BrainHex: Preliminary Results from a Neurobiological Gamer Typology Survey

Lennart E. Nacke[1], Chris Bateman[2], and Regan L. Mandryk[3]

[1] Faculty of Business and Information Technology, University of Ontario Institute of Technology, 2000 Simcoe St N, Oshawa, ON, Canada
[2] International Hobo Ltd, 8 Milton Road, Manchester, UK
[3] Department of Computer Science, University of Saskatchewan, 110 Science Place, Saskatoon, SK, Canada
lennart.nacke@acm.org, chris@ihobo.com, regan@cs.usask.ca

Abstract. This paper briefly presents a player satisfaction model called BrainHex, which was based on insights from neurobiological findings as well as the results from earlier demographic game design models (DGD1 and DGD2). The model presents seven different archetypes of players: Seeker, Survivor, Daredevil, Mastermind, Conqueror, Socialiser, and Achiever. We explain how each of these player archetypes relates to older player typologies (such as Myers-Briggs), and how each archetype characterizes a specific playing style. We conducted a survey among more than 50,000 players using the BrainHex model as a personality type motivator to gather and compare demographic data to the different BrainHex archetypes. We discuss some results from this survey with a focus on psychometric orientation of respondents, to establish relationships between personality types and BrainHex archetypes.

Keywords: player types, player satisfaction modeling, play patterns, neurobiology, social science, survey.

1 Introduction

An extensive range of different personalities play games. They do so for myriad of different reasons. When digital games were first developed, they tended to focus on a single principle of play catering to just one specific play style, often dictated by the hardware limitations of the time (e.g., *Pong* and related games were constrained by limitations in display technology). More recently digital games make use of multiple game mechanics, often structured over many levels, thus extending appeal to players expressing many different kinds of playing preferences. Prior game research in emotions of play and player satisfaction modeling reveal experiential distinctions that connect to neurobiological systems [4].

Exploring the gaming preferences of diverse players offers significant advantages for the development of games that cater to different demographic players groups, which is considered a factor for higher sales. Such insight can be valuable for marketing a game or for creating games with a more personalized experience, and may also benefit artistically motivated games by establishing a conventional

framework of game design to be subverted, deconstructed or otherwise manipulated in the pursuit of artistic goals. In the field of player satisfaction modeling, typologies of playing preferences can provide a theory basis for technical modeling approaches.

BrainHex is a top-down approach (similar to psychometric evaluations), taking the inspiration for its archetypes from neurobiological research, previous typology approaches, discussions of patterns of play, and the literature on game emotions [3]. While BrainHex is based on neurobiological research literature, it is currently not a model using neurobiological techniques (but rather questionnaires) for its evaluation. In the following, we will introduce the seven BrainHex archetypes and their specific traits. For a discussion of the literature leading to the creation of BrainHex, please also see Bateman and Nacke [2]. We will then present and analyze a demographic survey of psychometric types in the context of the BrainHex archetypes.

2 The BrainHex Model

Each category within BrainHex should be understood, not as a psychometric type, but as an archetype intended to typify a particular player experience. Thus, BrainHex types can be understood as a qualitative presentation of an underlying implicit trait framework, with the descriptions combining hypothetical expressions of neurobiological research with observational case studies of players.

1. **Seeker:** Following research by Biederman et al. [5], the archetypal Seeker is motivated by interest mechanism, which relates to the brain area processing sensory information and memory association. Encountering richly interpretable patterns produces endormorphin, which in turn triggers the pleasure center [4]. The Seeker type is curious about the game world and enjoys moments of wonder.
2. **Survivor:** While terror is a strong negative experience, some people enjoy the intensity of the associated experience. The neurotransmitter related to this type is epinephrine, the chemical underpinning of excitement, which enhances the effects of dopamine (triggered when rewards are received). The state of arousal associated with epinephrine becomes that of terror as a result of the action of the fear center, which becomes hyperactive when a situation is assessed as frightening (based on prior experience, and certain instinctive aversions). It is not yet clear whether the enjoyment of fear should be assessed in terms of the intensity of the experience of terror itself, or in terms of the relief felt afterwards.
3. **Daredevil:** This play style is all about the thrill of the chase, the excitement of risk taking and generally playing on the edge. Game activities such as navigating dizzying platforms or rushing around at high speeds while still in control typify the implied play preference. The behavior related to this type is focused around thrill seeking, excitement and risk taking, and thus epinephrine, which was already mentioned, can be seen as a reward enhancer.
4. **Mastermind:** A fiendish puzzle that defies solution or a problem that requires strategy to overcome is the essence of fun to this archetype. Players who fit this archetype enjoy solving puzzles and devising strategies, as well as focusing on making the most efficient decisions. Whenever players face puzzles or must devise strategies, the decision center of the brain and the close relationship between this and the pleasure center ensures that making good decisions is inherently rewarding.

5. **Conqueror:** Some players are not satisfied with winning easily—they want to struggle against adversity. Players fitting the Conqueror archetype enjoy defeating impossibly difficult foes, struggling until they achieve victory, and beating other players. They behave forcefully, channeling their anger in order to achieve victory and thus experience fiero [6]. When mammals face difficult situations, their body produces epinephrine (adrenalin) and norepinephrine, the former producing arousal and excitement and the latter are being associated with anger and combative tendencies. Anger serves to motivate opposition and to encourage persistence in the face of challenge. Testosterone may have an important role in this behavior.

6. **Socialiser:** People are a primary source of enjoyment for players fitting a Socialiser archetype—they like talking to them, they like helping them, they like hanging around with people they trust. Players whose preference for play fits this pattern tend to be trusting, and they get angry at those who abuse their trust. This behavior connects to the social center, and which is the principal neural source of oxytocin, a neurotransmitter demonstrated to have a connection with trust.

7. **Achiever:** While a Conqueror can be seen as challenge-oriented, the Achiever archetype is more explicitly goal-oriented, motivated by long-term achievements. This distinction can be subtle, but it is nonetheless important: preference for Achiever-style play is rooted in 'ticking boxes', while preference for Conqueror-style play is rooted in defeating challenges. The satisfaction felt on attaining goals is underpinned by dopamine (and hence the pleasure center) but should be understood as being ultimately obsessive in its focus. Achievers prefer games amenable to ultimate completion. While the pleasure center is related to this preference, the decision center likely plays a role: subjective reports from players tending toward Achiever-style play show a compulsive fixation on reaching goals.

3   Demographic Player Type Survey

Predating this study were two demographic studies, known as DGD1 which identified play styles from Myers-Briggs typology in conjunction with a series of questions concerning playing preferences. Following case studies supported the qualitative validity of the suggested four types: *Conqueror*, *Manager*, *Wanderer* and *Participant*, which correspond broadly to Conqueror, Mastermind, Seeker and Socialiser of the current BrainHex archetypes [3].

To increase the number of respondents and in the hope of providing a more reliable data set for statistical analysis, the BrainHex study (launched in August 2009) was branded as a game personality survey that would compute the individual player types based on a few questions (similar to a psychometric type survey). It was not expected that the BrainHex types reported in the results would be objectively verified by the results, but rather that the data gathered would be open to a variety of analyses capable of yielding possible elements of a future trait theory [3].

3.1   Methods and Participants

The survey was launched through the website www.brainhex.com and a custom PHP script was developed to gather demographic and playing preference data alongside computing the preferential order of the BrainHex 'classes' (i.e. archetypes) and

anonymous survey respondent identification. The survey was split into several parts. The first part collected demographic information (e.g., year of birth, gender, geographical territory). Participants who knew their Myers-Briggs-Type (a personality type test) could select it from a drop-down menu.

The second part of the survey presented participants with several statements that were connected to the different BrainHex player archetypes from early pilot testing. Each player type had three statements (e.g., Seeker: "Looking around just to enjoy the scenery.") that needed to be rated on an arbitrary scale with the answers "I love it!" (1), "I like it." (0.5), "It's okay." (0), "I dislike it." (-1), and "I hate it!" (-2).

The third part of the survey then presented seven strong identifying statements for each BrainHex archetype that would need to be rated on a scale from 1 (worst) to 7 (best) in order of preference (e.g., Seeker: "A moment of jaw-dropping wonder or beauty."). The PHP script computed the sum of the three statements and the ratings to get the BrainHex archetype, which would be directly presented to the participant.

At the time of analysis, the survey had been taken by 50,423 participants. The gender split between respondents was not equal as this variable is hard to control for in an open field survey (88.6% male). The survey language was English, and it seems that the survey was most appealing to a North American audience (49.8%). The survey was also popular in Western Europe and the UK (27.9%), followed by Eastern Europe or Russia (8.2%), Australasia (4.3%), and South and Central America (4.3%). The majority of the respondents played regularly, most of them every day (66.2%).

4   Preliminary Results

These results will primarily be concerned with analyzing psychometric type responses to the questionnaire, based on MBTI preferences. These preliminary results can be considered a follow up to the original DGD1 study, which focused on MBTI [3].

4.1   Psychometric Types and Player Types

Most respondents fell into the INT categories, meaning more respondents seemed to be part of an introverted psychometric type. For the analysis of psychotypes and their distribution within each of the player classes, we excluded all answers without an MBTI type. This resulted in 11,526 responses for the following analyses. The dataset limited only to the people who answered the psychometric type question was individually split 4 times for each dimension to conduct separate analyses.

When divided between Extraversion and Introversion, BrainHex archetypes show a preference for Introversion. A chi square test showed differences (all p<.001) for Achiever (χ^2=344.20), Conqueror (χ^2=618.17), Daredevil (χ^2=117.60), Mastermind (χ^2=1087.20), Seeker (χ^2=883.20), Socialiser (χ^2=125.33), and Survivor (χ^2=240.17).

The same split was performed upon the Thinking-Feeling dimensions for each BrainHex primary class. Within the Seeker, Achiever, Socialiser, and Survivor class, there seemed to be a greater preference for Feeling than in the other primary classes. In general, all classes seem to be dominated by Thinking. This is supported by differences (all p<.001) for Achiever (χ^2=95.72), Conqueror (χ^2=649.21), Daredevil (χ^2=90.24), Mastermind (χ^2=765.73), Seeker (χ^2=121.02), Socialiser (χ^2=28.72), and Survivor (χ^2=57.49).

Fig. 1. MBTI Judging and Perceiving groups broken down by BrainHex primary archetype

Compared to the other dimensions, there is no clear dominating type in the Judging and Perceiving dimension (shown in **Fig. 1**). For Conquerors (χ^2=0.79, p=.38), Masterminds (χ^2=0.01, p=.93), and Socialisers (χ^2=1.42, p=.23) both Judging and Perceiving preferences are equally represented without differences. Interestingly, the Achiever type is significantly dominated by Judging preferences (χ^2=15.98, p<.001). Daredevils (χ^2=9.16, p=.002), Seekers (χ^2=49.27, p<.001), and Survivors (χ^2=18.73, p<.001) are all more likely to show Perceiving preferences.

Finally, for the Intuitive and Sensing dimension, the split was more obvious across all BrainHex primary classes. This is supported by significant differences (p<.001) for Achiever (χ^2=248.03), Conqueror (χ^2=757.50), Daredevil (χ^2=171.99), Mastermind (χ^2=1310.27), Seeker (χ^2=1006.79), Socialiser (χ^2=374.56), and Survivor (χ^2=231.08).

5   Discussion

From those respondents knowing their Myers-Briggs type, there was a clear skew in the data towards preferences for Introversion, Intuitive and Thinking, which was also prevalent in each of the BrainHex archetypes in this subset of the data. The first of these findings—the greater incidence of Introversion preference—verifies the finding of the original DGD1 study [3], which connects an interest in digital games with a preference for Introversion. The high incidence of Intuitive preference may be a consequence of the branding of the survey, which appears to have attracted more gamer hobbyists than those in the wider market for games.

In the context of the BrainHex archetypes, it is striking that Seeker, Survivor, Socialiser and Achiever should show a greater incidence of Feeling preference. The three archetypes that skew most heavily towards Thinking are concerned with intensity of the fight-and-flight response (Conqueror and Mastermind via fiero, Daredevil via excitement). Conversely, Seeker, Survivor and Socialiser can be understood as *aesthetic* archetypes: Seeker concerns the aesthetics of wonder, Survivor the aesthetics of horror, and Socialiser the aesthetics of interpersonal relationships. Achiever, while not being obviously aesthetic in its focus, is also notably disconnected from fight-and-flight play.

Thinking preference is usually associated with emotionally detached decision-making and Feeling with empathic decision-making; these results suggest an alternative interpretation of this measure in terms of preference for *fight-or-flight play* versus *experiential play*. This suggests a possible play theory trait distinguishing between direct visceral rewards and more nuanced aesthetic preferences.

The results in terms of Judging versus Perceiving preference conform to what would be expected. This axis expressly distinguishes goal-orientation (Judging) from

process-orientation (Perceiving). Individuals preferring process-orientation may well be interested in the quality of the eventual outcome, but are not as motivated as goal-oriented individuals to actually *complete* the process. The preference process-orientation for the Daredevil, Survivor and Seeker archetypes is consistent with their definitions, since (along with Socialisers) these players are less concerned with goals and more interested in the quality of their immediate experience.

These preliminary results are only the tip of the iceberg. A considerable volume of data remains to be examined. In comparison with its progenitor, the DGD1 survey, in terms of Myers-Briggs typological axis, the BrainHex data seems to verify the greater incidence of Introverted preference among gamer hobbyists. However, DGD1 actively typed respondents, while BrainHex asked respondents to provide their Myers-Briggs type *if known*. This might have produced inherent biases, depending on the distribution of knowledge of MBTI.

For identifying elements of a trait theory of play, distortions in the sample are less relevant since any significant pattern is evidence for a possible trait. Our results suggest these traits: preference for (1) visceral play, (2) aesthetic experience, (3) obsessive play, and (4) experiential play. It is also possible this is simply two traits: (A) visceral versus aesthetic play, and (B) degree of goal-orientation. Further investigation is required to distinguish these scenarios from the four-trait alternative.

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