

# Player Personality Profile Grid (PPP Grid)

Julian Alvarez<sup>1,2,3</sup> and Thierry Lafouge<sup>4</sup>

1- Polytechnique University Hauts-de-France, LARCH / Devisu, Valenciennes, France

2- Lille University, CRISTAL / NOCE, Lille, France

3- Immersive Factory, Paris, France

4- Lyon University, ELICO, France

**Abstract.** The purpose of this article is to propose a model called the "Player Personality Profile Grid" (PPP Grid) to help an instructor assess the profiles of the players he or she is likely to encounter in his or her learner audience. Specifically, this means addressing games that emphasize competitive aspects for competitive audiences (killers) or collaborative games for audiences that are more interested in dialogue and exchanges (socializers). The goal is to maximize the chances of making an edutainment session as efficient as possible. The approach resulted in a first iteration of a model. This model was constructed and derived based on statistical analyses of 1126 individuals who completed a questionnaire about their personality, age, gaming profile, and weekly gaming time. From this data, we constructed personality profiles and attempted to match the DiSC model with player profiles from Bartle's classification. This is an initial approach that will need to be tested later. At this point, in order to allow the reader to appropriate the PPP Grid model, we propose an example of its use. The idea is that it can be used to prepare edutainment sessions by suggesting the types of games that could be used with the learners involved.

Keywords: Profiles, Players, Personality, Learners, Typology

## 1 Introduction

The DiSC® model [1] is used by some actors in the field of recruitment and management, although it has been criticized and considered scientifically unfounded<sup>1</sup>. Based on the work of William Moulton Marston [2], this model proposes to identify the main strengths, weaknesses, motivations and challenges of employees in order to better understand and communicate with them [3]. Specifically, in its simplified version, the DiSC® model identifies 4 main profiles categorized by:

- "D" for "Dominance": Extroverted and task-oriented, such people would be considered "energetic" and "competitive";
- "i" for "Influence": extroverted and people-oriented, such people would be "communicative" and "passionate";
- "S" for "Steadiness": introverted and people-oriented, such people would be "empathetic" and "caring".
- "C" for "Conscientiousness": introverted and task-oriented, these people would be "conscientious" and "careful".

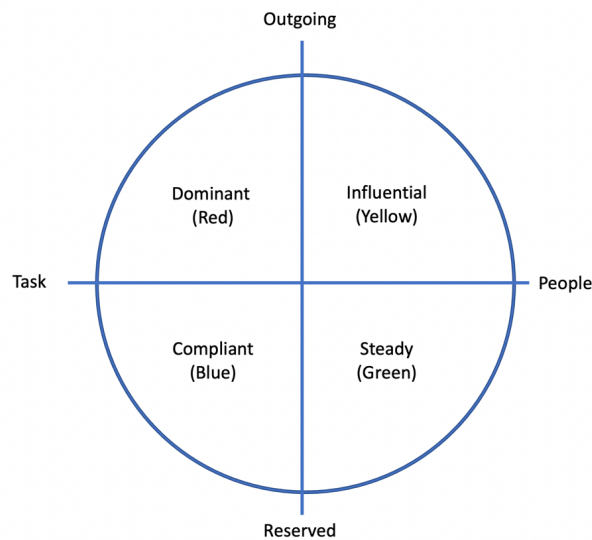
Each profile would have its own priorities. This could explain misunderstandings and tensions when different profiles communicate with each other. Based on this assumption, using the DiSC model would make it possible to identify the different profiles, understand their priorities, and thus be able to adopt adapted communication strategies. For collaborative games used in an edutainment setting, this could be useful to maximize the chances of keeping different groups of participants in the game activity until its resolution and thus hope to achieve the intended utilitarian goals. A graphical representation of the DiSC model according to ICAUDA and

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<sup>1</sup> <https://www.vof.se/how-swedes-were-fooled-by-one-of-the-biggest-scientific-bluffs-of-our-time/> (accessed on May 6, 2022)

published by Wikipedia<sup>2</sup> suggests a division into two axes to identify the four profiles<sup>3</sup>. The vertical axis defines the "Extroverted" and "Introverted" poles, and the horizontal axis distinguishes the "Task" and "People" poles (see Fig. 1).

Of course, such a model has its limits in that we are plural [4] and can move from an extroverted to an introverted profile depending on the mood of the moment, the fact of being alone or in a group, the issues, contexts or frameworks. Thus, the same profile could theoretically be positioned on several colors. Moreover, other models are more popular today because they seem more robust, such as the "Big Five" model developed since the 1980s, which combines personality traits grouped under the acronym OCEAN: Openness, Conscientiousness, Extroversion, Agreeableness, and Neuroticism [5]. Nevertheless, in order to overlap with Richard Bartle's [6] player model, we will continue to use the DiSC model. This is with the idea of understanding the responses obtained as a photograph of a trend taken at a moment T.



**Fig. 1.** Profiles based on the DiSC model as represented by Profile 4 (ICAUDA Company).

In the case of Bartle, the following player profiles are identified by the MUDs<sup>4</sup>: "achievers", "explorers", "socializers", and finally "killers". The first would play to achieve the best performance or to collect all the items in the game, the second would try to explore the universe offered by the game or even its functioning, the third would seek contact with other players, and the last would aim to defeat their opponents.

Even if research such as that of Jérôme Legrix-Pagès [7] still uses Bartle's model in statistical studies, we know from various authors [8,9] that Bartle's approach is limited. However, given the similarities found between Fig. 1 and Fig. 2, we would like to continue our exploration. By superimposing them, we obtain Fig. 3, whose axes and scales concatenate those of Fig. 1 and Fig. 2. Of course, this may be debatable, especially in the context of the sciences of psychology. It should also be noted that our mapping proposal, as illustrated in Fig. 3, is essentially based on lexical logic.

<sup>2</sup> [https://en.wikipedia.org/wiki/DISC\\_assessment#/media/File:DISC\\_wheel.png](https://en.wikipedia.org/wiki/DISC_assessment#/media/File:DISC_wheel.png) (accessed on May 6, 2022)

<sup>3</sup> <https://www.profil4.com> (accessed on May 6, 2022)

<sup>4</sup> MUDs (Multi-User Dungeons), are role-playing games played online over the Internet that manage multiple players simultaneously. They are essentially played in text mode. MUDs can be considered the ancestors of MMORPGs (Massively Multiplayer Online Role-Playing Games).

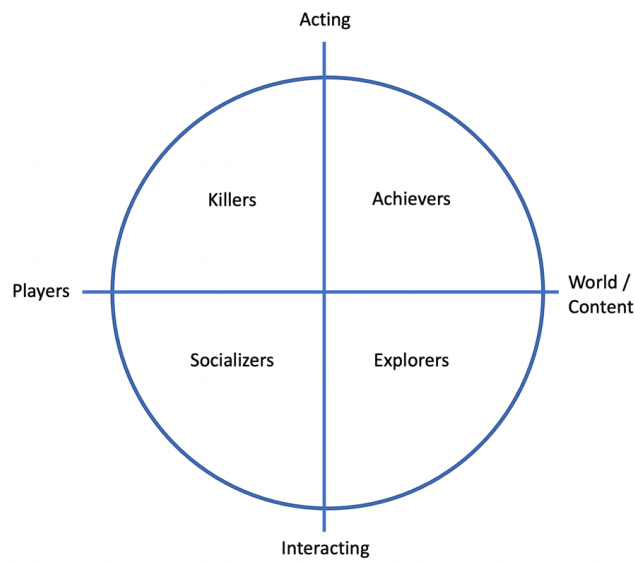


Fig. 2. Player profiles based on Richard Bartle's player profile model.

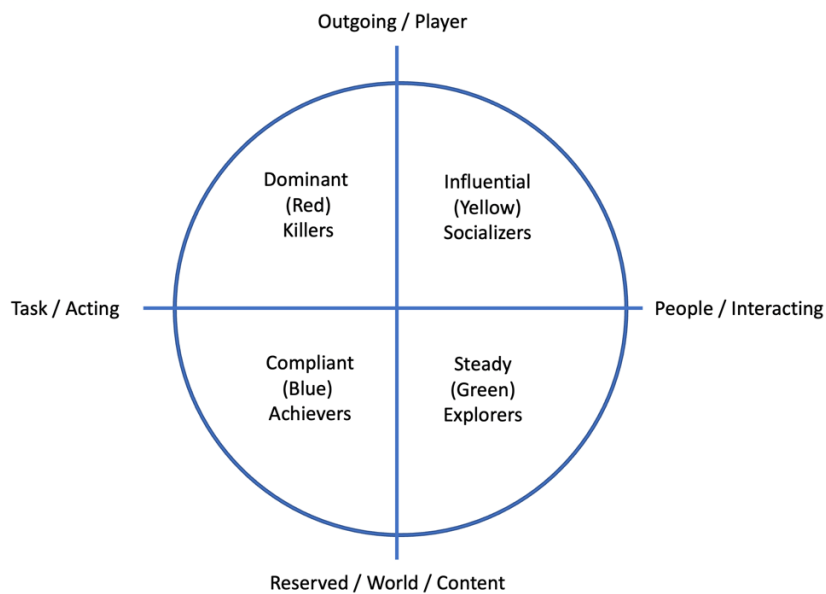


Fig. 3. Mapping DiSC models to Richard Bartle's player profiles.

These different concatenations suggest that it would be possible to deduce a person's DiSC profile from a player profile and vice versa. Furthermore, we could also take into consideration the poles of the different axes to deduce both the DiSC profile and the player profile of a person. These are hypotheses that we wish to explore as they would provide us with a simple and operational model for identifying learner-player profiles. The study is divided into three parts:

1. Methodology,
2. Statistical processing of a questionnaire based on 1126 responses,
3. Grid of results.

With these elements in hand, we will discuss our hypotheses.

## 2 Methodology

### 2.1 Questionnaire profiles, players & motivations

In order to test the hypothesis that DiSC and Bartle player profiles match, we submitted a Google Form questionnaire to Internet users to complete anonymously. It consists of 8 questions:

- Q1 - Do you feel more introverted or extroverted (on a scale of 1 to 4)?
- Q2 - Do you prioritize tasks and goals or people (on a scale of 1 to 4)?
- Q3 - Check the profile that fits you best (one choice):
  - a. Red: I like challenges, taking the lead. My motto: What's done is done!
  - b. Yellow: I enjoy communicating with others. I am often described as creative and bright!
  - c. Green: I like to listen to others and am empathetic. I need stability.
  - d. Blue: I like rigor and doing things by the book. I like to weigh my words.
- Q4 - As a player, I tend to be (one possible answer):
  - a. Achiever: I like to finish all the levels in a game, do all the available quests, have 3 stars everywhere!
  - b. Explorer: I like to see how a game works, to discover its universe, to find bugs that allow me to win differently...
  - c. Socializer: I like to interact with other players during a game. Winning is secondary.
  - d. Killer: I like to win, but usually against opponents. If I can eliminate them, that's even better!
- Q5 - (Not used)
- Q6 - I have...
  - a. Less than 10 years old
  - b. Between 11 and 17 years old
  - c. Between 18 and 24 years of age
  - d. Between 25 and 34 years of age
  - e. Between 35 and 44 years of age
  - f. Between 45 and 54 years of age
  - g. Aged 55 to 64
  - h. Over 64 years old
  - j. Don't want to say...
- Q7 - I am...
  - a. A woman
  - b. A man
  - c. Not specified or prefer not to say...
- Q8 - I play...
  - a. More than 10 hours per week
  - b. Between 5 and 10 hours per week
  - c. Between 2 and 4 hours per week
  - d. Between 0 and 1 hour per week
  - e. I do not want to say...

It is also possible for Internet users to leave a free comment at the end of the form. It should be noted that the subjects are asked to answer as quickly as possible in order to take a picture of the subject at a given moment. In fact, the more time spent on answering the questions, the more the subject could show fluctuations in his or her mood at the moment, or be disturbed or influenced by an element of context, and thus potentially switch from one state to another.

## 2.2 Q1 and Q2 Explanations

Questions Q1 and Q2 propose a scale of 4 possible answers, thus avoiding a median choice. The idea is to use the answers to questions Q1 and Q2 to create a "constructed profile" called "Qc". This concatenates the DiSC model and Bartle's player profiles as follows:

- If  $A > 2 + B < 3$  then Qc = Dominant / Red / Killer;
- If  $A > 2 + B > 2$  then Qc = Influencer / Yellow / Socializer;
- If  $A < 3 + B > 2$  then Qc = Stable / Green / Explorer;
- If  $A < 3 + B < 3$  then Qc = Conscientious / Blue / Gatherer.

Knowing that:

- If  $A > 2$ , the subject declares to be an Extrovert;
- If  $A < 3$ , the subject declares to be an Introvert;
- For  $B > 2$ , the subject declares to be oriented towards people;
- For  $B < 3$ , the subject declares to be task oriented.

## 2.3 Q3 and Q4 Explanations

Questions Q3 and Q4 correspond to self-positioning suggestions to directly select one's DiSC and player profile according to Bartle's model. To test our hypotheses, we want to see if the constructed profile Qc can match the answers to Q3 and Q4.

## 2.4 Q6 and Q8 Explanations

Questions Q6 through Q8 are designed to identify the age range of the subjects, their gender, and the estimated amount of time they play per week.

# 3 Statistical processing of the questionnaire

## 3.1 Panel and characteristics of respondents

The questionnaire<sup>5</sup> was distributed on the Internet via the social network LinkedIn between June 2021 and March 2022. It was also sent by email to the members of the Immersive Factory company and to the students of the eSport association of the Université Catholique de Lille (France). Among the 1126 responses collected, we count mainly students, teachers, trainers, researchers, administrators, project managers and health actors. They are interested in serious games related to health, prevention, education or communication. The panel consists of:

- Women: 582 (51.5%)
- Men: 524 (46.5%)
- Uncertain or unwilling to answer: 20 (2%)

The age ranges are:

- Under 18 years old: 5 (0.5%)
- Between 18 and 24 years old: 178 (16%)
- Between 25 and 34 years old: 315 (28%)
- Between 35 and 44 years old: 324 (29%)
- Between 45 and 54 years old: 230 (20%)
- Over 55 years old: 68 (6%)
- Don't want to say / mistakes 6 (0.5%)

The duration of the subjects' playing is:

- Between 0 and 1 hour per week: 340 (30%)
- Between 2 and 4 hours a week: 317 (28%)
- Between 5 and 10 hours per week: 228 (20.5%)
- More than 10 hours per week 212 (19%)
- Don't want/mistake: 29 (2.5%)

<sup>5</sup> Study data available at: <https://www.ludoscience.com/FR/diffusion/1673-Donnees-associees-au-Questionnaire-profil-joueurs-motivations-reponses.html>

### 3.2 Comparisons between constructed profile and self-positioning

The objective of this first statistical treatment is to verify a correlation between the constructed profile Qc and the self-positions Q3 and Q4. We verify this with classical statistical tools. All the following cross-tabulations are made on the data collected during our survey, based on 1126 individuals.

#### Constructed Profile and DiSC Self-Positioning

We compare the Qc profile with the self-positioning from question Q3 (see Table 1). The goal is to check if we get the following four correspondences:

- "Yellow" for a profile constructed as "Influential",
- "Red" for a profile constructed as "Dominant",
- "Green" for a profile constructed as "Steady";
- "Blue" for a profile constructed as "Compliant".

Identifying them would imply that the two approaches, constructed profiles and self-positioning, are interchangeable.

A simple calculation shows that 46% of individuals are well positioned and invites us to statistically process this intersection using descriptive statistics (row and column percentages) and probabilistic methods (Chi-square test). The size of the population of 1126 individuals allows us to consider a margin of error of 3% (with the classical risk of 5% of a survey in SHS).

**Table 1.** Cross-reference of DiSC self-positioning (Q3) and constructed profile (Qc)

	Influential	Dominant	Steady	Compliant	Total
Yellow	192	46	63	14	<b>315</b>
Red	63	58	21	52	<b>194</b>
Green	87	22	163	105	<b>377</b>
Blue	33	47	54	106	<b>240</b>
Total	<b>375</b>	<b>173</b>	<b>301</b>	<b>277</b>	<b>1126</b>

The Chi-square calculated after this crossing (see Table 2) allows us to state that questions Qc and Q3 are dependent<sup>6</sup>. To validate our hypothesis, we perform a chi-square analysis to identify the dependency [10] and validate our conjecture. To do so, we calculate the weights, expressed as percentages (see Table 2), of the pairs of modalities for which the sign of the deviation from independence is positive<sup>7</sup>.

We keep the four weights of the correspondences mentioned above:

- "Yellow" / "Influential": 23% [A1]
- "Red" / "Dominant": 8% [B1]
- "Green" / "Steady": 12% [C1]
- "Blue" / "Compliant": 12% [D1]

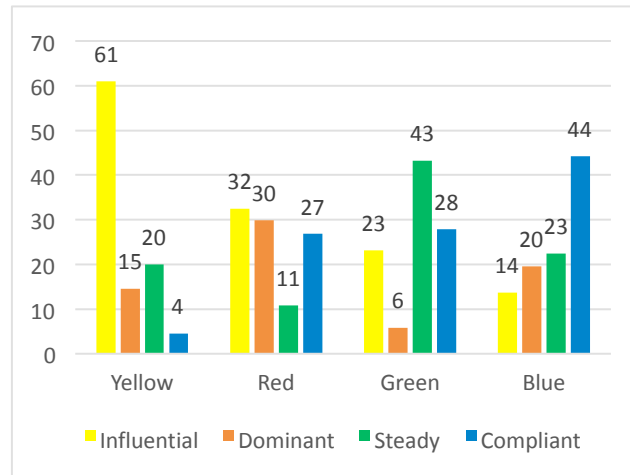
**Table 2.** Percentage contribution to Chi-square (in yellow/gray attraction) over Q3/Qc

	Influential	Dominant	Steady	Compliant	Total
Yellow	23	0	2	16	<b>41</b>
Red	0	8	6	0	<b>14</b>
Green	4	7	12	2	<b>23</b>
Blue	9	1	1	12	<b>22</b>
Total	<b>35</b>	<b>16</b>	<b>20</b>	<b>29</b>	<b>100</b>
Khi2=319					

<sup>6</sup> At 5% risk, Chi-square read in the table is 16.919 with 9 degrees of freedom

<sup>7</sup> That is, where the observed cross-sectional population is greater than the population expected if the variables were independent.

These four out of 16 possible matches represent 55% of the chi-square value. To better describe these matches statistically, we calculate the row percentages.



**Fig. 4.** Statistical Profiles of DiSC Self-Positioning (Q3) according to the constructed modalities (Qc).

From Fig. 4., we can see that the "Influential" profile significantly characterizes the "Yellow" self-positioning (61%). The same is true for the "Steady" profile and the "Green" self-positioning (43%), as well as for the "Compliant" profile and the "Blue" self-positioning (44%).

On the other hand, the "Influential," "Dominant," and "Compliant" profiles characterize the "Red" self-positioning almost equally (about 30%). However, a calculation of the column percentages allows us to complete the "Dominant" constructed profile. It breaks down as follows: 34% "Red", 27% "Yellow", 27% "Blue" and 13% "Green". In this case, the Red modality is clearly superior.

This first treatment shows that the self-positioning of individuals who define themselves as "Influential," "Compliant," "Steady," or "Dominant" at a given moment corresponds quite well with the profiles of the DiSC model.

#### Constructed profile and self-positioning of Bartle's players

We now cross-tabulate Qc with the responses from question Q4, for which subjects are asked to self-position using the "Socializer," "Killer," "Explorer," and "Achiever" items from Bartle's player model.

The purpose of such a cross-tabulation (see Table 2) is to check whether the responses obtained by self-positioning are consistent with those of the constructed profiles.

To validate this hypothesis, it is necessary to examine the following four correspondences:

- "Socializer" for an "Influential" profile,
- "Killer" for a "Dominant" profile,
- "Explorer" for a "Steady" profile,
- "Achiever" for a "Compliant" profile.

Identifying such correspondences would mean that Bartle's model of player profiles would be confirmed by our survey in that the positioning on the two axes "Extrovert / Introvert" and "Tasks / People" would correspond well to the fact of self-positioning with regard to the categories "Socializer," "Killer," "Explorer" and "Achiever".

A simple calculation shows that 34% of people are well positioned. Let's statistically process this intersection as before (see Table 3).

**Table 3.** Cross-reference of the self-positioning Bartle's player profile (Q4) and the constructed profile (Qc)

	Influential	Dominant	Steady	Compliant	Total
Socializer	126	20	79	21	<b>246</b>
Killer	36	27	25	27	<b>115</b>
Explorer	138	60	124	121	<b>443</b>
Achiever	75	66	73	108	<b>322</b>
<b>Total</b>	<b>375</b>	<b>173</b>	<b>301</b>	<b>277</b>	<b>1126</b>

The Chi-square calculated as a result of this crossover (see table 4) allows us to state that Qc and Q4 are therefore dependent (See note 6). In order to validate our hypothesis, we perform a Chi-square analysis to identify the dependency and to validate our conjecture.

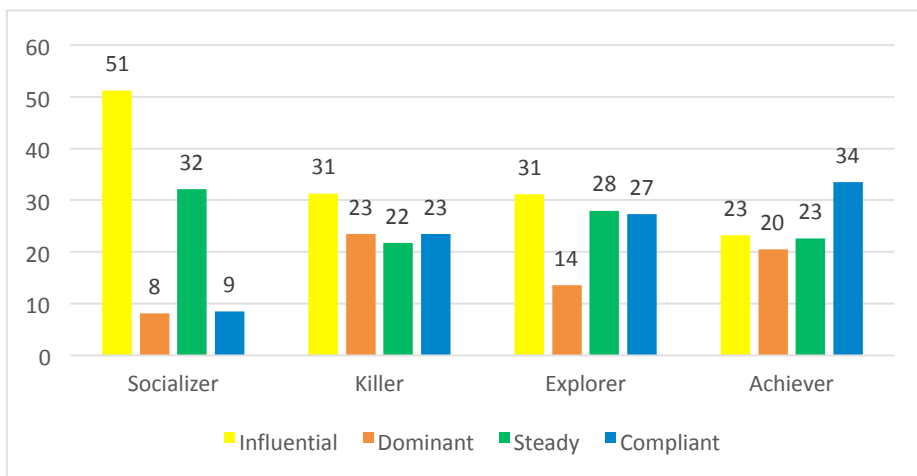
We calculate the weights of the modality pairs and keep the four weights of the following correspondences:

- "Socializer" / "Influential": 24% [A2]
- "Killer" / "Dominant": 5% [B2]
- "Explorer" / "Steady": 0% [C2]
- "Achiever" / "Compliant": 10% [D2]

**Table 4.** Percentage contribution to Chi-square (in yellow/gray attraction) over Q4/Qc

	Influential	Dominant	Steady	Compliant	Total
Socializer	23	9	3	26	<b>62</b>
Killer	0	5	1	0	<b>6</b>
Explorer	1	1	0	1	<b>3</b>
Achiever	10	6	2	11	<b>28</b>
<b>Total</b>	<b>35</b>	<b>20</b>	<b>6</b>	<b>39</b>	<b>100</b>
Khi2=98					

These four out of 16 possible matches represent 39% of the chi-square value. To better describe these matches statistically, we calculate the row percentages. The histogram in Fig. 5 describes the statistical profiles.



**Fig. 5.** Statistical profiles of Bartle's self-positioning profiles (Q4) according to the constructed modalities Qc.



We can see that the constructed profile "Influencer" significantly characterizes the "Socializer" self-positioning (51%). The same is true for the "Killer" (31%) and to a lesser extent for the "Explorer" (31%). On the other hand, the constructed profile "Conscientious" significantly characterizes the "Achiever" self-positioning (34%).

Our survey is less significant in validating Bartle's model of player profiles. Thus, when we cross the constructed profiles Qc with the selves-positioning Q3 and Q4, we have a higher probability of correctly identifying the different DiSC profiles than the different Bartle player profiles.

**DiSC Self-Positioning and Bartle's Player Profiles**

The purpose of crossing the Q3 selves-positioning with Q4 is to test the hypothesis that we could match the 4 categories of the DiSC model (cf. Fig. 1) with those of Bartle (cf. Fig. 2) as illustrated in Fig. 3. To validate this hypothesis, it is necessary to study the following four correspondences:

- "Socializer" for a "Yellow" profile,
- "Killer" for a "Red" profile,
- "Explorer" for a "Green" profile,
- "Achiever" for a "Blue" profile.

A simple calculation shows that 34% of the individuals are well positioned. The Chi-square calculated after this intersection (see Table 5) allows us to conclude, as before, that questions Q3 and Q4 are significantly dependent (See note 6).

**Table 5.** Cross-referencing DiSC Self-Positioning (Q3) and Bartle's Player Profiles (Q4)

	Yellow	Red	Green	Blue	Total
Socializer	95	22	96	33	<b>246</b>
Killer	25	45	26	19	<b>115</b>
Explorer	122	72	153	96	<b>443</b>
Achiever	73	55	102	92	<b>322</b>
<b>Total</b>	<b>315</b>	<b>194</b>	<b>377</b>	<b>240</b>	<b>1126</b>

To better identify these correspondences, we perform the chi-square analysis, expressed in percentages, to fine-tune the dependence and validate our conjecture (see Table 6).

**Table 6.** Percentage contribution to the Chi-square (in yellow/gray attraction) of the Q3/Q4 cross

	Yellow	Red	Green	Blue	Total
Socializer	12	12	3	9	<b>36</b>
Killer	2	40	5	2	<b>49</b>
Explorer	0	0	0	0	<b>1</b>
Achiever	4	0	0	10	<b>14</b>
<b>Total</b>	<b>18</b>	<b>52</b>	<b>8</b>	<b>21</b>	<b>100</b>
Khi2=80					

We keep the four weights of the games:

- "Socializer" / "Yellow": 12% [A3]
- "Killer" / "Red": 40% [B3]
- "Explorer" / "Green": 0% [C3]
- "Gatherer" / "Blue": 10% [D3]

These four correspondences account for 62% of the Chi2 value. This correlation is very significant if we compare it with the two previous crossings, which each reached 55% (Qc with Q3) and 39% (Qc with Q4).

The results obtained consolidate the relationships between the modalities of the two self-positioning: ("Yellow", "Red", "Green", "Blue") and ("Socializer", "Killer", "Explorer", "Achiever"). However, we did not find a significant relationship between "Explorer" and "Green". Thus, our hypothesis seems to be confirmed for ¾ of the expected matches. Although transitivity did not hold for the correlation, this result was still expected between the modality pairs:

- "Yellow" / "socializer" (see relations [A1] and [A2] => [A3]),
- "Red" / "Killer" (see relations [B1] and [B2] => [B3]),
- "Green" / "Explorer" (see relations [C1] and [C2] => [C3]),
- "Blue" / "Gatherer" (see relations [D1] and [D2] => [D3]).

### 3.3 Influence of playtime duration on profiles

At this point, the "Green" and "Explorer" profiles do not match. In parallel, Qc and Q4 show the lowest agreement with 39%. An explanatory hypothesis would be to consider the amount of time the subjects play per week (Q8). Perhaps playing a lot would allow for better self-positioning?

To test this, we recode question Q8. We divide our subjects into two classes:

- The first class, called "pJ" for "small players", groups together the subjects who report playing between 0 and 4 hours per week. It represents 657 individuals or 58% of the panel.
- The 2nd class, called "gJ" for "big players", includes the subjects who declare to play more than 4 hours per week. It represents 440 individuals or 39.5% of our panel.

We note that there are 1097 individuals instead of 1126. The loss is due to the deletion of subjects with an anomaly in the answer given for the duration of weekly play.

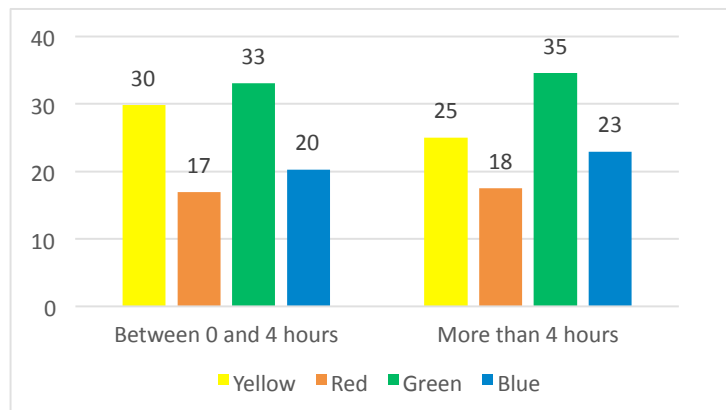
#### Study the correlation between game duration and self-positioning Q3

We compare the Q3 self-positions with the duration of the game in terms of the "pJ" and "gJ" classes (see Table 7).

**Table 7.** Cross-tabulation of Q3 self-positioning and weekly playing time ("pJ" and "gJ" classes)

Weekly playtime	Yellow	Red	Green	Blue	Total
pJ Class	196	111	217	133	<b>657</b>
gJ Class	110	77	152	101	<b>440</b>
<b>Total</b>	<b>306</b>	<b>188</b>	<b>369</b>	<b>234</b>	<b>1097</b>

Fig. 6. (row percentages) show similar rates for the two classes. We can therefore deduce that there are no significant differences.



**Fig. 6.** Statistical profiles of the "pJ" and "gJ" classes according to the of self-positioning (Q3).

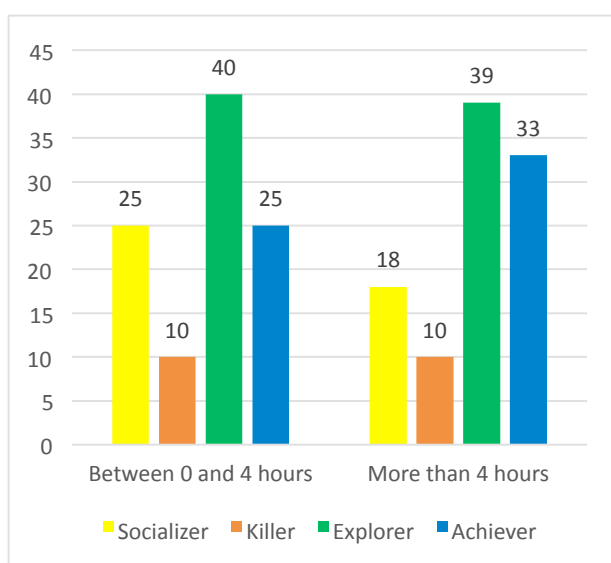
**Study of the correlation between playing time and self-positioning Q4**

Now let us see what happens to the cross between Qc and Q4 as a function of "pJ" and "gJ" (see Table 8).

**Table 8.** Cross-tabulation of Q4 self-positioning and weekly playing time ("pJ" and "gJ" classes)

Weekly playtime	Socializer	Killer	Explorer	Achiever	Total
pJ Class	161	66	263	167	<b>657</b>
gJ Class	77	46	170	147	<b>440</b>
<b>Total</b>	<b>238</b>	<b>112</b>	<b>433</b>	<b>314</b>	<b>1097</b>

The histograms in Fig. 7 (row percentages) show differences, but only for two categories of player profiles: "Socializer" and "Achiever", which seem to be related.



**Fig. 7.** Statistical profiles of self-positioning (Q4) according to the "pJ" and "gJ" classes

The Chi-square calculated (see Table 9) allows us to state that the questions Q4 and the length of weekly play are significantly related<sup>8</sup>.

We conclude that for subjects who play less than 4 hours per week, we are more likely to identify the "socializer" profile. Conversely, for those who play more than 4 hours per week, we are more likely to identify the "Achiever" profile (see Table 9). Note that these two profiles are diametrically opposed in Bartle's model, if we refer to Fig. 2. We can therefore speak of "antagonistic profiles".

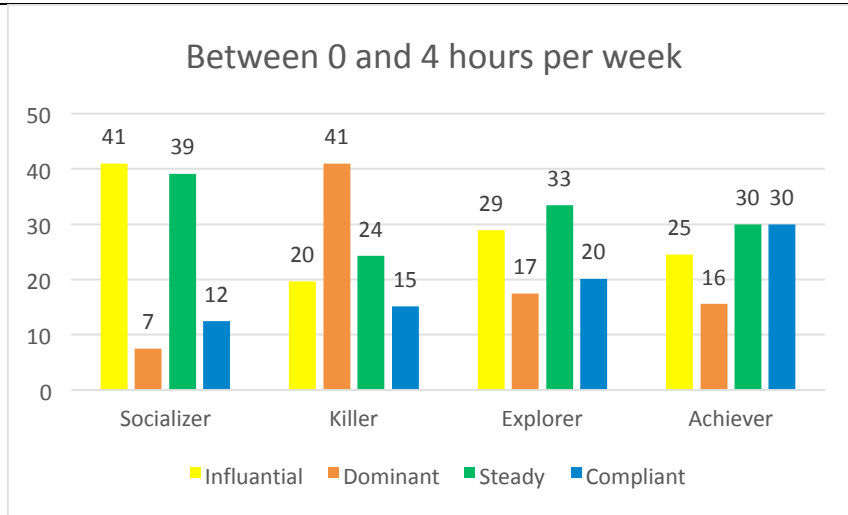
On the other hand, for the "Killer" and "Explorer" profiles, which are also antagonistic, we find no variation between the "pJ" and "gJ" classes (see Table 9). However, we do not have a fine representation of the distribution of the profiles here. It seems interesting for us to study it in order to identify possible variations. Charts from Fig. 7 and Fig. 8 illustrate this distribution on the "pJ" (657) and "gJ" (450) strata for each of the "Socializer", "Killer", "Explorer" and "Achiever" profiles.

<sup>8</sup> At 5% risk, Chi-square read in the table is 7.815 with 3 degrees of freedom

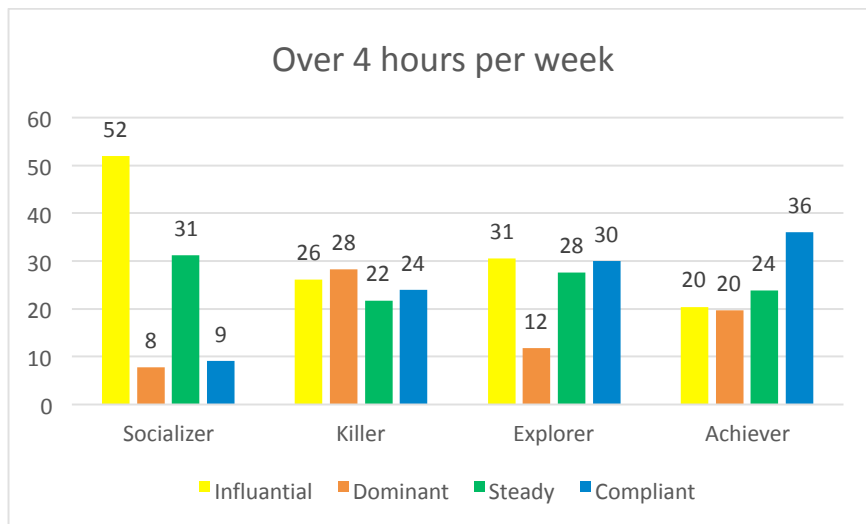
**Table 9.** Percentage contribution to the Chi-square (in yellow/gray attraction) of the Q4/game duration intersection)

	Socializer	Killer	Explorer	Achiever	Total
pJ Class	20	0	0	20	40
gJ Class	30	0	1	29	60
<b>Total</b>	<b>50</b>	<b>0</b>	<b>1</b>	<b>49</b>	<b>100</b>

Khi2=12



**Fig. 8.** Statistical profiles of self-positioning (Q4) as a function of the constructed modalities (Qc) ("gJ" class)



**Fig. 9.** Statistical profiles of self-positioning (Q4) according to the constructed modalities (Qc) ("gJ" class)

Fig. 8 and Fig. 9 show us that regular or irregular playing influences the self-positioning of subjects. Indeed, in Fig. 8, if we take into account the highest rate for each profile constructed (Qc) only, we identify the following set of modality pairs:

- "Influential" and "Socializer" (41%)
- "Dominant" and "Killer" (41%)
- "Compliant" and "Achiever" (30%)

However, the "Steady" and "Explorer" pairing is not verified. More surprisingly, the "Dominant" and "Killer" pairing is diluted with the "Dominant" profile dropping from 41% to 28%. Only the two couples "Influential" and "Socializer" (52%) and "Compliant" and "Achiever" (36%) are preserved and also reinforced.

### 3.4. Consider the age and gender of subjects

Since our hypothesis based on playing time does not allow the desired pairing of "Stable" and "Explorers" to emerge, let us see if the age or gender of the subjects can have a possible impact on the profile of the players.

#### Consider the age

The Chi-square calculated (see Table 10) is significant<sup>9</sup>, so we do a Chi-square analysis.

**Table 10.** Percentage Contribution to Chi-square (yellow/gray attraction) of Q4/Age Crossover

	Socializer	Killer	Explorer	Achiever	Total
Between 18 and 24 years old	8	44	0	2	54
Between 25 and 34 years old	2	0	1	8	11
Between 35 and 44 years old	0	2	4	2	7
Between 45 and 54 years old	8	4	2	0	14
Over 54 years old	7	5	0	2	13
<b>Total</b>	<b>25</b>	<b>56</b>	<b>6</b>	<b>13</b>	<b>100</b>
Khi2=64					

From this, we can derive the following matches, which account for 71% of the total in our panel:

- Between 18 and 24 years old 44% for the "Killer" profile
- Between 25 and 34 years old 8% for the "Achiever" profile
- Between 35 and 44 years old 4% for the "Explorer" profile
- Over 44 years old 15% for the "Socializer" profile

#### Consider the gender

The Chi-square calculated (see Table 11) is significant (see note 8), so we do a chi-square analysis: Gender differences are significant in all 4 player profiles. The gray/yellow boxes are those for which the contribution to the Chi2 is significant. These data confirm that in our panel:

- Women are more "Socializers" and "Achievers": weight 47%
- Men are more "Killers" and "Explorers": weight 53%

From Tables 10 and 11 we can conclude that the age and gender of the subjects play a significant role in the self-positioning of the subjects with respect to Bartle's player profile (Q4). We will now try to interpret what all this might mean.

<sup>9</sup> At 5% risk, Chi-square read in the table is 20.026 with 12 degrees of freedom.

**Table 11.** Percentage Contribution to Chi-square (yellow/gray attraction) of cross Q4 with gender

	Socializer	Killer	Explorer	Achiever	Total
Woman	24	13	9	2	47
Man	26	15	10	2	53
<b>Total</b>	<b>50</b>	<b>28</b>	<b>18</b>	<b>4</b>	<b>100</b>
Khi2=12					

#### 4 Results Grids

Table 12 summarizes the self-positioning of player profiles from Bartle's typology that we are most likely to encounter when we compare the constructed DiSC profiles (Qc/Q3) with weekly playing time ("pJ" and "gJ" classes).

**Table 12.** Player Profiles by DiSC and Weekly Playing Time ("?? " means "unspecified")

DiSC / Weekly playtime	Less than 4 hours (pJ)	Over 4 hours (gJ)
<b>Influential (Yellow)</b>	Socializer	Socializer
<b>Dominant (Red)</b>	Killer	??
<b>Compliant (Blue)</b>	Achiever	Achiever
<b>Steady (Vert)</b>	??	??

We found that age (Q6) and gender (Q7) can have an impact on the self-positioning of player profiles (Q4). While gender is in principle an invariant, this is not the case for age. So, one might think that player profiles should change with age. More specifically, given what we found for age and gender, we can extrapolate within our panel that with age:

- A majority of women will tend to move from an "Achiever" profile to a "socializer" profile.
- A majority of men will tend to move from a "Killer" profile to an "Explorer" profile.

It is interesting to note that these are both antagonistic player profiles, as shown in Fig. 2. Based on our analysis and extrapolation, we hypothesize that as players age, they will move from one profile to its exact opposite, as shown in Fig. 11. Female and male players would move from the "Act" axis to the "Interact" axis. However, a majority of the female gender will move from the World/Content axis to the Player axis, while a majority of the male gender will move in the opposite direction. We can also note that this evolution would start earlier for men (35 years and older) and a little later for women (45 years and older). This hypothesis also leads us to believe that women and men are mirror images in terms of their player profile (see orange and blue arrows in Fig. 11).