The Player Experience of Need Satisfaction (PENS)

An applied model and methodology for understanding key components of the player experience

By

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The Player Experience of Need Satisfaction (PENS) Model

Scott Rigby & Richard Ryan – Immersyve, Inc.

Executive Summary

As the game industry matures and developers face rapid increases in competition, development budgets, and player expectations, there remain very few proven models for practically understanding and measuring the player experience. Without such models, few developers are able to leverage a more precise understanding of the psychology of satisfying experiences into more successful design. Furthermore, accurately measuring fun, customer satisfaction, and meaningful play throughout the development process is difficult and often imprecise. Certainly all developers have some personal theories about what works best with players, but for most the process of successful design and subsequently validating the "fun factor" of games through market or usability testing remains hit or miss. Immersyve believes this is largely because:

- *Designing the player experience is often done without a validated theory of the specific psychological factors that result in fun, enjoyment, value, and commercial success.* The current "state of the art" is that developers take their best guess during design at what the player will find "fun" without specific knowledge of the psychology behind immersive and satisfying experiences. Far from restricting or trying to control the designer's creativity, we believe that such knowledge can, in fact, catalyze even greater innovation.
- *Evaluating a game's fun factor is imprecise without a specific model that can be applied and tested*. Simply put, it is critical to have a clear player experience model, and the methodology to assess it, in order to gauge the player experience of a game and demonstrate its value to enhancing a game's success.
- *The actual evaluation of a game is often not done with sufficient scope or analytic precision*. Many market research and usability-testing approaches do not employ valuable psychometric methods that can bring the clearest and most unbiased results to the development team without unnecessary speculation or "red herrings". We believe that while the game industry is in a remarkable position to leverage advanced research and data analytic techniques (given the data-rich nature of its products), this potential has not yet been realized.

Based on years of research and a multidisciplinary team that combines experience in interactive product development, motivational theory and psychometric testing, **Immersyve** has developed an in-depth model of games that identifies and measures those elements of the player experience that are most deeply satisfying and valued. In research with more than 7500 video game players, Immersyve's ***Player Experience of Need Satisfaction model (PENS)*** has consistently demonstrated that:

- PENS has statistically proven power in predicting not only fun/enjoyment, but also **game ratings, sales, developer loyalty, and sustained player interest**.
- PENS is a more detailed and precise model of "fun" and player satisfaction that provides both heuristic value to developers as they seek to design games to achieve specific goals, as well as analytic value in evaluating games both within and across genres.

- PENS indices have specific links with game features and controls that aid in development, design, and potentially even optimizing marketing and positioning of projects (by highlighting features and aspects of gameplay that resonate most strongly with the player's expectations of need satisfaction).

In fact, because Immersyve's PENS model measures specific global variables in the player experience that are consistently predictive of success metrics, it represents what we believe to be the first methodology for benchmarking the player experience that can be used to compare games both past and present, even across genres. Consequently, Immersyve's PENS solution will build a developer's corporate assets over time in the form of internal datasets and identified best-practices from existing projects that can be leveraged across the company into new projects – multiplying the ROI of each individual game testing effort by bringing its data forward from one project to the next, company-wide.

Sharpening focus: The problem with "fun" as a measurement goal & the need to look deeper into the player experience

There's no argument that the goal of games is to have fun. But fun and satisfaction are *outcomes* of psychological processes, and not the processes themselves. Immersyve believes that too often game analysts have assumed that fun is a self-explanatory construct that is (1) uniformly understood conceptually, (2) most meaningfully assessed by asking about it directly during playtesting, and (3) the strongest indicator of a game's long term success.

But exactly how precise and uniform is the construct of "fun" in giving practical and actionable feedback to developers? After all, fun is a broad and diffuse term with many meanings. Surely having fun at a dinner party or while out walking your dog is not the same as having fun playing a video game. If we want to build and test the enjoyment of games, we need to look deeper and understand the psychological experiences that form the building blocks of fun and deeper satisfaction in the context of games.

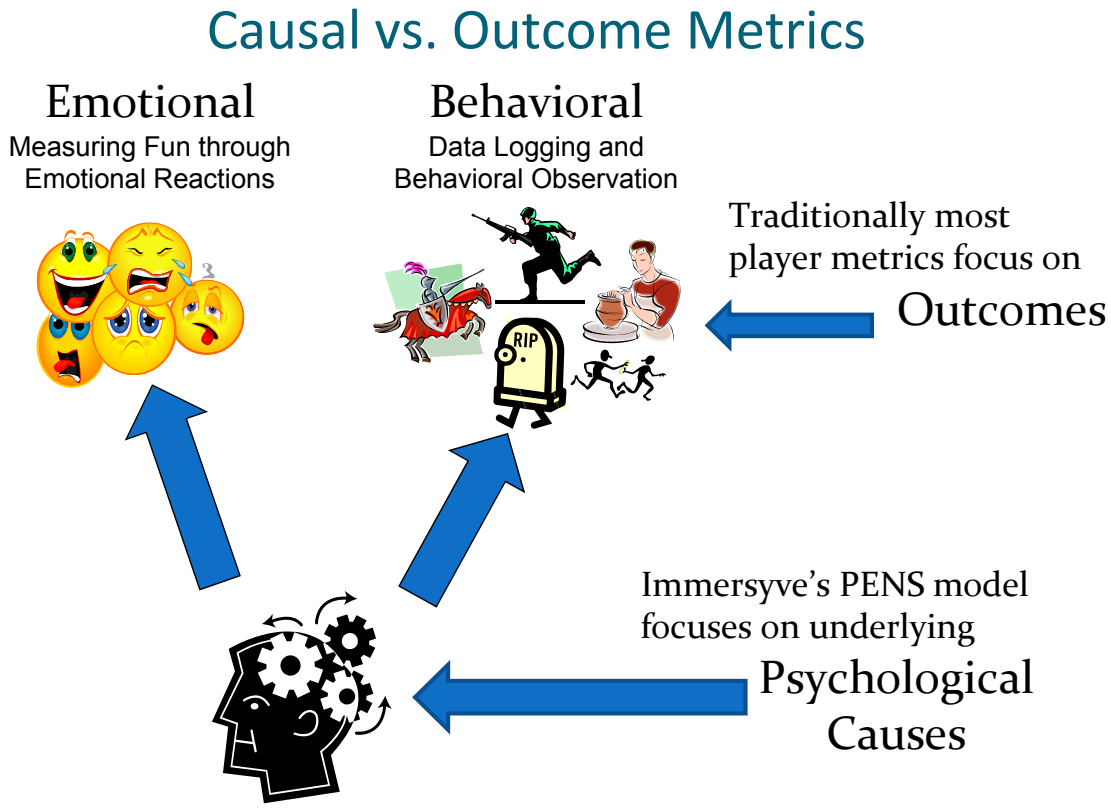
As an example of the value a more fundamental understanding can bring, imagine you encounter your first rear-projection television and want to understand what's creating the images on the screen. You can watch it from the front and very thoughtfully catalog the images being output, such as the thousands of colors on the screen or the pacing of images in different genres of shows. You might even scientifically measure how dramas have darker pixels and comedies brighter. From all this you may form some thoughtful theories about what is going on and how the television works. But if instead you understood its inner electronics, you'd know there was a very elegant system consisting of three colored lights that were the foundation of all the myriad outcomes on the screen. You would have a concise, practical, and effective understanding of the fundamentals that would help you understand it's potential and more quickly identify problems.

In a similar way, Immersyve's PENS model diagrams the motivational lightbox that lies behind enjoyable and meaningful player experiences. This approach looks beyond the surface level emotional expressions of "fun" and focuses on the *basic psychological needs* that games can satisfy. Just like the television's lightbox energizes the myriad images that dance on the screen, our model is at the heart of the player experience regardless of genre, platform, or even individual differences in what players find fun. More importantly, the extent to which players are experiencing satisfaction of these needs can be quickly and objectively measured and show statistically significant relationships with enjoyment and immersion, as well as commercial outcomes such as game ratings, perceived value, sustained engagement (decreased churn), and a player's intent to recommend/purchase

sequels. In essence, this approach represents a next-generation model of the player experience that is both conceptually and methodologically useful across diverse game types, and in measuring the value of specific activities within gameplay.

On another level, an approach such as PENS refines the focus from measuring only outcomes to also measuring the causal elements that construct fun and satisfying experiences. This has several benefits for the developer:

1. Understanding the causal systems behind emotional and experiential outcomes is significantly more valuable for developers than measuring outcomes alone, because developers must design games and new features/content from the ground up. Simply put, it's one thing to know what emotional result you want to bring to your players, but quite another to know the specific psychological experiences that will bring about a successful result.
2. Being able to measure more fundamental elements of the player experience clearly and accurately (through validated methodology and analysis tools) provides an invaluable resource to assessing the success of concepts, features, and development iterations throughout the build process.



The Player Experience of Need Satisfaction (PENS)

To fulfill it's aspiration of being a global causal model means that PENS must not simply catalog observations of player behavior and emotion (e.g. "players like powerful weapons" or "players pursue challenges") but should first and foremost be able to describe the *underlying energy* that fuels actions in the first place across all types of games (i.e. our "motivational lightbox"). Immersyve's founders have been developing and testing motivational

models in various areas of work and leisure for more than 30 years[1], consistently finding that motivational energy can be largely accounted for by three intrinsic psychological needs: Those of *competence, autonomy, and relatedness*. These basic needs comprise the major components of what we call the ***Player Experience of Need Satisfaction (PENS)***. Each of these needs, in turn, expresses itself in different ways within the context of a game – in relationship to one or more of three aspects of gameplay:

1. Game mechanics - which refer to the game controls, UI, and other game elements that mediate the player's ability to take the actions in the game that they intend;
2. Gameplay - which refers to the moment to moment activity of the player within the game world and its content (the primary area of focus for this paper);
3. Player narrative - which refers to the enduring development of the player's character over time, including the "metagame" elements that surround the game itself (e.g. online forums, "gamerscores," etc.).

Numerous studies, both in Immersyve's labs and in field testing with thousands of gamers, confirms that when games satisfy the PENS motivational needs in these key areas it has significant implications for the player experience and the game's success.

The methodology for assessing how each of these needs is being satisfied in a game is a combination of:

(1) Carefully constructed and validated psychometric measures of PENS that are completed directly by players in relationship to the various aspects of the game experience outlined above (e.g. mechanics, gameplay, and player narrative). This is done both in lab settings using real-time assessment strategies and in broader surveys of players in the field (when possible);
(2) Direct expert PENS analysis of game elements alongside the player's experience of the game;
(3) Detailed data analysis that isolates the impact of specific game elements on the player as well as looking at the "big picture" experience using advanced tools such as hierarchical linear modeling and multiple regression analyses that can more accurately assess cause and effect.

We'll begin by exploring each of the motivational needs in the PENS model more closely, how they contribute to player motivation and satisfaction, and how each differentially predicts important outcomes of success.

PENS Competence: The need behind the player's love of conquering challenge and expressing mastery

Competence can be defined as the intrinsic need to feel a sense of mastery or *effectance* in what one is doing. Numerous studies by Immersyve's team have shown that in both work and leisure activities people are intrinsically motivated to seek out opportunities to experience competence and the satisfaction that accompanies it. No matter what we're up to, feeling effective energizes us and motivates further action, while feeling ineffective decreases motivation and brings a negative psychological impact.

Before discussing the key ways in which this competence need operates during core gameplay, we first discuss its application to *game mechanics*, which are the first interactive element of a game all player's encounter.

[1] For information on more than 150 publications by Immersyve's founders on the application of our theory in various domains, including work, leisure, sports, and health, please contact us at info@immersyve.com

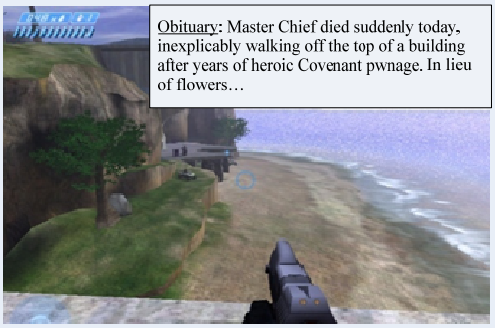
Game Mechanics – Mastery as "the price of admission"

Immersyve defines game mechanics as both (1) the interface between player and the game environment (e.g. controls, graphic interface.) and (2) the basic "rules" that govern actions within that environment (e.g. gravity). If players are not able to feel mastery of both of these dimensions of game mechanics, they usually have a frustrating experience that will subsequently act as a barrier to continued involvement with the game. Competency in game mechanics is thus a critical hurdle for entrance into any virtual world, and can be considered to be the "price of admission" to the gaming experience itself.

Motivationally, this dimension of games and virtual worlds can be compared to the ability to walk: Learning to do so is the means for our participation with the rest of the world, and as such we desire to master it quickly and completely so that we can get on with the real business of "living." Similarly, learning game mechanics is a prerequisite for experiencing the virtual world itself, but is not considered to be part of the "real" game experience by players.

Consequently, it is important that mastery of game mechanics not be confused with game play or participation in the world itself. Simply put, while we are intrinsically motivated to conquer challenges (which will be discussed below as a key element of motivating gameplay) we do not want to be "challenged" by game mechanics anymore than we want to be challenged by basic motor functions such as walking. Therefore, it is important during the development process to assess what players themselves consider to be aspects of mechanics versus gameplay, because it can be highly demotivating if an element perceived as a mechanic is designed as an aspect of gameplay challenge. For example, nothing is more frustrating than walking off the edge of a cliff in a virtual world simply because we could not see our own feet or couldn't remember whether it was the blue or the red button that made our character jump. In real life, the fidelity and awareness of our situation would enable us to simply and intuitively jump, and players want game mechanics to similarly extend the effortless and unconscious mastery of these skills into the virtual world.

The implementation of a simple, intuitive interface, including an innovative "auto-jump" feature, won widespread praise for "Ocarina of Time" which was credited by many with eliminating one of the more annoying aspects of traditional game mechanics.



These kinds of unintentional "dumb avatar" experiences break immersion and are usually not perceived by players as a desirable game challenge, even if that is the intent of the developer.

PENS assessments of game mechanics are therefore focused on several aspects of the player's experience of game mechanics, each of which is most clearly assessed through both objective observations of player behavior (e.g. frequency of breaking engagement with the game to remember controls) and subjective assessment of the player's experience:

1. What is the learning curve of the game mechanics (i.e. the time and effort required to reach an experience of mastery)?
2. Are any gameplay "features" considered by players to be aspects of the game's mechanics (where challenge is not desirable)?
3. How successfully are players able to convert their intention into action? In other words, does the player not only feel an intuitive mastery of the control scheme, but do they also experience the controls and UI provided by the game to be sufficient to accomplish what they intend?

Overall, PENS can provide feedback to developers on how to *optimally reduce the learning curve for game mechanics, lowering the price of admission to the game experience itself and maximizing the game's potential audience*. While game mechanics requires a variety of considerations, from a motivational standpoint we assess it as a "zero sum" issue; as a gate that must be passed to get to the virtual world itself. As such, a negative experience is almost always experienced as frustrating and de-motivating, while a positive experience will likely be notable only by the absence of any direct concerns (or even overt awareness) of the game mechanics. As support of this, in our research we consistently find a strong statistical relationship between perceiving game controls as intuitive and easily mastered, and a sense of immersion in the game[2].

Satisfying competence needs in core gameplay

Arguably the most well established principle in game design is the need to provide players with challenges that draw them into engaging gameplay. Here many developers are familiar with ideas inspired by the work of the psychologist Csikszentmihalyi and his theory of Flow[3], which describes the positive psychological state of full engagement that occurs when challenges are well-matched with one's level of ability (i.e. challenging without being overwhelming). Flow theory stops short, however, of fully explaining the underlying psychological needs that are being satisfied and that are energizing these behaviors – and this is where the PENS competence component is able to elaborate more fully and point in new directions.

Immersyve's research has shown that it is the intrinsic need for competence that energizes and is subsequently satisfied by the optimal challenges games provide. During PENS assessments of individual gaming sessions, it is often when players report the closest match between their level of ability and the game's challenges that they also feel a strong satisfaction and experience of competence, and when possible players will seek out those specific opportunities that bring this sense of balance. Thus we see direct evidence in player behavior of the inherent need to continually grow competencies and to stretch abilities, and it is when this intrinsic need is satisfied that the positive elements of flow are observed.

One of the purest examples of competence being satisfied by optimal challenge lies in the arcade genre, beginning with games such as Space Invaders, Robotron, Asteroids, and Tempest. These games are not about winning, because, in fact, you know from the outset that you will eventually lose all of your lives and the game will end. The goal of the game is to engage in a series of increasingly difficult challenges until the challenge became too great. Your "score," has minimal value as a tangible reward, but instead provides feedback on your increasing development of skill.

[2] Mechanics mastery measures from PENS assessment tools correlate significantly with various Immersyve measures of Immersion/"Presence", with r values commonly ranging from .2 to .4

[3] Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. Harper & Row Publishing, New York, NY

Basic Competence Satisfaction in Action

Robotron begins with few enemies…

…but becomes increasingly harder with progressive "waves"

Interestingly, the primary reward in these games, "bonus lives," supports the notion of the game's intrinsic appeal in that they represent only an *extended opportunity to play*. By way of comparison, imagine how most people would react if they were told the reward for working were the opportunity to do more work! Such is the power of activities that are truly intrinsically motivated, and perhaps no simpler examples exist of the motivational strength of satisfying competence needs than these video games. This same cycle of motivational need and satisfaction is operating in many patterns of player behavior, such as repeating the exact same game content on harder and harder difficulty settings. Overcoming game challenges satisfies the intrinsic need for competence and allows us to stretch our abilities, perhaps in a more immediate and direct way than many activities in "real" life. As one player put it to us "In my real job I've been grinding for about 20 years now, and still haven't leveled up." By contrast, games provide a much more immediate and clear sense of competence satisfaction - whether it's reaching the next level of *Geometry Wars* or unlocking "Insane" difficulty in *Gears of War* – that gamers intrinsically value.

As such, we find that competence experiences can be facilitated or frustrated by not only level of challenge, but by the form and frequency of feedback mechanisms. As a best practice, we consistently find that providing feedback that is (1) clear and unobtrusive, and (2) immediately responsive to the player's actions contributes to an experience of mastery and satisfaction, particularly when engaging game challenges.

The "God of War" series excels at providing players with immediate feedback on their efficacy and mastery during moment-to-moment gameplay.

Optimal Challenge is not the whole story

Increasingly, Immersyve's work has been focused not only on what engages players *in the moment*, but what brings them to value a game *over time*, motivating them to return again and again with sustained levels of satisfaction. An important finding has emerged in relation to satisfying the player's need for competence in such a way that they will sustain their engagement with a game: Simply creating experiences that are optimally challenging is not enough.

What is equally important (and perhaps even more important) to sustaining interest in a game over time is gameplay that gives players the opportunity to *express* their mastery, not just succeed in overcoming challenges. This *mastery in action* experience occurs when the player can more easily conquer game challenges and obstacles, delivering a superlative performance without having to work too hard or "white knuckle" their way to the finish line on a consistent basis. Immersyve finds that these *mastery in action* experiences, even though they may not be stretching the player's abilities or optimally challenging them in traditional ways, are extremely satisfying of the player's need for competence and more importantly, contribute to the player's desire to return to the game. More specifically, some preliminary data indicates that experiences of mastery in action may be particularly valuable when the player has a lot at stake, such as during key engagements.

Here we see an example of one of the advantages in focusing on deeper need satisfaction rather than emotional expression or momentary enjoyment. We believe that the reason this important play experience is often overlooked during development in favor of an emphasis on challenge is that most playtesting occurs within a very discrete period of play, from which broader conclusions are drawn about the game's "fun factor." In this case, during a play session a participant may well become quite enjoyably immersed in an extended period of challenge. But subsequently, this same player may show a decreased motivation or interest in returning to the same game, despite the experience in the moment. PENS provides an opportunity to assess these important motivational dynamics at a deeper and more accurate level, and provides specific guidance on how to craft optimal experiences.

Some ideas for maximizing competence need satisfaction in gameplay

- Don't focus only the idea of "optimal challenge." Instead, be sure gameplay is giving players the opportunity to put their **mastery in action**
- Consider giving players the leg-up, particularly in pivotal situations where they are feeling as if there is more "on the line."
- Provide consistently positive (but relevant) feedback during gameplay
- Sustained enjoyment is more a function of continued success than feeling continually stretched

PENS Competence: The data on its importance to outcomes

The conceptual value of PENS competence notwithstanding, one of the goals in developing this model is demonstrating that it is relevant to important outcomes, such as value, fun/enjoyment, and immersion. Across numerous games, players, and genres, we specifically tested whether PENS competence satisfaction predicted key metrics of success and found the relationships to be uniformly strong. A representative snapshot of our findings is summarized in Table 1 below.

Table 1: Relationship Between Player's Feeling of Competence and Important Outcomes (across genres)

	Player Outcomes				
	Fun/ Enjoyment	Feel Immersed	Value Game	Will Buy More of Developer's Games	Recommend Game to Others
Experience of Competence (Adventure/RPG)	★★	★★★	★★	★★★	★★
Experience of Competence (MMO)	★★	★★	★★★	★★	★★
Experience of Competence (FPS)	★★★	★★	★★	★★	★★
Experience of Competence (Strategy)	★★	⊘	★	★★	★★

★★★ = corr. greater than .40
★★ = corr. between .25 and .40
★ = corr. signif. at p<.05
⊘ = No Significant Relationship

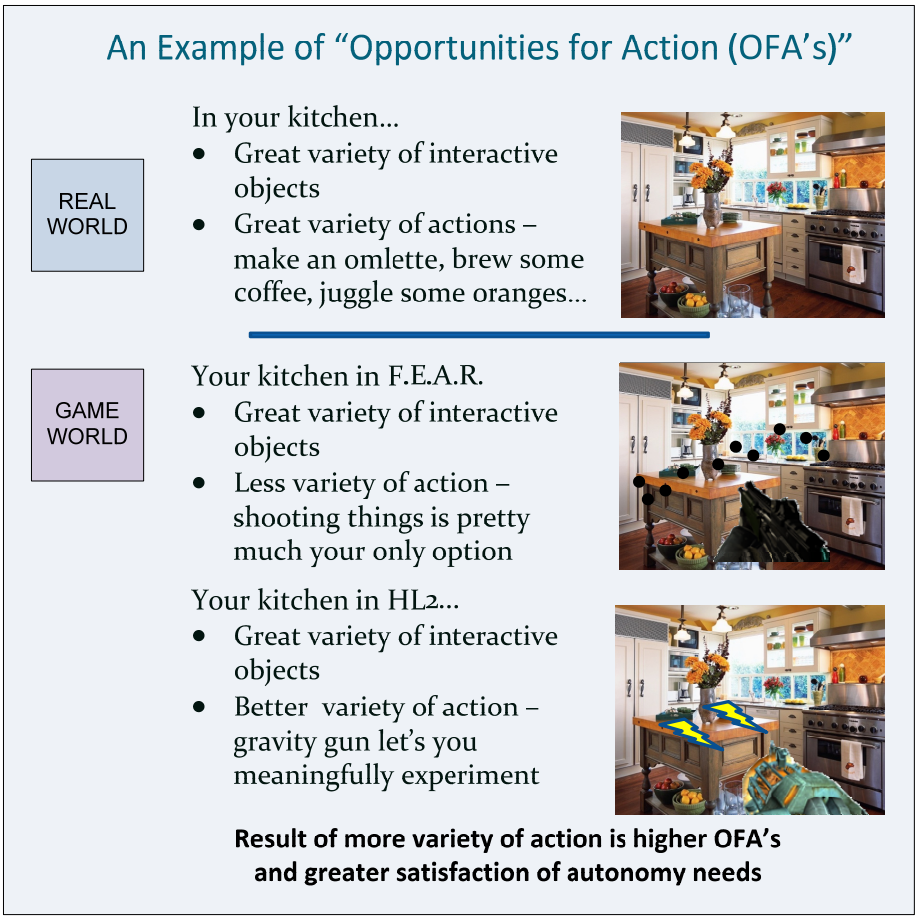
Table 1 shows the predictive value of competence satisfaction assessments in relationship to a variety of relevant variables and across multiple game genres. Across the four major genres tested, competence is consistently a predictor of multiple measures of success, predicting a high portion of variance in these outcomes (i.e. r^2) that is statistically significant across genres. In addition, there are meaningful genre differences in the importance of competence satisfactions to outcomes that demonstrate the sensitivity of the PENS tool in identifying not only *how* different games satisfy player needs for competence, but *when* satisfaction of those needs are most important as players engage different kinds of games. As the table shows, gameplay competence is significantly related to the player's enjoyment and sense of immersion, as well as how much value the player feels the game provides value and will buy and recommend more of the developer's games. Immersyve has also conducted a number of more advanced statistical analyses of the model to examine the primacy of the PENS needs to these kinds of outcomes, which are elsewhere published[4] and available upon request.

[4] Ryan, R., Rigby S., & Przybylski, A. (2006). "The Motivational Pull of Video Games: A Self-Determination Theory Approach". *Motivation and Emotion,* Springer Science (reprints available from Immersyve or at www.springer.com)

PENS Autonomy: The player's desire for volitional action

The second intrinsic psychological need of the PENS model is autonomy, which is the experience of volition or choice in one's decisions and actions. In activities in which we feel we have the freedom to choose and create the experiences we want for ourselves, we are more likely to be energized and intrinsically motivated to engage in those activities. There's no way to fudge this -- choices that are forced upon us don't count and are actually demotivating. In gameplay, these can include such things as one's avatar being taken out of our control too frequently by cut-scenes, running into invisible walls, or generally gameplay that gives the illusion of choice (e.g. the player is free to cut the blue wire or the red wire to defuse the bomb) when in fact there is only one solution to a challenge or one path to follow (e.g. red wire = boom).

One of the key elements to consider when optimizing autonomy need satisfaction in moment-to-moment gameplay is maximizing the player's *opportunities for action*. Opportunities for action can be defined as the options that the player perceives as available to them at any given time during gameplay. More specifically, they are a function of (1) the interactive objects perceived by the player (including NPC's, items, MOBs, etc) and (2) the choices the player can make about how to meaningfully interact with those objects (e.g. destroy, collect, throw, combine) in order to achieve goals or create new opportunities. Immersyve regularly assesses how the player perceives "opportunities for action" – the range of opportunities that can be freely pursued – within the moment to moment gameplay as one of the key components of the PENS autonomy assessment. Below is a simple example comparing a real world environment with that of a successful (F.E.A.R.) and blockbuster (Half Life 2) first-person shooter.



In addition to assessing this key dimension within gameplay, PENS also focuses on other aspects of choice and volition in the player experience, including the subjective sense of personal agency players feel in deciding **who they will be** in the gameworld, and **when, where, and how they take action**. Each of these can have an incremental effect on satisfying the player's autonomy needs, and is worth consideration during the design of game features and the intended game experience. Simply put, PENS autonomy is a more precise way to understand, design, and measure the true player experience of "open-ended gameplay" and to ensure that development choices are actually increasing player satisfaction of this important need.

As with the need for competence, when researching a variety of games across different genres we find that autonomy need satisfaction is uniformly important to all games, but of particular value to players within certain genres, most notably RPG and MMO titles. We consistently find that when looking at these game genres that the player's experience of autonomy is by far the greatest predictor of enjoyment – showing a correlation (r) of nearly .50 ($p<.001$). This indicates that what players really mean when they report enjoyment and fun is largely, and more precisely, that they are experiencing autonomy need satisfaction. By having a more precise definition and measurement methodology, it is possible to zero in on what's important and whether a game is hitting the mark. Similarly strong relationships are found between satisfying the need for autonomy and commercially relevant outcomes, such as game value, intent to recommend game to others, and desire to play more games by the developer. In particular, Immersyve is finding that autonomy need satisfaction is particularly important for titles that achieve "perennial" value for players (i.e. those games that players return to again and again, for many months and even years). Table 2 provides a snapshot showing the predictive value of measuring the satisfaction of autonomy across genres.

Table 2: Relationship Between Player's Feeling of Autonomy and Important Outcomes (across genres)

	Player Outcomes				
	Fun/ Enjoyment	Feel Immersed	Value Game	Will Buy More of Developer's Games	Recommend Game to Others
Experience of Autonomy (Adventure/RPG)	★★★	★★★	★★★	★★★	★★★
Experience of Autonomy (MMO)	★★★	★★★	★★★	★★★	★★★
Experience of Autonomy (FPS)	★★	★★★	★	★	★★
Experience of Autonomy (Strategy)	★★★	★★	★★	★★	★

★★★ = corr. greater than .40
★★ = corr. between .25 and .40
★ = corr. signif. at $p<.05$

Keep in mind that this data, particularly when combined with similar analyses of the other PENS needs, points to the relative strengths and weaknesses in how today's games and genres satisfy needs. This can subsequently act as a more precise "motivational map" for developers looking to innovate, differentiate, and stand-out within their category. For example, when Immersyve looks at individual FPS titles – a genre that traditionally focuses on more linear challenges and satisfaction of competence needs over autonomy needs – we consistently find that those FPS titles that do stand-out from their competitors by also satisfying autonomy needs experience both the strongest reviews and the greatest commercial success. This exemplifies how PENS can provide more resolution in identifying areas for innovation and strengthening value with players.

What are some examples of the other specific ways that PENS autonomy can be understood and assessed with specificity and precision? Immersyve has identified many granular elements that it looks at in a full analysis, such as:

- Does the game environment graphically suggest actions that cannot be pursued (such as unnecessary non-functional objects in the game environment) that result in lowering certain dimensions of the experience of autonomy?
- How do game rewards enhance or detract from a sense of personal agency (i.e. the player's experience of volitional choice)? Although all rewards are intended as a positive motivator, their form and presentation to the player can have significantly different impacts on the experience of autonomy (vs. manipulation).
- Does the game build a sense of increasing opportunities for action that intrinsically motivate sustained interest?

These important questions again exemplify the value of PENS in bringing greater focus to design and measurement, providing practical feedback to the development team.

PENS Relatedness: The need behind the player's love of connecting

Relatedness is a third intrinsic need within the PENS motivational model. Relatedness can be defined as the intrinsic desire to connect with others in a way that feels authentic and supportive. While it has been an important motivational variable in areas outside of gaming, only in the last few years as multiplayer games have emerged and the sophistication of gaming has increased has relatedness started to have increased relevance to the mainstream player experience. Interesting, relatedness turns out to be important even in single player games, whenever computer generated figures interact, communicate, provide support, or even exist just to be "saved" or "conquered" by the player. We have been studying just what types of interaction turn on or turn off these experiences of relatedness, as well as ways of assessing this experience accurately.

As with the other two intrinsic needs in the PENS model, relatedness is a core motivational need that it is important to satisfy across genres and throughout the player's experience whenever possible. **Immersyve's** data shows that wherever there is a multiplayer component to games that allows players to build real relationships with those with whom they play, either as teammates, guildmates, or social friends – having the opportunity to connect intrinsically satisfies and energizes. Whether it's "Parties/Guilds" in World of Warcraft "Gangs/Corporations" in Eve Online, or one's favorite teammates in FPS games such as Counterstrike – virtually all of these multiplayer game features enable the experience of relatedness to varying degrees and contribute meaningfully to the player's motivation and enjoyment. PENS Relatedness measurement enables developers to more precisely assess whether the multiplayer and communication features they are considering are achieving the important goal of relatedness need satisfaction.

The Need for Relatedness

MMO's like World of Warcraft *enables players to connect socially and cooperate with others, thus satisfying the intrinsic need for relatedness*

Even in FPS like Counter-strike*, players have their relatedness need satisfied by relying on each other for protection and achievement*

Our research shows that particularly in MMO's and multiplayer FPS games, relatedness plays a significant role in enjoyment, perceived value, and sustained participation in games. Table 3 summarizes a snapshot of these findings within these two genres

Table 3: Relationship Between Player's Feeling of Relatedness and Important Outcomes (MMO and FPS)

	Player Outcomes				
	Fun/ Enjoyment	Feel Immersed	Value Game	Will Buy More of Developer's Games	Recommend Game to Others
Experience of Relatedness (MMO)	★★	★★	★★	★	★
Experience of Relatedness (FPS)	★	★★	★★	★	⊘

★★ = corr. between .25 and .40
★ = corr. signif. at p<.05
⊘ = No Significant Relationship

In more recent data we are also finding that NPC characters can have a significant motivational impact on players through the satisfaction of relatedness needs, with specific design implications for such things as NPC scripts for interactive dialogue with players. In this regard, an important aspect of scripting is to support the player's autonomy and sense of competence whenever possible, by providing feedback that is relevant to a player's actual achievements in the game (e.g. completion of a quest or victory in a battle).

NPCs can significantly enhance the satisfaction of a player's need for relatedness

- Relatedness needs are best satisfied by NPC's when they support the player's autonomy and competence
- This is best accomplished by "positive contextual feedback"

In *Oblivion*, characters will spontaneously enhance players' feelings of mastery and relatedness based on the player's actual in-game achievements

In general, as games continue to increase in their ability to connect players with greater degrees of expression and effectiveness, Immersyve believes that relatedness will continue to gain in its importance and will be a critical element to assess objectively through PENS methodology.

Measuring "Immersion"

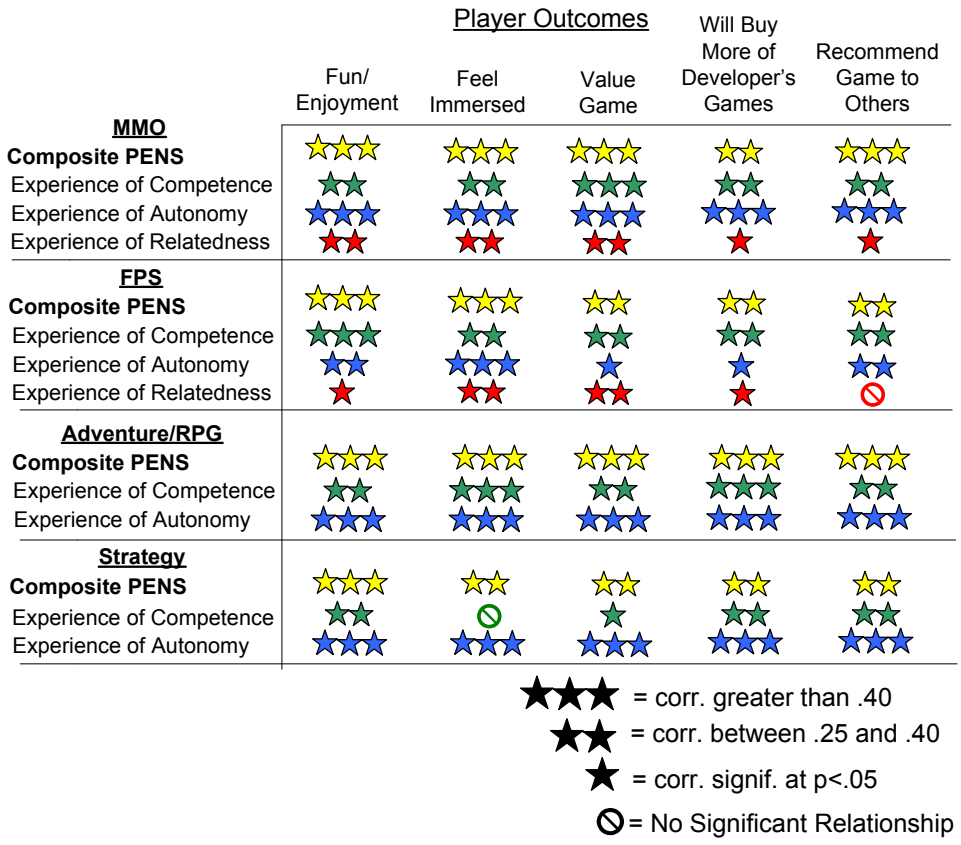
Another often discussed, but poorly defined aspect of games that Immersyve has been working to bring into sharper focus is that of "Immersion" or what is we sometimes call "Presence." The concept of presence means that players feel they are truly "in the game"– not just in terms of it holding attention, but involving the player emotionally and drawing them in to the world it creates. But what are the elements that evoke this experience and are associated with player satisfaction?

Immersyve's model differentiates the concept of immersion into several elements and looks at those game factors that are most important for each. *Physical presence* is a primary measure of immersion, and measures the extent to which the player feels that have been physically transported into the game environment during play. *Emotional presence* measures the extent to which the game action elicits emotion that feels authentic to the player, much like they may feel in response to real life events. Finally, *narrative presence* looks at the involvement of the player in the story or narrative of the game. Interestingly, many of the factors that are assumed will contribute most strongly to immersion, such as maximizing the realism of graphics and sound, are often not the strongest predictors of immersive experiences. Instead, we again find that satisfying the player's intrinsic needs, as assessed by the PENS, are in most cases much more strongly related to deeper, more immersive experiences across all of these measures. Immersyve is currently completing a separate white paper on this aspect of the player experience and the important elements of games that most contribute to it.

Having now outlined all the major components of the PENS model, we can put together a complete correlation table to show how each of our needs is contributing to meaningful outcomes across multiple genres. In Table 4 (below) notice how just as the red, green, and blue lights in a projection television combine differently to produce different outcomes, the motivational needs in our lightbox combine with varying degrees of strength depending on genre. For example, in sandbox and strategy games, the major contributor to most outcomes is the experience of autonomy, which is what we'd expect. For FPS games, competence need satisfaction takes a more important role in influencing satisfaction and value. The key point is that PENS not only identifies what's most important, but makes it possible to measure it with practical precision.

In addition to scoring individual need satisfaction, Immersyve also computes a composite PENS score, which is a combination of all of the PENS components (i.e. competence, autonomy, relatedness) into a global motivational metric. This often provides an even stronger predictive profile than the individual measures alone for getting a global measure of a game's level of value and success with players and game reviews.

Table 4: Relationship Between all PENS Measures and Important Outcomes (across genres)



Several things are worth emphasizing in summary of the above data:

(1) Note that in almost all cases each of the PENS needs is contributing significant predictive power to both the player experience and commercial outcomes.

(2) As mentioned above, genres display differential patterns in the PENS, showing its usefulness in providing more targeted guidance to developers when they are working on projects in specific genres.
(3) As developers seek to innovate by "breaking the rules" of a particular genre and expanding into new areas, the PENS approach can help them assess how well they are actually achieving their goal by assessing how well a project is satisfying a broader range of needs than those "typical" of one genre or another.

Further evidence PENS is a superior measurement of "fun"

We've outlined the core elements of the PENS approach and highlighted some of the strong relationships with important outcomes, both with regard to the player experience and commercial success. Next we present some more data in detail, taking the full PENS model into account and looking at the power of our complete motivational lightbox when competence, autonomy, and relatedness are working together to create the player experience.

Remember that one of our hypotheses is that the PENS variables are the power behind things such as fun/enjoyment and perceived value. Hence our data needs to show that PENS is where the deeper action is. We accomplish this objectively through a variety of analyses, but will here focus on correlations and regressions.

A quick note on regression analyses for those who are unfamiliar with them. Regressions allow you to determine the relative contribution of different factors to your outcomes. As an example, let's say you want to know what factors contribute to good grades in the classroom. You find two variables predict good grades: Student motivation and sitting towards the front of the class. To raise grades, do you focus on student motivation or reconstructing classrooms so more students sit near the front? Or both? It is important to know the relative contribution of variables to outcomes, and how one (motivation) may be the true power behind the other (sitting at the front). Regression analysis allows us to do just that: We can look at groups of variables and see their relative contribution to outcomes. We can give credit where credit is due.

We illustrate this using two factors in our data: player's ratings of game "fun" and their rating of various PENS measures. In one longitudinal study of MMO gamers over an eight month period, we asked them at the beginning of the research about their experience of fun/enjoyment (i.e. the usual kinds of questions developers ask during playtesting), and also asked them about their experience of need satisfaction in areas of autonomy, competence, and relatedness (i.e. the PENS model). We then talked to them again eight months later to see if they were still playing the game they reported playing back in month 1, and to get their impressions of the game and its value.

For those still playing the game after eight months, our model showed better predictive value than enjoyment, even though both related positively to enthusiasm ("This game rocks!"), and perceived value (see Table 5). Note however that even in the basic correlations, fun is *not* related to continued play eight months later, but PENS measurements are.

Table 5: How Player Need Satisfaction (PENS) and Fun/enjoyment in Month 1 correlate to player subscriptions and feelings eight months later (Correlations)

Player Feelings (after 8 months)	PENS – Month 1	Fun – Month 1
Still Playing in Month 9	**.46****	.18
Interest in sequel/more games by the developer	**.38***	.34
"This game rocks!"	**.56****	.46**
Game Value	**.54****	.37**

*p<.05 **p<.01

Although PENS often outperformed fun measures in these initial simple tests, this gap widened even further when we conducted regression analyses on the data. When these analyses were run to see who is really predicting outcomes (remember the motivation v. front of the class issue?), the PENS measure related even more strongly to all of the outcomes, while enjoyment questions did not. In other words, only PENS predicted these important outcomes, including sustained subscriptions, as seen in Table 6.

Table 6: What REALLY explains the outcomes?: How PENS and enjoyment in Month 1 relate to their subscriptions and feelings eight months later using multiple regression analysis

Player Feelings (after 8 months)	PENS – Month 1	Fun – Month 1
Still Playing in Month 9	**.41****	.01
Interest in sequel/more games by the developer	**.42****	.09
"This game rocks!"	**.45****	.24
Game Value	**.47****	.14

*p<.05 **p<.01

This directly supports our hypothesis that it is the deeper need satisfaction that is experienced in games that leads to their success, both in the direct emotional experience of the player (i.e. "This game rocks!") and in commercial outcomes (such as perceived value and future intent to purchase). Apparently what "rocks!" about

games is that they satisfy motivational needs, supporting our contention that the PENS motivational lightbox lies behind the experience of enjoyment, and more directly measures what is important to the gaming experience in order to catalyze sustained player enthusiasm and commercial success. It is, simply put, a better measure of fun.

How might this contribute value directly to a game's bottom line? As the tables above show, in this MMO study only our model was able predict future play eight months later. Fun/enjoyment measures did not relate to continued play. Based on the data, we estimate that an MMO developer could increase retention (decrease churn) by 15-20% if they tested and implemented gameplay ideas validated by Immersyve's PENS, which based on today's subscription rates (i.e. about $15/month) roughly equates to about $25,000 in additional revenue every month for every 10,000 players. For a game with 100,000 subscribers, that could mean $3MM in revenue each year (mostly dropped right to the bottom line).

Putting the PENS to work in your company

One of the goals in the creation of this model was to develop a precise and efficient methodology that could allow for actionable feedback. All of the data presented here were achieved by assessing the player's experience of competence, autonomy, and relatedness need satisfaction in games through methods and protocols that Immersyve can rapidly deploy (1) in its own game testing labs, (2) on-site with developers alongside their current testing protocols/infrastructure, or (3) in field or beta testing projects.

Immersyve regularly conducts workshops with developers on the PENS model to apply the methodology to specific projects and corporate goals. Additional ways Immersyve works with developers and publishers to unlock the value of PENS include:

(1) Evaluating current projects and past titles using PENS measurement and analysis tools. Specifically, Immersyve analyzes games at all levels of development to help developers identify areas of strength and weakness in current and planned products, helps them maximize ROI in their product portfolio, and works with them to carry forward "best practices" from previous successes into innovative new design. Some examples include:

- Using multilevel models and real-time PENS assessments in our lab to identify which game elements, features, and events are working for players and which are not. Immersyve's protocols allow for a highly tuned analysis that can yield more stable data with fewer players than many traditional statistical approaches. This enables efficient feedback that is objectively data-based and more detailed than simpler approaches such as focus groups and small sample interviewing.

- For developers with existing in-house playtesting, Immersyve has solutions to remotely integrate PENS measures into a developer's current protocols and can provide real-time data and basic reporting of player need satisfaction. Basic PENS measures can also be integrated on a large scale alongside data-logging techniques to give developer's a fuller picture of the player experience during betas and post-launch, assessing not just behaviors, but key elements of the player's subjective experience.

(2) Developing the team's overall awareness of the key needs driving player motivation. Immersyve conducts training and ongoing consulting with development teams on how the PENS model can assist in

innovative game development and maximizing fun, satisfying experiences. Immersyve's model can be applied conceptually from the very beginning of design concepts, through decisions regarding game features and iterative development.

The deeper value of the PENS motivational model

The PENS model is able to not only bring greater clarity and commercial success to the development of entertainment titles, but has broader applied value to the industry by virtue of its roots in a deeper psychology. As part of its ongoing research program, Immersyve has data emerging in several areas with significant value to game developers whether they are developing in the commercial entertainment field or in related areas such as serious games, simulations, and education.

Two such areas explore (1) the "hot button" topic of game violence, and (2) the potential for positive psychological impact of video games.

Violence in games: A PENS perspective

From a research standpoint, Immersyve is agnostic on the political issue of violence in games. We are, however, very interested in it from a motivational standpoint as it clearly needs to be better understood given its salience to the industry. Immersyve began exploring the issue of video game violence in the fall of 2005, with a number of field and lab studies exploring a wide range of variables in both players and games. A subset of this work over the last two years has focused on the relationship between video game violence, need satisfaction, and game enjoyment and value. As part of Immersyve's mission is to publish PENS research in peer-reviewed scientific journals alongside industry white papers such as this, we are completing for submission a new paper on the specific studies and findings from several rounds of research in this area. While a full review of the topic is outside the scope of this paper, several points are worth mentioning.

First and foremost, a picture is emerging from our data that suggests that it is not violent content *per say* that is coveted by players, even when they enjoy violent video games. In fact, in several studies where we statistically analyze the factors that are contributing to player enjoyment and value of a game, we find that it is really the underlying satisfaction of PENS needs, particularly the need for competence and mastery, that is being satisfied and is subsequently contributing to enjoyment and value. A possible explanation here is that violent action in games characteristically provides mastery opportunities and positive competence feedback to players, which in turn satisfies this need and leads to enjoyment and value. In fact, in one experiment we built two versions of the same gameplay experience, but manipulated the level of violence (both in the game's "backstory" and in the gameplay itself) while holding other aspects of the gameplay constant. What we found is that (1) there was no difference in the enjoyment of the game, even in those players with higher levels of "trait hostility," and (2) need satisfaction continued to emerge as a primary predictor of outcomes regardless of the level of violent content or the specific interests of players. One interesting finding, however, is that while violent content did not add significantly to enjoyment, it did *detract* from the interest value of many players who were turned off by violent premises[5]. Clearly more work is needed in this area, but it suggests something interesting – that there is a deeper way to understand the enjoyment of violent games that does not require a belief that they are

[5] It should also be noted that for those players who scored higher on a measure of trait level hostility, there was a significant positive correlation between violent content and interest in the game, although there was no impact of that content on the actual enjoyment of the game – even within this subgroup of participants.

satisfying a deep-seated "sadistic" impulse. Again, understanding the dynamics of more fundamental need satisfaction can bring greater clarity and a more objective perspective.

PENS as a blueprint of "meaningful fun"

As games continue to expand in the possibilities they provide players, in their "serious games" applications outside of pure entertainment (in areas such as health and education), and in their broader reach to children (as exemplified by the nearly tenfold increase over the past year in children MMO's such as *Club Penguin* and *Webkinz*) there is growing value in designing for and assessing the player's experience of "meaningful fun" – those experiences that have authentic and lasting positive impact. Because the PENS model is built on fundamental principles of positive motivational psychology, it has the potential to provide guidance in constructing these experiences, and the ability to demonstrate empirically that games can have a meaningful impact when they are designed to authentically satisfy intrinsic needs.

Immersyve and its research associates have completed several studies looking at this area, with some preliminary results published in a 2006 paper on "The Motivational Pull of Video Games[6]" and more studies currently being written up for an additional journal publication. In short, we are finding that when games satisfy the needs in the PENS model that players typically experience positive psychological effects, such as increases in well-being and vitality, at least over the short term[7]. In other words, games that satisfy needs are not only fun, but also have a positive psychological impact. In contrast, we have also identified specific player characteristics and elements within game designs that are associates with post-play irritability, tension, and in some cases game overuse. Thus our methods allow us to discriminate factors associated with "good fun" as well as risk factors that can follow from play. In other words, we believe that a PENS framework holds promise as a balanced and objective model for addressing the impact of games, both positive and negative.

It is worth noting that the same PENS factors that contribute to commercial success are also directly related to a positive psychological impact has encouraging implications for developing future games that are not just successful but demonstrably healthy. This possibility certainly seems to stand in counter-point to the current political concerns over gaming's impact, and we look forward to exploring and reporting on the issue further.

Summary

In its ***Player Experience of Need Satisfaction model (PENS)***, Immersyve brings an applied theory of player motivation that meaningfully contributes to developers' understanding of what fundamentally satisfies players and provides a practical testing methodology and analytic approach with proven value. The PENS outlines three intrinsic psychological needs – those of competence, autonomy, and relatedness – that numerous data demonstrate are at the heart of the player's fun, enjoyment, and valuing of games. By collecting data on how these needs are being satisfied, the PENS model can strongly and significantly predict positive experiential and commercial outcomes, in many cases much more strongly than more traditional measures of fun and enjoyment. The PENS model has repeatedly demonstrated predictive value regardless of genre, platform, or

[6] Ryan, R., Rigby S., & Przybylski, A. (2006). "The Motivational Pull of Video Games: A Self-Determination Theory Approach". *Motivation and Emotion,* Springer Science (reprints available from Immersyve or at www.springer.com)

[7] In one study, Immersyve found that the positive impact of need satisfaction in games on the player's feeling of vitality was still present an hour after the gameplay session ended. Currently we are conducting more extensive longitudinal studies to further examine this effect.

even the individual preferences of players.

In addition to its testing value, we believe PENS brings conceptual value to the industry in three specific ways:

1. PENS is a useful heuristic model of player psychology that developers can easily understand and tuck in their pocket to inspire new designs and features. Creating a great game will always be an art and not a science – but having a compact understanding of a player's motivational needs can catalyze innovation and help to vet specific design choices.
2. The PENS model and methodology can embrace innovation well into the future because it is driven by well-validated theory that involves the fundamental satisfactions games provide. One of the challenges of playtesting methodologies that focus primarily on observing player behavior without an underlying theory is that games and technology are constantly evolving (case in point: The Wii). This creates a moving target that behavioral measurement approaches must continually chase. By contrast, the motivational lightbox of the PENS model is a constant – it is measuring the fundamental energy of the player experience, regardless of its outward expression.
3. Describing the player experience in terms of genuine need satisfaction, rather than simply as "fun," gives the industry the deeper language it deserves for communicating what makes games so powerfully unique and valued by players. It allows developers and publishers to speak more directly to what matters to players from the moment they "pick up the box," building enthusiasm and loyalty throughout the experience. In a broader sense, it allows us to speak meaningfully about the value games have beyond leisure and diversion, diffuses the political bias against games as empty experiences, and provides an important new lexicon that talks about games in more meaningful ways than simply "momentary fun." When we speak of games in terms of their satisfaction of competence, autonomy, and relatedness, we respect that this is both what makes them fun and also what can make them so much more meaningful.

For more information on putting PENS and the game research expertise of Immersyve's team to work for your company, contact us at info@immersyve.com