives and repair skills, etc. In summary, the common forms of player interaction that are repeated throughout the game remained almost the same.

### Analysis of Fallout 3: Derived Statistics & Skills

Before analyzing the game mechanics of *Fallout 3* from a needs perspective, it is important to note that the unique nature of *Achievement* requires special attention. According to Murray, nAch is the dominant psychogenic need that fuses readily and naturally with every other need. Similarly, nAch fuses with every other need in a computer game and every single action of the player contributes to his/her achievement. This contribution, which is quantifiable in terms of experience points, is more noticeable in RPGs.

Every skill used, every item purchased or found, every dialogue option selected and every region explored eventually assists the user in gaining more experience points or achieving a new level in the game. Thus, nAch will not be specified in the motivational analysis of the game mechanics, unless it is the only dominant need of a derived statistic or skill. Given below are derived statistics and skills of *Fallout 3*, their descriptions and relevant motivational variables.

Table 2: Derived statistics and motivational relations.

Statistic	Description	Needs Satisfied
Action Points	Number of things a player can do during Vault-Tec Assisted Targeting System, or V.A.T.S. See V.A.T.S. below for further explanation	+ nAgg, + nHarm
Carry Weight	Maximum amount of weight a character can carry. Carrying more items means retaining more possessions.	+ nAcq, + nRet
Critical Chance	Chance to cause extra damage in combat. Critical hits provide a means for quick elimination of enemies and receiving less damage in combat.	+ nAgg, + nHarm
Damage Resistance	Reduces damage taken from attacks.	+ nHarm
Health	Hit points or the game mechanic used to measure the health of the player.	+ nHarm
Radiation Resistance	Reduces damage taken from radiation.	+ nHarm
Perk Rate	How often player is given a perk.	+ nAch



Figure 2: V.A.T.S. screen initiated on a Behemoth.

V.A.T.S.: Vault-Tec Assisted Targeting System, or V.A.T.S. is an action queuing system that enables the players to shoot specific body parts in turn-based combat. Targeting in V.A.T.S enables the player to cripple specific body parts of

enemies, thus rendering them less effective in combat in various ways. For example, because crippling an enemy's head reduces his/her perception, the player can run away or hide. V.A.T.S. increases the precision of attacks and causes more damage (sometimes dismembering enemies) than in real-time combat. The alternative for V.A.T.S. is real-time combat which usually takes more time to eliminate enemies, thus causing to receive more damage in the process.

The most common fusions arising from the analysis are between +nAcq and +nRet (both of which are associated with inanimate objects), and between nAgg and nHarm (which exhibit a more complex pattern). The fusion between +nAgg and -nHarm indicates a more aggressive behavior, because the player is more captivated by the thrill of eliminating enemies than being concerned with the injuries or damage he/she may receive in the process. Using melee weapons is an example of this fusion. The player is aware that he/she has to engage in close combat which, depending on the enemy to be faced, usually results in receiving more damage. Of course, there are other mechanics that compensate for this loss of health such as wearing damage-resistant power armors or using proper medication, but the action itself is an aggressive one. The fusion of +nAgg and +nHarm refers to a more conservative behavior and tactical planning. Placing explosives in strategic positions is an aggressive act, but it is surely a safer way of eliminating certain enemies such as Mirelurk Hunters which move faster than the player and inflict tremendous damage when engaged in close combat. As player skills serve different needs, critical choices in skill usage are represented with AND/OR structures in the following table.

Table 3: Player skills of *Fallout 3* and motivational relations.

Skill	Description	Needs Satisfied
Barter	Decreases the value of objects when buying, increases their value when selling.	+ nAcq
Big Guns	The ability to use bigger weapons such as flamer, gatling laser, minigun, missile launcher, etc.	+ nAgg
Energy Weapons	The ability to use energy-based weapons such as laser pistol, plasma rifle, pulse pistol, etc.	+ nAgg
Explosives	The ability to set or disarm explosives, also increases damage of explosives such as mines, grenades, etc.	+ nAgg AND/OR + nHarm
Lockpick	The ability to open doors or safes without the proper key. Also promotes gaining access to places, avoiding heavily enemy crowded areas.	+ nAcq AND/OR + nHarm
Medicine	Increases the health earned from medical items such as stimpaks, radaways, etc.	+ nHarm
Melee	The ability to combat with melee	+ nAgg,

Weapons	weapons such as a sword, knife, etc. Close combat results in receiving more damage.	- nHarm
Repair	The fixing of broken equipment, machinery and electronics. Repair is also used to disarm traps (non-explosive traps like tripwires) or to make new items. The user also profits from repairing items since he/she is capable of carrying more valuable equipment for the same weight.	+ nRet, + n Acq AND/OR + nHarm AND/OR + nCons
Science	The ability to hack computers terminals and electronic equipment. Terminals in the game allow the user: (1) to turn off turrets (2) to open safes (3) to access information (4) to control robots	+ nCog AND/OR + nHarm AND/OR + nAcq
Small Guns	The ability to use pistols, shotguns, assault rifles and rifles.	+ nAgg
Sneak	The ability to move silently. Also enables the player to steal items from others. See below for further explanation.	+ nHarm AND/OR + nAgg AND/OR + nAcq
Speech	The ability to persuade or influence others. See below for further explanation	See below
Unarmed	The ability to combat with hands and feet. Close combat results in receiving more damage.	+nAgg, - nHarm



Figure 3: Player character sneaking behind some bushes.

*Sneak*: Sneaking can be used as a defensive strategy to avoid combat or to inflict more damage on enemies in the form of sneak-critical attacks. It is even possible to eliminate enemies with one-hit sneak critical, without receiving any damage in combat. Stealing ammunition also disables the NPCs from firing their weapons and thus protects the player from damage. And, reverse pick-pocketing is a special form of acquiring an item. If the player wishes to steal some

equipment that an NPC wears (which is of course not suitable for stealing), then he/she can reverse pick-pocket and place a better item in the NPC's inventory. The NPC will eventually equip the better item, and neglect the item player wants, thus rendering it vulnerable to be pick-pocketed.

*Speech:* The speech skill is used to communicate effectively in persuading and influencing the NPCs. Although it sounds like an *Affiliation* oriented skill, its primary concern is not to forge friendships or associations, but to affect others. To influence or direct the behavior of others by suggestion, seduction, persuasion, or command is an act of *Dominance*, but the underlying mechanisms behind this skill provide different forms of fusions between other needs which are imposed by game mechanics. To define the relationship between the speech skill and each individual need, relevant gaming situations are analyzed. Throughout the game, 87 gaming situations, where the speech skill plays a major role, have been experienced. Twenty-nine percent of these are used to convince an NPC to do something so as to avoid confrontation. This is how the player chooses to solve problems more peacefully by persuading or influencing people, instead of using brute force and getting harmed in the process. To cite an example, General Jingwei, who is the primary villain of *Operation Anchorage* (the first downloadable content pack of *Fallout 3*), can be persuaded to commit suicide. If the player fails to persuade, he/she has to fight with the General.



Figure 4: Speech skill used on an NPC.

Twenty-five percent of the gaming situations are used to convince an NPC to give something - personal gain or benefit – to the player. The most common form is to request for greater reward/more benefit for a quest or an item. Another 25% of the situations are used to convince an NPC to tell something, to gather information about something or someone and 8% to do something, solely for finishing a quest. From the remaining gaming situations, 5% are used for learning information and avoiding confrontation, 5% for acquiring an object from an NPC to avoid confrontation, and 3% for helping people with no additional reward. Gaming situations relevant to the speech skill show that

there are some cautious choices in the game that offer a fusion between  $-nAgg$  and  $+nHarm$ . These choices are important indicators of a trend for non-aggressive behavior. Players can avoid confrontation and find a peaceful solution to a problem, which might otherwise require weapons to be drawn. Two other remarkable fusions are between  $+nDom$  and  $+nCog$ , and  $+nDom$  and  $+nAcq$ . These dominative or authoritative choices are used either for information gathering or for object acquisition. Gathering information is vital for completing quests in the game but the dominative act of object acquisition usually comes in the form of ill-gotten gains.

Table 4: Gaming situations relevant to speech skill.

Percentage	Description	Needs Satisfied
%29	Avoiding confrontation	+ nHarm, - nAgg
%25	Acquiring something	+ nAcq, + nDom
%25	Gathering information	+ nCog, + nDom
%8	Finishing a quest	+ nAch
%5	Acquiring something & Avoiding confrontation	+ nAcq, + nHarm, - nAgg
%5	Gathering information & Avoiding confrontation	+ nCog, + nHarm, - nAgg
%3	Helping someone	+ nNur

### The Importance of Choices in Analysing Player Actions

Although the game mechanics analyzed in this study are chosen from a role-playing game (RPG), it is also possible to analyze basic games using this motivational framework. For example, the *Pacman* game is primarily governed by the needs of *Harmavoidance* (running away from the ghosts), *Achievement* (getting to next level and increasing the game score), *Aggression* (eliminating ghosts by eating power pellets) and *Acquisition* (acquiring pills or other objects). Similarly, the four major game mechanics of a RPG are gaining experience, acquiring objects, avoiding harm and eliminating enemies. Thus, it is not surprising to see that the three dominant needs (besides nAch) of *Fallout 3* are nAgg, nHarm and nAcq. But the critical factor that determines the difference between action patterns of players is how they use the mechanics when they are given a choice. Micro choices are moment-to-moment choices of a player; the way these micro-choices fuse as a long-term strategy defines the macro level of a choice (Salen and Zimmerman 2004). As the system responds in some way to every player choice, the action-outcome unit of a choice defines the meaning that emerges in a game.

For instance, if a quest requires the player to kill an opponent when he/she has no other option, then the act of killing cannot be considered inclination towards aggressive behavior. It can be considered so only when the player has other options. For example, the sneak skill in *Fallout 3* has a variety of uses. The player usually notices the enemies before the enemies notice the player, and it is up to the player how he/she overcomes obstacles. Some alternatives are to ignore the enemy by sneaking from a safe distance, to directly attack the enemy with a weapon of choice or to sneak to a favorable position and eliminate the enemy quickly taking advantage of surprise and without receiving much damage in the process. It is these choices in a computer game that determine the play style of a player and indicate his/her trends in motivation. But the player's actions before and after the choice are also important determinants for understanding his/her motivations of the player. If the player is low in health and ammunition before the choice, it is understandable why he/she avoids a powerful group of monsters (nHarm inhibiting nAgg). And, one who loots every single enemy after the combat is not like the one who ignores the dead bodies and proceeds to his/her next quest destination (macro level of a choice).

## CONCLUSION

Murray's framework is applicable to computer gaming, because it can match player motivations to different gaming situations. It is obvious that the relative importance of the needs may change from one game/genre to another, but the variables of this taxonomy could assist the analysis of gaming experiences within a motivational framework. Nevertheless, the framework needs some modifications, because some of the actions are specific to computer gaming (to disarm traps, to pick locks, to sneak attack, to pickpocket, etc.) which can not be found in the original study. Also, there is a need to redefine the fusions and conflicts, because what are proposed to be common fusions or conflicts may show different patterns when the player interacts with a virtual environment (such as the common +nAgg & +nHarm fusion). Although Murray neither defined the specifics of seven needs nor systematically used them in his study (nAcq, nBlam, nCog, nCons, nExp, nRec and nRet), the exploration of core game mechanics in this study indicate some common patterns among these needs (+nRet & +nAcq, +nAcq & +nDom, +nCog & +nDom).

It should be noted that the needs to be satisfied by the gaming situations are constrained by the imposed mechanics of the game and most of the needs in Murray's taxonomy (1938) are not fulfilled at all. On the other hand, tying all the gaming situations related to the needs of *Affiliation* and *Power* to one game skill (speech skill) may not be the wisest choice. Most of the research on the forms of interaction and communication between characters focuses on multi-player environments. However, if designers wish to satisfy a broader range of player needs, they should provide in single player computer games also richer verbal and non-verbal communication forms and dialogue options with meaningful

choices. The identification of individual player needs and their corresponding actions should also aid research on dramatic characters in interactive storytelling experiences. In this regard, Laurel (1997) commented that dramatic characters are better suited to the roles of agents than full-blown simulated personalities and these characters can be represented by personality aspects which are appropriate to a particular set of actions and situations. Similarly, Manovich (2001) noted that narrative actions are more important than the narration itself.

This study should also aid researchers and game designers in identifying various user preferences and play styles, and thus provide a method for profiling gamers. But, the critical issue is what kind of choices are given to the player and how they are constrained by the game mechanics. Certain skills of *Fallout 3* (explosives, lockpick, repair, science, sneak) can be used for different purposes (represented with AND/OR structures); how the player chooses to use them might give an idea about different play styles. Also, certain needs such as Infavoidance, Blamavoidance, Defendance, etc., can be satisfied more easily if player choices are not black and white stereotypes and if they have a meaningful impact on the virtual world and its inhabitants (Bostan 2009). In terms of player profiling, even the popular playstyles of Bartle (2004) have never been empirically tested to validate that the four player types (Explorers, Achievers, Killers and Socializers) are independent of each other. In fact, it is even more difficult to discriminate between these playstyles in a single player RPG. For example, if the player is exploring the whole map of *Fallout 3*, he/she is assumed to be an Explorer but his/her motivation could be just to complete all the quests (nAch), to acquire all unique items (nAcq), to eliminate every single enemy (nAgg) or could be all of them. Thus, future studies should investigate if independent player profiles or playstyles can be defined with the variables of this taxonomy.

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