Let Me Be Implicit: Using Motive Disposition Theory to Predict and Explain Behaviour in Digital Games

Susanne Poeller[1], Max V. Birk[2], Nicola Baumann[1], Regan L. Mandryk[2]

[1]Department of Psychology,
University of Trier
Trier, RLP, Germany
{s1supoel, nicola.baumann}@uni-trier.de

[2]Department of Computer Science,
University of Saskatchewan
Saskatoon, SK, Canada
{firstname.lastname}@usask.ca

ABSTRACT

We introduce explicit and implicit motives (i.e., achievement, affiliation, power, autonomy) into player experience research and situate them in existing theories of player motivation, personality, playstyle, and experience. Additionally, we conducted an experiment with 109 players in a social play situation and show that: 1. As expected, there are several correlations of playstyle, personality, and motivation with explicit motives, but few with implicit motives; 2. The implicit affiliation motive predicts in-game social behaviour; and 3. The implicit affiliation motive adds significant variance to explain regression models of in-game social behaviours even when we control for social aspects of personality, the explicit affiliation motive, self-esteem, and social player traits. Our results support that implicit motives explain additional variance because they access needs that are experienced affectively and pre-consciously, and not through cognitive interpretation necessary for explicit expression and communication, as is the case in any approaches that use self-report.

Author Keywords

Motive disposition theory; digital games; player types; implicit motives; explicit motives.

ACM Classification Keywords

K.8.0 [Personal Computing]: General - Games.

INTRODUCTION

In player experience (pX) research, we are interested in describing what players enjoy and predicting what choices they will make. For example, what attracts players to different games in the first place? What explains churn – why do some players move away from a game whereas others stay committed? What are the different play styles and how can we scaffold a tailored experience in a game with myriad mechanics and possible approaches toward play?

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There are many theories that explain aspects of pX and predict behaviour (e.g., flow [98], satisfaction of needs [82], immersion [18,53]); however, they don't incorporate the known differences between people in terms of their personalities (e.g., [27,71]), motivations for play (e.g., [45,106]), self-concepts (e.g., [48,81]), or play styles (e.g., [7,75]). And we know that people are different: they play different games, make different in-game choices, and enjoy different game features. For example, what satisfies one person's need for competence – such as finishing a level – might not satisfy another's – such as a person who needs to finish that level with 3 stars to experience competence. Or consider that two players may need different amounts of arousing game features to enjoy playing [11]. How can researchers begin to characterize the differences in people that drive in-game behaviour and result in differing experiences?

Many attempts have been made to describe individual differences in the context of play either through statistical models of how traits affect experience directly (e.g., [41,54,55]), or moderate the translation of in-game experience into enjoyment (e.g., [14]); however, they all rely on explicit measures of personality (e.g., [27,79]), play style (e.g., [75]), or motivation for play (e.g., [45]). Self-report methods are valuable because they reflect how individuals consciously describe themselves and what they think they enjoy, they explain how we cognitively evaluate our experiences, and they predict short-term behaviours, especially in contexts where social influences are present [19,70,97]. However, they are not reliable predictors of long-term behaviours and spontaneous behaviours [70], or volitional activities undertaken outside of a context of social incentives [19,70], which are important for explaining our perceptions, actions, choices, and persistent behaviours when interacting with the physical world [91].

To describe what actually pleases us, rather than what we rationally think that we want, we can turn to *affective preferences.* Affective preferences [20,69] are the *incentives that someone enjoys and actively seeks out*. They are unconscious drivers of behaviour based on experienced positive affect, established early in life [70], assumed to be stable over the lifespan [93], and predict long-term behaviour [70,104]. They describe why people behave differently in – and get

different value from – similar experiences [57,84,105]. Because of their explanatory value, affective preferences could help researchers explain play behaviour and understand play experiences. However, because people aren't generally consciously aware of their own affective preferences [57,70,90], when we ask players about them – as is common in pX research – we do not actually access their implicit affective preferences, but rather their *explicit conscious preferences* [57,70]. We determine how individuals consciously describe themselves (e.g., 'I enjoy being surrounded by other people', 'I am happy with what I have achieved so far') – as people respond using cognitively elaborated answers [44,56] given in a context of social desirability [42,73] – rather than being capable of directly accessing what provides them pleasure [105] and drives their behaviour [104].

In this paper, we present *Motive Disposition Theory (MDT)* [67] as a framework to explain individual differences in behaviour and experience in digital games. MDT describes three motives (achievement [4], affiliation [17], and power [65,102]), with an additional fourth motive (autonomy) [2,3] under validation. Motives overlap with existing models of player motivations [45,106] and preferred play style [75]; however, one important distinction with other trait approaches is that there are tools to assess both explicit conscious preferences, i.e., *explicit motives* [52,60,83], and implicit affective preferences, i.e., *implicit motives* [62,93, 103], which presently cannot be accessed through any form of self-report [70,86,97]. Another difference is that motives offer depth by differing in their orientation between approach and avoidance [34] – such as hoping for success versus fearing failure, hoping for social closeness versus fearing rejection, or hoping for power versus fearing weakness [62].

We first describe the theory, provide examples of how it relates to play experiences, and contextualize its potential for understanding players in relation to current theories of player personality (i.e., Big Five model [27,71], self-esteem [81]), motivation (i.e., Digital Games Motivation Scale (DGMS) [45], BrainHex [75], Quantric Foundry [107]) and experience (i.e., intrinsic motivation [30,31], need satisfaction [82], flow theory [28]). We then describe a study, designed to investigate the affiliation motive in social play; 109 participants played Minecraft (Mojang, 2009) in groups of 3 for 30 minutes with the sole instruction to 'build a house'.

Our results show three contributions: First, that most explicit motives correlate with measures of player style and experience, but that implicit motives do not as they access more embodied structures of affective experiences, rather than consciously rationalized ones. Second, we show that implicit affiliation predicts social behaviour in the game in terms of the types of chat messages exchanged and likeability ratings for other players. Third, we show that implicit affiliation adds significant variance to explain these social behaviours even when we control for social aspects of personality (Extraversion and Agreeableness), explicit affiliation (approach and avoidance), self-esteem, and social player traits (DGMS Social and BrainHex Socializer). Together, these results reinforce the idea that implicit motives explain additional variance because they access needs that are experienced affectively and pre-consciously, and not through cognitive rationalization to be explicitly expressed and communicated, as is necessary in any approaches that use self-report.

Our work introduces motives into player experience research, contrasts them with existing approaches, and demonstrates that implicit affiliation explains significant variance in behaviour over and above explicitly-accessed social constructs. Implicit motives bring a valuable new perspective and method that can help us better understand players, and what drives them to behave in the ways that they do.

A PRIMER ON MOTIVE DISPOSITION THEORY

We introduce motives, the interplay between implicit and explicit motives, and approach and avoidance motivations.

Motives

In order to understand how and why players behave differently within games, we have to understand the motives (i.e., desired end-states) that drive their behaviour. These can either be consciously-described goals that individuals attribute to themselves (i.e., explicit motives), or unconscious affective preferences for certain types of incentives inherent in activities (i.e., implicit motives). These two types of motives rarely correlate with each other [22,29,50,69], but can interact with one another in various ways.

Traditionally, three motives were identified. The *affiliation* motive is the desire to form meaningful and satisfying relationships or not be rejected and alone. The *achievement* motive is a preference for activities that increase an individual's performance. The *power* motive is the need to impress, control and influence others, and to receive recognition for doing so [64,91]. A fourth motive – the *autonomy* motive – was recently identified and described as the need for self-preservation by establishing and protecting boundaries between the self and others through self-integration, self-expansion, and self-protection [2,3]. It describes the need to have control over oneself rather than allowing others to do so [88]. Research validating the autonomy motive is ongoing.

A central postulate about motives is that they orient, select and energize behaviour [68]. In other words, they influence what options for action we see, choose, and persevere toward. As established by McClelland [66], implicit motives predict *operant* behaviour, that is, spontaneous behaviour and behavioural trends over time. They are aroused by affective, task-related incentives that promise rewarding emotions. Explicit motives, on the other hand, predict *respondent* behaviour, that is, immediate responses in structured situations, often based on cognitively elaborated decisions [66,68]. Explicit motives are aroused by rational, social-evaluative incentives, and influence how individuals consciously describe themselves (e.g., 'I like helping other people').

Explicit Motives

The more commonly used and known type of motives are the conscious explicit motives. McClelland et al. [70] labelled

them *self-attributed needs* (often referred to in literature as *san*Aff, *san*Ach, and *san*Pow for affiliation, achievement and power, respectively); however, they are now most commonly referred to as *explicit motives*. Explicit motives are assessed by self-reports through questionnaires and work particularly well in predicting behaviour when assessed shortly before the behavioural measurement and in a similar context [1]. However, the problem with explicit motives is that they predict behaviour only in a restricted range of contexts, especially in highly structured situations in which a social incentive is present. To illustrate, Brunstein and Maier [19] showed that individuals high in explicit achievement were more likely to keep working on a mental concentration task after normative feedback (i.e., social-relative phrasing, such as "you performed worse than others") but not after self-referenced feedback (i.e., individual-relative phrasing, such as "you performed worse than previously"). This finding demonstrates how social incentives (i.e., outperforming others) are more important for the explicit achievement motive than task-inherent incentives (i.e., improving own skills).

Explicit motives are developed in later phases in life and are related to cognitive areas, such as the cerebral cortex [70]. They drive respondent behaviour, e.g., the choice to engage in a competition because of an individual's self-concept that he or she is a competitive person. Similar to New Year's resolutions, these attributions as to what is important for the self are not necessarily connected to what a person *actually* enjoys and will continue to choose to engage in over time. As such, explicit motives often do not predict long-term behaviour [70], and if people do pursue explicit goals that do not meet implicit needs it often results in exhaustion [58], especially when social incentives are not present.

A number of explicit motive questionnaires have been developed within the last seventy years, e.g., the Personality Research Form [52], the Motive Enactment Test [60], and the Unified Motives Scales [83].

Implicit Motives

Implicit motives are unconscious motives, so the person is usually not aware of these affective preferences. They are also referred to as *needs* (e.g., literature will use, for example, *n*Ach for the need to achieve) [70]. Implicit motives are measured with projective techniques like the Thematic Apperception Test (TAT), in which participants write stories to a set of ambiguous pictures that are analyzed according to a complex coding system [74]. The idea underlying these projective techniques is that individuals perceive and interpret their surroundings in need-related ways; recurrent themes that emerge reflect the participant's underlying motives.

Implicit motives are assumed to develop very early, in preverbal phases in life and have a close connection to affective experiences in infancy and early childhood [70]. They predict hormonal reactions; for example, the implicit power motive predicted testosterone increases in males after winning a dominance contest and cortisol increases after losing [89]. The affiliation motive has been linked to enhanced immune system functioning and progesterone release [46].

Implicit motives do not reflect conscious opinions about the usefulness or value of a behaviour but affective preferences, that is, the type of incentives someone enjoys and actively seeks out [70]. Therefore, implicit motives predict long-term behavioural patterns that can unfold in various ways and situations rather than concrete goals in specific domains. For example, a high achievement motive could lead to higher effort in painting, writing, sports, or video game play depending on the person's explicit goals, but the implicit achievement motive is always characterized by the unconscious need to do something well, regardless of the specific domain in which it is expressed. Achievement motivated people tend to be more persistent and successful in what they choose to do because they enjoy experiencing competence itself [92].

Common implicit motive measures are the Picture Story Exercise (PSE; [74,93]) and the Operant Motive Test (OMT; [62]), which are both based on the previously-described TAT and are projective measures. Semi-projective measures to assess implicit motives include the Multi-Motive Grid (MMG; [96]), in which participants have to select one or more of several given answers that describe the situation in each picture best. To date, however, the Operant Motive Test is the only method that measures all four implicit motives (including autonomy) within a single coding system.

Based on the theory and the long history of implicit motive research, we expect implicit motives to offer valuable insights into in-game behaviour, especially spontaneous choices and long-term trends. To the knowledge of the authors, there have been almost no attempts to study the connection between implicit motives and video game behaviour. One study used the MMG to assess implicit motives [101] and showed that the implicit achievement motive was negatively related to interest in playing digital games; however, it was published in 1995 and digital game technology and presence in society has changed drastically in the interim.

How Do Implicit and Explicit Motives Relate?

Although explicit and implicit motives access different preferences (cognitive or affective), their synthesis can lead to a more complete understanding of behaviour and experiences. First, high congruence between implicit and explicit motives leads to more flow [84] or well-being [20,49], as congruence indicates that an individual consciously engages in behaviour that corresponds well with unconscious needs, leading to a positive affective outcome. Second, implicit and explicit motives can cooperate in strengthening behaviour [70] or create a conflict by blocking each other and as a consequence reduce well-being [9]. For example, an individual high in implicit affiliation (i.e., gets pleasure from being close to others) but low in explicit affiliation (i.e., is not aware of this affective preference) will not seek to spend time with others, even though doing so would have a positive outcome [87].

Although they share nomenclature, implicit and explicit motives are different constructs, and multiple attempts to combine them into a single instrument that shows correlation [32,47] has failed [97].

Approach and Avoidance Motivation

Both implicit and explicit motives can be pursued with two types of motivational orientation: hope of need satisfaction (approach motivation) versus fear of need frustration (avoidance motivation) [36,38]. Both approach and avoidance can serve as strong motivators for behaviour. For the affiliation motive, *hope for closeness* (approach) entails liking and enjoying intimacy or spending time with others, whereas *fear of rejection* (avoidance) is the wish to be not alone [37,43]. For the achievement motive, *hope for success* (approach) entails the enjoyment of a challenge, whereas *fear of failure* (avoidance) focuses on not doing badly [6,33,35]. For the power motive, *hope of power* (approach) entails finding pleasure in helping, leading, or influencing others, whereas *fear of weakness* (avoidance) focuses on having a higher status than others or having power over them in order to avoid being dominated or powerless [59,102]. Finally, for the autonomy motive, *hope of self-integration* (approach) is associated with feelings of pride, self-worth, and enjoyment of self-experiences, whereas *fear of self-devaluation* (avoidance) is the wish to avoid feeling insecure about the self, ashamed, and unworthy [2,62]. Motive assessment techniques differ in the extent to which they allow differentiation between approach and avoidance motivations [85]. For example, the most common coding system for the Picture Story Exercise [103] does not differentiate between hope and fear components, but integrates them into a single score for each motive, whereas the Operant Motive Test (OMT) can differentiate up to five different strategies (S1-S5; 1. self-motivation, 2. positive incentive, 3. self-regulation, 4. active avoidance, and 5. passive avoidance) for enacting each of the four motives [10,62].

CONNECTING MDT TO PX RESEARCH APPROACHES

As described in the previous section, motives represent our cognitive and affective preferences, which explicate what drives our short-term choices and long-term behaviours. Exploring player motivations, choices, behaviours, and experiences has also been a central goal of pX research, thus there is overlap between game-specific approaches to understanding motivations, experiences, and constructs in MDT.

Connection to Self-Determination Theory (SDT)

Self-Determination Theory (SDT) [31] is one of the most prevalent theories used in pX research [80,82]. MDT [67] defines motives as learned needs, and focuses on individual differences in the strength of these needs as driving forces for behaviour, whereas SDT defines needs as innate, and focuses on their universal importance for psychological functioning and well-being. The fundamental needs described in SDT are *relatedness*, *competence,* and *autonomy*, suggesting that the need for power is less fundamental and not collectively shared by all human beings, although some aspects of the power motive are included in the need for relatedness. Because satisfaction of the basic needs is assumed to be equally beneficial for everyone, SDT researchers do not measure individual differences in the strength of needs but the amount of need satisfaction as predictors of well-being. The differences in the definitions, research topics, and measurement approaches might lead to the conclusion that the theories are not compatible. However, Sheldon and Schüler [95] show that both provide valuable insights and can be integrated into a coherent framework (see also [85]); for example, that the effects of need satisfaction are universal when predicting general outcomes, but are moderated by implicit motives when predicting domain-specific outcomes.

In the context of pX, SDT effectively describes why a play experience is preferred, but MDT will incorporate individual differences into that preference. For example, SDT may explain why a game is enjoyable, but not why one player finds it enjoyable and another does not. To address individual differences when using SDT to explain pX, researchers have generally turned to individual traits as moderating variables.

Relationship of MDT with Trait Differences

To explain individual differences in pX, researchers focus on differences in player personality, motivation, or playstyle.

Personality and Self-Esteem

Personality has been often employed to understand differences between players in pX research; personality is usually characterized using the Big Five factor model [27,71], although other aspects of personality, such as self-esteem [14,81] or self-discrepancy [13,48,78] have also been explored in pX research. In some cases, personality has been shown to connect with game preference, for example with a preference for violent games [23], problematic game play [25], appropriate in-game behaviours [72], and inclination toward evil characters [100]. Personality factors have also been associated with preferred genres [77], presence in games [54], and as a moderator of experienced need satisfaction in games [14]. However, personality has been a weak or unsuccessful predictor of the number of hours spent playing mobile games [94], of choice in character role, class or race [12], of game preferences [76], or of in-game experiences [8,99,108].

Explicit motives show significant but moderate overlap with the five factors of personality [40]: In a factor analysis that include both the five factors and explicit motive measures, the affiliation motive loaded on a common factor with Extraversion, the achievement motive with Conscientiousness, and the power motive with low Agreeableness. In contrast, Neuroticism loaded on a common factor with the avoidance dimensions across motives whereas Openness to experience emerged as a separate factor [40]. However, the five factors do not show correlations to implicit motive measures [90].

Player Motivations and Playstyle

Personality, as described by the five-factor model, has not been shown to be consistent in predicting player experiences, and some researchers have concluded that “games studies re-

quire innovation in research methods rather than the application of received theories, constructs and models to the context of games and play" [8]. In response, several game-specific approaches to measuring player style or motivation have been proposed and created. Bartle's Test of Gamer Psychology suggested four player classes: Killer, Achiever, Socializer, and Explorer [7]. The BrainHex approach [75] divides players into seven types based on the intended neurobiological experience: Achievers, Conquerors, Daredevils, Masterminds, Seekers, Socializers, and Survivors. The Motivation to Play in Online Games Questionnaire (MPOGQ; [106]) uses three overarching categories of Achievement, Social, and Immersion based on a bottom-up factor analysis. The Digital Games Motivation Scale (DGMS; [45]) uses Social Cognitive Theory [5] and factor analysis to suggest eight motivations for play: Performance, Narrative, Social, Pastime, Habit, Escapism, Agency, and Moral self-reflection.

These questionnaires assess different motivations (i.e., *self-attributed preferences*) for categories of behaviour in games that may have some content overlap with motives (e.g., social motivation is likely related to the affiliation and power motive). However, these player-specific trait assessments are not systematically aligned with motives according to MDT. Further, these game-specific approaches assume that playing games cannot be well explained by theories that explain human-behaviour in general. We propose that the four motives (affiliation, achievement, power, autonomy) and their two orientations (approach, avoidance) applied in a conscious explicit or implicit affective manner can be useful in describing player motivations, experiences, and behaviours.

STUDY METHODS

To investigate the applicability of MDT in the context of pX research, participants played Minecraft in a social context (groups of 3). Implicit and explicit motives were assessed along with a variety of standardized player trait and experience measures. We also logged in-game player behaviours.

Game Environment: Minecraft

Minecraft is a multiplayer sandbox construction game played from the ego-perspective, which allows players to mine in-game resources called blocks that are used to build an infinite variety of structures, such as houses or rollercoasters. Participants played Minecraft (Microsoft, Version 1.9.2) in Survival Mode; they had to fight monsters and could die, in which case their avatar was returned to a dedicated spawn point. Participants chose one of 8 avatars and a name before starting. To prevent participants from focusing solely on mining blocks, they had access to in-game storage containing more blocks than they could reasonably use, and chests with weapons and tools. They could not access Obsidian blocks, which allow players to create portals to another dimension.

Measures

We assessed implicit and explicit motives, player experience, personality, game-related motivations, and behaviour. If possible, we used an existing German version of an instrument; however, for DGMS, a German translation was not available. We translated the DGMS scales and double-checked the results with a team of bilingual experts to ensure accuracy of meaning and nuance. We gathered additional data (e.g., Flow [39]) that we do not report on in this paper.

Implicit and Explicit Motives

Implicit Motives were assessed using the 15-picture version of the Operant Motive Test (OMT; [62]). Each picture is designed to arouse one of the five strategies (S1-S5, described previously) for enacting each basic motive, i.e., affiliation (pictures 1-5), achievement (pictures 6-10), power (pictures 11-15). The 20-picture version including pictures arousing autonomy was not yet available. For each of the 15 pictures, participants were asked to first choose who they identify with; second they were asked to briefly answer three open questions: 'What is important for the person in this situation and what is the person doing?', 'How does the person feel?' and 'Why does the person feel this way?'.

Stories were coded for motive contents, i.e., affiliation, power, achievement, and autonomy. If a motive was present, one of the five enactment strategies (S1-S5) was coded. The strategies were aggregated to compute *approach* (S1-S2), *approach-to-avoid* (S3-S4), and *avoidance* (S5). In approach, higher values indicate more motivation to approach, e.g., to solve a difficult puzzle for the sake of enjoying the challenge. Approach-to-avoid indicates motivation to approach from the desire to avoid a negative outcome, e.g., be friendly to others in order to not be rejected. Avoidance indicates evasion behaviour, e.g., avoiding to engage in a competition to avoid losing.

Five coders were employed. Each picture of the OMT was coded for the four motives and the five strategies by a single coder; to assure quality, all five coders coded the same five stories in the 20 categories (Fleiss' Kappa: 51.8% (moderate) overall; 72.4% (substantial) for motive and 43.0% (moderate) for the 5 strategies; agreement levels were described according to the suggestions by Landis and Koch [63]) and then coders received individual feedback and further training from an expert coder, before they coded the remaining OMT stories. Quality was controlled by an expert coder.

Explicit Motives were assessed using the Motive Enactment Test (MET; [60]) and the Freedom Enactment Test (FET; [61]); combined, they measure the strength of explicit motive dispositions, representing affiliation, achievement, power, and autonomy. The instruments can distinguish different enactment strategies. However, in the present study, we only assessed explicit approach motivation and explicit avoidance motivation respectively for each of the four motives using a 4-pt Likert-scale.

Personality, Player Experience, and Game Motivation

Big Five: Personality was assessed using the German NEO-FFI (60 items, 5-pt Likert scale [15]). **Self-Esteem** was measured using the Rosenberg Self-Esteem scale (10 items, 4-pt Likert scale [24]). **Explicit game-related motivations** were measured using the Digital Games Motivation Scale (DGMS, 43 items, 5-pt Likert scale [45]). **Play Style** was

measured with a modified version of the BrainHex survey (30 items, 5-pt scale [75]).

Chat Behaviour

Chat logs were coded for the percentage of messages for each player that included: the number of smileys; the number of messages concerned with the mechanics and controls of the game, e.g., 'which key do I use to eat?' (game-relevant); the number of messages referring to the task of building a house, e.g., 'should we start building the house or is something still unclear?' (task-relevant); and the number of messages that neither concerned the game mechanics nor the task, e.g., 'I wanted to catch the pig first' (task-irrelevant). The message coding was handled by a single coder as messages either included a smiley or not, talked about the task or the game, or neither talked about the task nor the game.

Likeability Ratings

Participants were asked to answer questions regarding each of their fellow players individually. 5 items for each player were used to calculate likeability ratings and were answered on a 5-point Likert scale. They included items like 'I liked player 1 very much' and 'I found player 1 to be very dislikable'(R). As the likeability index was a scale created for this study, we report that Cronbach's alpha was .843.

Participants and Procedure

121 participants were recruited from the student pool of the University of Trier and the University of Applied Sciences Trier and compensated either with course credit or 10€. Participants were scheduled to play in groups of 3 (41 groups). One participant volunteered as a third player for two sessions in which a different person missed the appointment – he was not aware of the purpose of the study; only his first session's data were included. We asked for participants who play video games in general and were familiar with 'WASD' controls as the keyboard was used for movement and the mouse for panning and tilting the camera. The game Minecraft was not mentioned when recruiting participants. The study was performed in a laboratory that allowed us to separate participants into sound-proof cubicles – communication was only possible through the in-game chat system. Participants were placed separately in the cubicle without seeing each other or interacting with each other in any way.

Three groups (9 participants) were eliminated from the analysis because of technical problems, e.g., not being able to connect to the server, which affected the whole group. Three individual participants were also removed for a lack of compliance, e.g., not moving the character, which did not affect the other participants in the group, leaving a total of 109 participants (36% female, 0% other; mean-age=23.4, SD=3.5).

Participants had played video games for an average of 12.85 years (SD=4.76) and were currently playing video games on an average of 4.13 days per week (SD=2.6); 53 participants (47.7%) reported having played Minecraft before and two participants (1.8%) had never heard of Minecraft.

Participants completed the trait questionnaires, followed by a Minecraft tutorial, and instructions for play: *'You will now spawn in Minecraft together with two other players. The task is to build a house within the next 30 minutes. There are no restrictions or rules on how to fulfill this task. For a faster start you will find some materials within chests. You can use the chat window to communicate with the other two players'.* Participants entered the game at the same time. After 30 minutes of free play time, participants were redirected to the second set of questionnaires, including measures for player experience and game-related motivation.

Analysis

Analyses were performed using IBM SPSS Statistics 24. Participants were treated as individual samples. For analyses including implicit motives, participants with more than two stories resulting in zero-codings were excluded (n=16). Zero-codings are used for written stories of participants that do not contain content related to a specific motive, such as 'I don't know'. If more than two stories have zero-codings, the motive dispositions between participants become less comparable. For analyses regarding chat log coding, participants who did not use the chat during the experiment were excluded (n=14). One participant who did not use the chat was also excluded for zero-coding stories.

RESULTS AND INTERPRETATION

We present three analyses. First, how explicit and implicit motives correspond to measures of personality, player motivation, and play style. Second, how the affiliation motive predicts in-game behaviour. Third, that the affiliation motive explains additional variance in player behaviour, even when we control for explicit measures of player personality and motivation. We focus on the implicit affiliation motive, because the study was conducted in a social play situation.

Connecting Motives to Player Traits used in pX Research

Our first goal was to show how explicit and implicit motives connect to measures of personality, motivation, and play style, when taking approach and avoidance motivation into account. Correlations with explicit motives are seen in Table 1; Correlations with implicit motives are displayed in **Table 2**; For brevity, only the most notable patterns and correlations are discussed.

Due to the exploratory nature of this study, we calculated 420 correlations between 20 motive categories and 21 other questionnaire variables. Because multiple tests could lead to alpha error accumulation – meaning that about 5 in 100 correlations are significant by chance when using an alpha error level of .05 (also known as 'Type I error' or 'false discoveries') – we applied a Bonferroni correction, which adjusts the significance level to $p<.00012$. Thus, correlations displayed in red (Table 1 & 2) are almost certainly meaningful. Because the Bonferroni correction is a strict criterion, we also report the common significance levels of .05 and .01.

Explicit Motives

For explicit motives, we found several correlations with questionnaire measures of personality and player motivation, confirming our expectations that there is significant overlap in the variance explained by these different frameworks.

Personality: Explicit motives correlate strongly with the Big Five and Self-esteem, but some personality factors correlate with more than one – or even all – of the explicit motives. Self-Esteem and Extraversion are both connected to a number of motives and in all of these relationships, they are positively associated with approach motivation and negatively with avoidance motivation. This pattern also applies for Neuroticism, but in reverse. The strongest link between Extraversion and explicit motives was with affiliation motivation, suggesting that these constructs share variance. Low Self-esteem and high Neuroticism are associated with avoidance motivation. This connection is expected [40], indicating that a high sensitivity for negative affect (i.e., high Neuroticism) leads to a motivation to avoid negative emotions. We find Openness to be connected to explicit power approach only, which is not consistent with prior findings [40].

Player Motivations: DGMS and BrainHex are most closely connected to the explicit power motive. However, after applying a Bonferroni correction, only one significant link remains between explicit power approach motivation and the BrainHex scale "Conqueror". The Conqueror scale describes a style of play that is close to the theoretical dominance aspect of approach power motivation.

These results could indicate that explicit motives in the offline context might not overlap with explicit motives in the online context for our participants, and that their beliefs about goals, needs, and usefulness offline might not apply equally to their goals in digital games. Another explanation is that the DGMS and BrainHex items do not capture the facets of, for example, the explicit affiliation motive well.

From a theoretical perspective, the Social scale in DGMS consists of both sociability aspects (e.g., 'Keep in touch with friends') – which are closer to the explicit affiliation motive; and status aspects (e.g., 'See your advice followed by other players') – which are closer to the explicit power motive. In fact, these factors were originally separate in the formation of the DGMS, but were collapsed when a bottom-up factor analysis failed to differentiate them. In general, there seems to be a power focus in the game-related questionnaires 9as evidenced in the pre-correction correlations), which is not surprising with many elements of games including competitions, leaderboards or ranking systems and status symbols.

Implicit Motives

For implicit motives, we find few (and only two Bonferroni-corrected) significant correlations with explicit measures, confirming our expectation that they share little variance with explicit measures assessed via self-report.

Personality: The only significant connections between implicit motives and questionnaire measures strong enough to remain after applying Bonferroni correction were found between low self-esteem as well as high Neuroticism and avoidance motivation in the affiliation motive. This is interesting because the affiliation motive is seen as an experience-oriented motive [2] and likely connected to strong and therefore possibly conscious, negative feelings, when frustrated.

Player Motivations: No correlations between implicit motives and player motivations were substantial enough to remain after the Bonferroni correction.

Explicit Motives	Affiliation		Achievement		Power		Autonomy	
Strategy	a	b	a	b	a	b	a	b
	a) Approach; b) Avoidance							
Self-Esteem								
Self-Esteem	.379***	-.549***	.302**	-.540***	.220*	-.555***	,04	-.457***
Big Five								
Neuroticism	-.323**	.655***	-.311**	.584***	-,11	.542***	,01	.564***
Extraversion	.642***	-.306**	.333**	-.373***	.248**	-.350**	-,07	-.272**
Openness	,17	,14	,15	,18	.375***	,07	,15	-,01
Agreeableness	.237*	-,03	-.228*	-,19	-.279**	-,09	-,19	,00
Conscientiousness	,09	-.213*	.362**	-.193*	,03	-.326**	,11	-,14
DGMS								
Habit	-,06	,09	,03	.208*	.214*	.265**	,01	,09
Moral	-,05	,13	,02	,17	.329**	.283**	,06	,15
Agency	-,01	-,08	,04	,14	,08	,14	,10	,10
Narrative	-,01	,13	-,01	.246*	,14	.251**	,09	,12
Escapism	-,11	,17	,05	.252**	,10	.308**	.220*	.258**
Pastime	-,14	,11	-.210*	,06	-,09	.238*	-,04	.196*
Performance	-,08	-,05	,08	,16	.220*	.199*	,16	,10
Social	,09	,03	,17	-,04	.232*	,09	,07	,01
BrainHex								
Seeker	,10	,08	-,01	.211*	,06	.191*	,10	,11
Survivor	,16	-,02	,12	,06	,18	.206*	,04	,17
Daredevil	,13	-,06	,18	,04	.210*	,13	,07	,06
Mastermind	,07	-,06	.352**	,07	,18	,10	,15	,03
Conqueror	.202*	-.218*	.360**	-,07	.415***	,04	,15	-,04
Socializer	,13	,05	,07	,00	.201*	,08	-,04	,00
Achiever	,01	-,03	,00	,08	,07	,01	.211*	,01

Table 1. Correlations of explicit motives; N=109; significant correlations displayed in bold, *p < .05, **p < .01, ***p<.00012 (Bonferroni correction for multiple tests in red).

Implicit Motives	Affiliation			Achievement			Power			Autonomy		
Strategy	a	b	c	a	b	c	a	b	c	a	b	c
	a) Approach; b) Approach to Avoid; c) Avoidance											
Self-Esteem												
Self-Esteem	,05	-,02	-.500***	-,02	-,09	-,12	.258**	.334**	-,10	,03	-,02	-.302**
Big Five												
Neuroticism	-,09	,04	.434***	-,08	,05	,13	-,19	-.295**	,10	,00	,15	.281**
Extraversion	,10	,07	-,12	-,09	-,01	-,15	,13	.254**	-,08	-,14	,00	-,15
Openness	-,07	-,01	,14	-,09	,04	-,01	-,07	,15	,00	,15	,12	-,08
Agreeableness	,18	,01	,00	,02	-,18	,16	,09	-,12	-,07	-,11	-,09	,10
Conscientiousness	,09	-,01	-.278**	,11	,04	,00	,04	,13	-,06	-,09	-,05	-,10
DGMS												
Habit	,00	-,11	,02	,00	,04	,11	-,13	,03	,03	,08	-,11	-,02
Moral	,02	-,03	,16	-,05	-,02	,04	-,05	,01	,01	,10	,03	-,10
Agency	,01	,01	,08	,11	,02	,06	-,17	-,10	-,02	-,03	,03	-,02
Narrative	,03	-,05	,10	,01	,07	-,03	-,16	-,01	-,02	-,01	,13	-,01
Escapism	,00	,05	,19	,10	,03	-,03	-.244*	-,07	,18	-,17	,15	.195*
Pastime	,02	-,14	,08	,06	,04	,00	-,10	,04	,07	,02	-,15	,15
Performance	,07	-,15	-,01	,09	,09	-,06	-,12	,01	,00	,09	,09	-,10
Social	.239*	-,05	,07	,09	-,02	-,04	-,06	.190*	-,04	-,05	-,14	-.269**
BrainHex												
Seeker	,04	-,07	.322**	,08	,05	-,03	-,09	-,13	,05	-,03	-,01	,15
Survivor	,06	-,08	,01	,09	,08	,02	-,11	-,02	,08	,04	,12	-,02
Daredevil	,12	-,03	,05	,01	,11	-,07	-.193*	,05	-,08	-,07	,10	-,07
Mastermind	-,03	-,17	-,04	,09	,03	,02	-,07	,14	,03	,03	-,05	-,10
Conqueror	,10	-,14	-,03	,08	,03	-,02	-,09	.266**	-,09	,04	-,12	-.197*
Socializer	.199*	-,08	,09	,05	-,09	-,06	,01	.221*	-,05	,02	-,18	-.205*
Achiever	,05	-,03	-,05	,03	,11	-,08	-,03	-,03	,03	-,04	,05	-,03

Table 2. Correlations of implicit motives; N=93; significant correlations displayed in bold, *p < .05, **p < .01 ***p<.00012 (Bonferroni correction for multiple tests in red).

Implicit Affiliation								
Approach		Approach to Avoid		Avoidance		Model		
beta	*p*	*beta*	*p*	*beta*	*p*	*F*	*p*	*R-sq*
Likeability Ratings for Other Players						*F (3,89)*		
1.384	.002	-.369	.347	.360	.268	4.034	.010	.120
Number of Smileys Used								
.109	.393	-.056	.619	.201	.034	1.779	.157	.057
Number of Task Relevant Messages						*F (3,73)*		
-.098	.419	-.137	.208	-.003	.975	.701	.554	.028
Number of Task Irrelevant Messages								
.060	.573	-.240	.013	.126	.098	3.033	.035	.111
Number of Game Relevant Messages								
.066	.598	.407	.001	-.008	.929	4.545	.006	.157

Table 3. Regression models for predicting behaviour with the implicit affiliation motive (significance in red).

		Likeability Ratings for Other Players			
Block		*F*	*p*	*R-sq*	*ΔR-sq*
1	Extraversion, Agreeableness	3.835	.025	.079	-
2	Explicit Affiliation: Approach, Avoidance	2.409	.055	.100	.021
3	Self-Esteem	2.013	.085	.105	.005
4	DGMS Social, BrainHex Socializer	2.690	.015	.183	.078
5	Implicit Affiliation Motive Strategies	2.748	.006	.253	**.070**

	Number of Smileys Used				*Task Relevant Messages*			
Block	*F*	*p*	*R-sq*	*ΔR-sq*	*F*	*p*	*R-sq*	*ΔR-sq*
1	.465	.629	.010	-	.643	.529	.017	-
2	.363	.834	.016	.006	.526	.717	.029	.012
3	.476	.793	.027	.011	.514	.765	.035	.006
4	1.677	.126	.123	.096	.940	.482	.088	.053
5	1.468	.167	.153	**.030**	1.006	.448	.134	**.046**

	Task Irrelevant Messages				*Game Relevant Messages*			
Block	*F*	*p*	*R-sq*	*ΔR-sq*	*F*	*p*	*R-sq*	*ΔR-sq*
1	3.793	.027	.094	-	.239	.788	.006	-
2	2.379	.060	.118	.024	1.150	.340	.061	.055
3	1.938	.099	.122	.004	1.024	.410	.068	.007
4	1.648	.137	.145	.023	.767	.617	.073	.005
5	2.523	.012	.280	**.135**	2.216	.027	.254	**.181**

Table 4. Additional variance explained by the implicit affiliation motive in hierarchical regressions (significance in red).

The Affiliation Motive and Game Behaviour

Our second goal was to show how implicit motives can predict and explain behaviour in digital games, thus we conducted regressions for the social behaviours that we logged and coded within Minecraft play. We considered only the implicit affiliation motive, entering all three strategies (approach motivation, approach-to-avoid motivation and avoidance motivation) into one regression model for each behavioural dependent measure (see Table 3).

The implicit affiliation approach motivation, but not approach-to-avoid or avoidance motivation, predicts the likeability ratings of other players. Approach-to-avoid motivation predicts a higher percentage of game-relevant chat messages and a smaller percentage of task-irrelevant messages. Implicit affiliation avoidance motivation predicts more frequent use of smileys. Approach or approach-to-avoid motivation do not predict the use of smileys. The implicit affiliation motive does not predict a preference for task-relevant messages.

Explaining Additional Variance using Implicit Motives

Our third goal was to demonstrate that implicit motives can explain additional variance, even when controlling for explicit motivations and personality. To show their added value, we added the implicit affiliation motive to hierarchical regression models comprised of other constructs that are also relevant to social behaviour. First, in Block 1, we entered the personality factors of Extraversion and Agreeableness; in Block 2 we added the explicit motive scales of approach and avoidance affiliation; in Block 3, we added self-esteem; in Block 4, we added the DGMS Social and BrainHex Socializer scales. Finally, in Block 5, we added the three implicit affiliation motive strategies (approach, approach-to-avoid and avoidance). The results are displayed in Table 4.

Interpretation and Discussion of Predicting Behaviours

One advantage of implicit motives is that they do not correlate well with explicit questionnaires (as shown in the previous section), yet have still been shown to validly predict behaviour [97]. This is assumed to be because they are unconscious and less influenced by social desirability [16]. They can explain different types and aspects of behaviours, while still being more easily accessible than, for example, physiological parameters. Our results support these findings.

We aimed to show that the implicit affiliation motive can predict behaviour in a social gaming context and even more so, that it explains additional variance even when controlling for explicit self-report measures of social motivations. Our results show that approach affiliation motivated people are more likely to rate other players as more likeable, even after only 30 minutes of mutual gameplay. This can be explained by the implicit hope to affiliate with others, which manifests in our study in giving others the benefit of the doubt, even while hardly knowing them. This is a good example of approach behaviour and the hope to bond with others. It does not necessarily mean that they will succeed in their effort for social bonding, but it might increase the likelihood of bonding as compared to an avoidance affiliation motivated person, who is led by an implicit fear of being rejected [43]. While the personality factors of Extraversion and Agreeableness can also explain variance in likeability ratings, and the explicit affiliation motive is also marginally significant, our results show that even after controlling for these other social measures, implicit affiliation approach adds an additional (and significant) 7% of variance in explaining these ratings.

Regarding the chat behaviour of our participants, we observe that individuals with an avoidance oriented affiliation motive use more smileys. This finding is interesting, because using smileys could be considered a rather passive way to decrease the likelihood of being rejected by others. However, when controlling for the explicit social measures, the effect does not persist, although none of the self-report measures significantly predicts the use of smileys.

When we consider message type, our results show that approach-to-avoid motivation is a positive predictor of game-relevant and a negative predictor of task-irrelevant messages. It is important to keep in mind that we are only looking at the proportion of messages sent for each type, which is independent from the raw amount of game-relevant, task-relevant and task-irrelevant messages. We are only predicting which

type of content our participants choose to chat about. In this context, we can see that individuals with a strong implicit approach-to-avoid affiliation motive (meaning the wish to avoid rejection is motivating approach behaviour as an active coping strategy) seem to prefer game-relevant over task-irrelevant messages. This could indicate that they are choosing a safe topic, using the game mechanics and controls as an excuse to chat with and approach others instead of the riskier approach of making task-irrelevant small talk that might be dismissed by the other players. This effect is very strong and while Extraversion and Agreeableness can also predict task-irrelevant messages, the implicit affiliation motive adds an additional (and significant) 13% of variance. For game-relevant messages, implicit affiliation is the only significant predictor, explaining 18% additional variance. Implicit affiliation motivation does not affect task-relevant messages.

Together, our results show how explicit motives relate to more player experience constructs than implicit motives, but that implicit motives can predict player behaviour, even when controlling for explicit measures.

DISCUSSION

The aim of the study was to demonstrate how implicit motives can be a useful addition to the toolbox of methods for understanding player behaviour and experience.

pX questionnaires are a valuable tool for player research; however, they also have limitations. For example, pX questionnaire constructs tend to correlate with each other, as they are influenced by the same cognitive representations. Even the most well-constructed factor analysis cannot point us to the items that we did not include in the pool. This is where a solid and well-researched theory can be useful. While we acknowledge the advantages and value that self-report measures have for personality and motivation research, it is important to also understand how and when they work, what their limitations are and that they are highly influenced by social desirability and cognitive evaluations [73]. They require a substantial amount of self-reflection to accurately predict behaviour and reflect experiences. They are therefore more strongly connected to short-term choices. An immediate and conscious decision, that has to be made, is closely connected to our elaborate cognitions about who we are and what we like at that point in time. This is not always a guarantee for enjoying what we choose to do.

In this paper, we demonstrate the utility of implicit motives in the context of player experience research through a study of a social play situation. Specifically, our results demonstrate the following important findings:

- Explicit motives correlate with self-esteem and personality but less so with motivation for gaming and play style; however, implicit motives do not correlate well with explicit measures of self-esteem, personality, motivation for gaming, or play style, as is expected and explained by MDT.
- The implicit affiliation motive significantly predicts social aspects of in-game behaviour.
- The implicit affiliation motive adds significant explanatory value in predicting social aspects of behaviour, even when controlling for the socially-relevant explicit measures that describe players' personalities, motives, motivations, and play styles.

Integration of Motive Dispositions and Universal Needs

The idea that all humans profit from having their basic needs of competence, autonomy, and relatedness satisfied does not necessarily mean that they all require the same things to choose high agreement on a need satisfaction scale. While one person might feel a complete satisfaction from having one long-distance friend in their life, others might require five very close acquaintances, interacting with at least one of them every day until they are ready to 'strongly agree'. With all the advantages that basic need satisfaction has to explain collective enjoyment of a game, we also have to acknowledge that people differ in their preferences and motivations, because otherwise we would all engage in the same behaviours and make the same choices. In this sense, need satisfaction is partially an outcome of having made the right, need-congruent choices whereas motives might guide choices and motivate corresponding behaviour [85,95]. The Big Five alone are not able to completely explain all of these interpersonal differences and motives can add to our understanding of player personality. For example, being an introvert does not necessarily mean that a person does not enjoy feeling close to other people. Being an extravert does not explain whether we want to lead or help people or just enjoy our time with them. Motives can help to understand what types of experiences people actively seek out and what drives these choices.

Application of MDT in pX Research

Understanding and predicting behaviour and experiences, especially when accounting for individual differences, is complex. We cannot assume that one theory or construct can describe an aspect independently from all the other factors. If we want to understand gamers specifically, and humans in general, we have to consider the motivations underlying people's behaviours, instead of simply describing them.

Explicit motives can give us an idea of what a player believes is important in the context of games. For example, she could think that it is very important or valuable to do well (achievement), to just be with and talk to others (affiliation), to guide the others through a mission and prove her knowledge (power), or to experience pride when succeeding (autonomy). These interpretations do not explain well how much these experiences will actually be enjoyed, because people can deceive themselves about their preferences, for example, because of how they wish they could be.

Implicit motives are largely independent from explicit measures, and thus provide unique value. They should explain the frequency of various spontaneous behaviours, because of their nature as affectively rewarding. They are thematically connected to the same goals as explicit motives, with the advantage of being less influenced by social

desirability and complex thoughts leading to a conscious conclusion. An affiliation-motivated player might leave a play situation happy because of a fun conversation that was unrelated to the challenge of the game, or disappointed because the other players have been rude and unresponsive. An achievement motive could lead to enjoyment of finishing a level successfully despite its challenge, while a player with a low implicit achievement motive might just be interested in completing it quickly. A power-motivated person may derive pleasure from having others follow their advice, or feel frustration if their leadership is thwarted. The disadvantage of implicit motives is that individuals might attribute their positive or negative emotions to different events that occur simultaneously, meaning that cognitions can overshadow implicit needs. However, enjoying a certain experience tends to increase the chances of it being repeated in the future [70,30], which could explain the long-term behavioural trends predicted by implicit motives. Further, when affective and cognitive preferences are congruent, either because of successful self-reflection or by chance, need satisfaction, flow, immersion and enjoyment should reach the highest levels in players.

Utility for Industrial Games User Research

Implicit and explicit motives have value to offer for games user research in both academic and industrial contexts. First, in a theoretical manner, they could be used to guide design through a persona-based approach [21,26,51]. Once understood, it is straightforward to use motive dispositions to characterize players and guide game design; it is conceivable to design a game for a person with high-affiliation approach, but difficult to imagine what a game targeted at, for example, extraverts would look like. Second, implicit motives will likely provide value in predicting and explaining behaviour in the context of data analytics. Third, integration of both explicit and implicit motives to understand player preferences and behaviour together would be beneficial for suggesting specific roles or activities in a game that would match a player's motives, making it more likely that they would enjoy initial play experiences. Fourth, motives can also be a useful tool to market games to the right players who would enjoy them. To do so requires an understanding of the different reasons that players have to engage in the same game content. For example, do they mainly enjoy the dungeon because they like the challenge of a boss fight, because they enjoy being part of a team, because they enjoy leading the team, or because they want to possess certain items?

Limitations

The main limitation preventing the application of motives in the context of games user research is the intensity of gathering and coding the projective tests. As such, there is a need to develop a better tool for assessing implicit motives.

There are several other limitations to our work. Our work is fruitful, but not exhaustive; the nature of our work is exploratory and we present preliminary results that can be used in future research to derive testable hypotheses with more complex models. Further, MDT is too rich to be fully captured in a single study; future work in varying contexts is required to deeply connect MDT to other pX theories. Finally, we acknowledge that German university students present a relatively homogeneous group. Future research would benefit from including a more diverse demographic.

CONCLUSIONS

Understanding the choices that players make and the behaviours that they exhibit in games are two of the central goals of player experience research. In this paper, we introduce Motive Disposition Theory as a new lens for understanding players, contrast the use of explicit and implicit motives with existing player experience methods, and demonstrate that the implicit affiliation motive can predict behaviour in a social play setting, even when controlling for explicitly-accessed social constructs of play style, personality, and motivation. Our results demonstrate the utility of implicit motives in player experience research as they access affective preferences, not conscious ones. We discuss how explicit motives explain the choices that we consciously make, but implicit motives describe the aspects of our experiences that bring us pleasure – both notions that are relevant to play.

Motive Disposition Theory – and implicit motives in particular – bring a valuable new perspective and set of assessment tools that can help us better understand players, the choices that they make, and what drives their behaviour in digital games.

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