

## Research Article

# A Gameplay Definition through Videogame Classification

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Received 30 September 2007; Accepted 15 February 2008

Recommended by Kok Wai Wong

This paper is part of an experimental approach aimed to raise a videogames classification. Being inspired by the methodology that Propp used for the classification of Russian fairy tales, we have identified recurrent diagrams within rules of videogames, that we called “Gameplay Bricks”. The combinations of these different bricks should allow us to represent a classification of all videogames in accordance with their rules. In this article, we will study the nature of these bricks, especially the link they seem to have with two types of game rules: the rules that allow the player to “manipulate” the elements of the game, and the rules defining the “goal” of the game. This study will lead to an hypothesis about the nature of gameplay.

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## 1. INTRODUCTION

This paper is part of a global experimental approach aimed at studying the nature of videogames, in order to try to define what “gameplay” is. The first step of our methodology is to elaborate a classification suited to videogames.

In a simple way, we could consider videogames as an interactive application, entering into interaction with a player.

According to Crawford [1], interactions between a player and a videogame can be perceived as a dialogue: “A cyclic process in which two active agents alternately (and metaphorically) listen, think, and speak.”

Through this paper, we aim to focus on the “computer” side of the cycle, in order to analyze the constitutive elements of videogames as pieces of software.

The first target of this approach is to identify formal data, ignoring for now the knowledge and psychological aspects of the player.

The next idea is to study this data in order to deduce a classification of videogames. It should also contribute to the definition of a common language suited to videogame analysis.

We have been inspired by the work of Propp [2] in his study of the Russian fairy tales during the beginning of the twentieth century.

Facing similar problems, such as the impossibility for the researchers of his time to conduct an objective study of

the inherent Russian fairy tales mechanisms, Propp used a formal deconstruction.

Starting from a hundred of fairy tales, that he has been analyzed in this way, he has been able to identify recurrent narrative structures which lead him to build a classification of Russian fairy tales.

We have also been influenced by the joint work of Salen and Zimmerman [3], who led us to focus our study on videogames rules: “Looking at games as rules means looking at games as formal systems, both in the sense that the rules are inner structures that constitute the games and also in the sense that the rules schemas are analytic tools that mathematically dissects games.”

By isolating the “computer” part of the videogame interaction cycle, we obtain a simple structural diagram (Figure 2) composed of three parts: the “Input,” peripheral devices allowing the user to enter choices. These choices are then evaluated by the rules of the “Compute” part, in order to produce a “result.” This result is finally communicated to the player through the “Output” device.

In order to stick to our paradigm, we will focus on the “rules,” featured in the “Compute” part, made of software.

According to this approach, we have studied the rules of 588 various videogames. All this data has been indexed in a database called V.E.Ga.S. (*video & electronic games studies*).

Our previous researches [4, 5] have shown strong recurrences, on the whole, of videogames rules. These recurrences are exposed in the first part of this article.

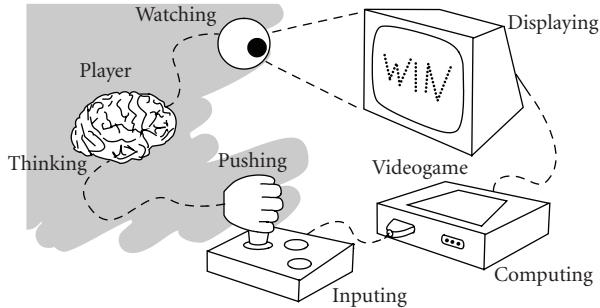


FIGURE 1: Player and videogame interaction cycle.

In the second part, we will analyze these recurrences and try to identify the eventual structures that could be related to the gameplay of these videogames.

## 2. A VIDEOGAME CLASSIFICATION

### 2.1. Game bricks

In accordance to Propp's methodology, we have developed a tool suited to the indexation and analysis of a large videogames corpus. This quantitative approach should raise eventual recurrent aspects likely to become criteria for a classification.

We based our corpus on as large a period of time as possible, in order to limit the impact of technical evolution on the results we may observe. However, we had to define several limitations to the videogames likely to join our corpus:

- (i) single player games only;
- (ii) computer games only;
- (iii) games based on both audio and graphical output.

The 588 games in our corpus were chosen after an online alphabetical list of videogames titles; however, the great majority of them are "arcade games" or "casual games."

Thanks to our tool, we have proposed a first step for the development of a classification criterion: we have emphasized the "Game Bricks" (Figure 3), the "fundamental elements" whose different combinations seem to match the different rules and goals of videogames.

After analysis [7], we noticed that every "Game brick" corresponds to a "recurrent template" in the rules of videogames.

For example, two games such as "Pac-man" and "space invaders" features the following rules:

- (i) "If Pac-man collides with Ghost, then destroy Pacman."
- (ii) "If Spaceship collides with Enemy's shot, then destroy Spaceship."

We notice a very strong similarity between these rules and we can consider, therefore, that they are built on the following template: "If player element collides with a hostile element, then there is a negative feedback towards the player element."

This template is then the definition of a "Game brick," namely, the AVOID brick. So far, we have identified ten "Game bricks," all built upon this same principle.

For example, the Game bricks featured in "Pac-man" are "MOVE," meaning the player can move an avatar; "AVOID" for the ghosts you have to avoid; "DESTROY" for the dots

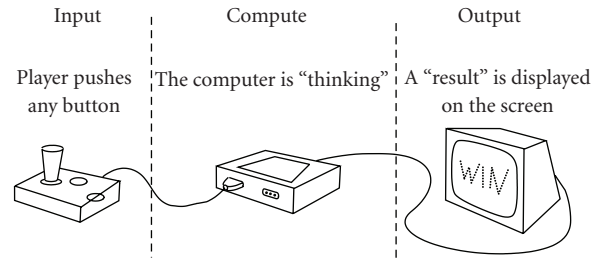


FIGURE 2: Structural parts of a videogame.

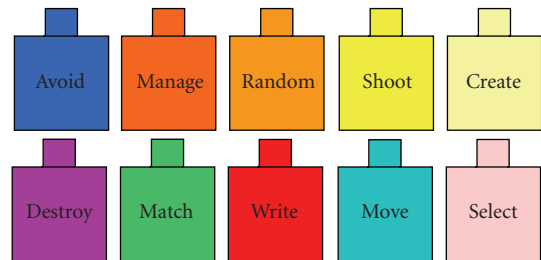


FIGURE 3: Game bricks discovered as of now. (A side note about the different bricks we have identified: since the paper presenting the first version of "V.E.Ga.S.," some bricks have been modified. You will notice that the bricks TIME and SCORE were removed. The COLLECT brick was merged with DESTROY. The POSITION brick was extended in the form of MATCH. Last but not least, the ANSWER brick was split in two bricks: SELECT and WRITE. More detail on the bricks modifications is presented in [7].)

you have to eat; and "MATCH" because you have to match each dot's spatial position to destroy it.

But you can also find these bricks in a racing game like "Need for Speed": MOVE a car, AVOID opponents, and MATCH on checkpoints you have to DESTROY. When reached a checkpoint becomes "out of the game" and is not reachable anymore, so it can be considered "destroyed," just like any dot eaten by Pac-man.

Nevertheless, even within their rules, these two games are different: the movement and thus the "MOVE" brick features two dimensions in "Pac-man," but three in "Need for Speed Carbon"; the number of checkpoints to reach in Need for Speed is much smaller than the number of dots that Pacman has to swallow; the movement of the elements to avoid is different in each game.

Differences between these two example games are the issue of different implementations of "rule templates" from the bricks they are sharing, but are also due to the use of rules which are not covered by the bricks: in order to obtain an efficient classification we could not make a brick for every existing rule template.

We then had to limit the number of Game bricks, trying to identify the most recurrent rules templates, after a close study of the games in our corpus.

However, the Game bricks are aimed to allow the representation of the diversity of challenges one can find among videogames.

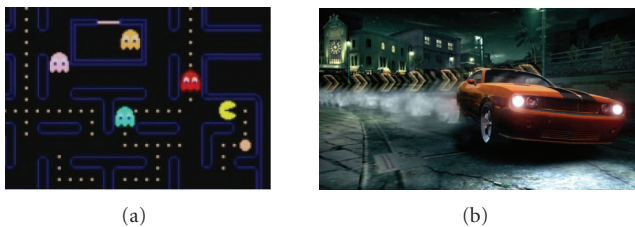


FIGURE 4: Pac-man (1980) and need for speed carbon (2006).

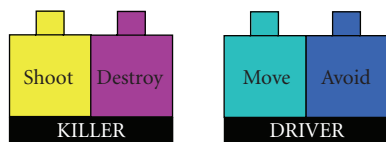


FIGURE 5: Two identified metabricks.

Besides the recurrent factor, we also took in account the nature of the rule: we have concentrated our efforts on representing the rules related to the actions of the player with the “Game Bricks,” meaning we focused on rules related to the game goal and to the means of reaching it.

Being inspired by the works of Koster [8] and Bura [9] who both try to elaborate a grammar of videogames in the shape of diagrams, we have formalized diagrams as definitions for our bricks (*these diagrams are presented in Section 4.1*).

The structure of these templates is based on the “structure of a rule”: one or several “*triggering conditions*” (If) associated with one or several *effects* (Then).

The “If...Then” structure of a rule obviously reminds one of the algorithmic scheme used in computer science, as studied in a previous article [7].

### 2.2. Metabricks

Nevertheless, the number of “total combinations” obtainable with these different bricks is still rather large, but we have noticed that *some couples of bricks were found very often* in a great number of games.

We named those couples of bricks “*Metabricks*” and after the study of games that have one or two of these metabricks, we have given them names that are rather meaningful: MOVE and AVOID became the “*DRIVER*” metabrick, and the association of SHOOT and DESTROY became “*KILLER*.”

These “metabricks” seem to us empirically related to the challenges proposed by these games.

Families that have identical metabricks, but also some different bricks seem to present a variation on the same challenge. For example, the families of “Pac-man” and “Frogger” have a difference concerning the DESTROY brick: Pac-man has to swallow dots and thus to destroy them, while the frog has only a busy road to cross.

To summarize, we have identified “Game Bricks” that represent “recurrent rule templates” within videogames. Based on these bricks, we have elaborated a classification that gathers videogames into “families” having identical combinations of “Game bricks.”

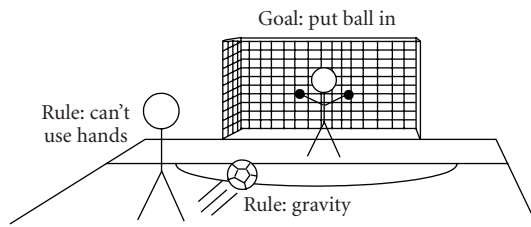


FIGURE 6: Elements, rules, and goal for soccer.

These families can then be classified through the use of some pairs of bricks, named “MetaBricks.”

## 3. TOPOLOGY OF A GAME

In order to fully analyze the results of our quantitative study, we also have studied the morphology of a videogame in a qualitative way.

We started from the definition of a game according to Salen and Zimmerman [3]: “*An activity with some rules engaged in for an outcome.*”

The authors of “The Rules of Play” consider a game as an activity defined by two elements: the *rules* and the *result*, the latter one coming from a previous goal.

### 3.1. “Some rules”

If we consider that a videogame takes place in a virtual universe, we can also consider that this universe is composed of several “elements,” in the broadest sense.

For example, in soccer, a game that is playable both as a videogame and as a sport, the universe would be composed of elements featured in a match: *players, pitch, goals, and ball.*

All these elements are driven by the “rules” of the game, in a similar way that elements from our own universe are driven by physical or behavioral laws.

From a soccer point of view, these rules are the physical rules handling the movement of several elements, like the gravity applied on the ball and the players, but also the game rules specifying that only the goalkeeper is allowed to touch the ball with his hands.

These rules seem to determine a “field of possible actions” that may happen when a soccer match is played. This is what Salen and Zimmerman call the “space of possibility” [3].

### 3.2. “An outcome”

According to the definition presented previously, a game proposes an outcome. Talking about an outcome implies a judgement of the player performance. But in order to judge, one needs a reference. In a game, the reference is tied to the goal the players have to reach.

For soccer, the goal of the game, identical for each team, is to bring the ball into the goals of the opposing team. The “goals” and “goalkeeper” words are by the way very explicit.

As shown in a previous article [7], we could also consider the goal of the game as a rule, indeed a special one: this rule has to state the end of the game, in others words its outcome, when some conditions are fulfilled.

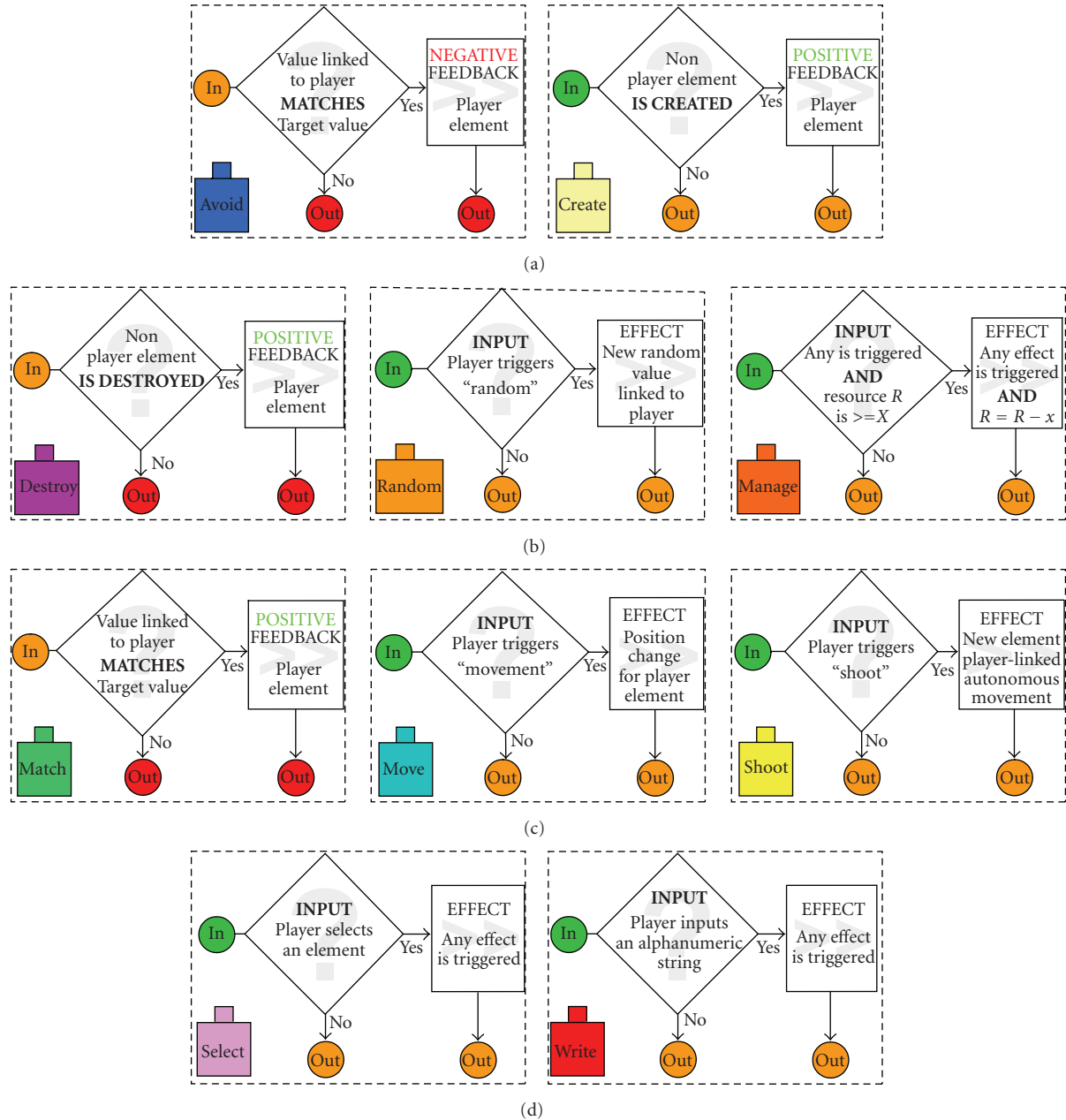


FIGURE 7

Back to the soccer example, the game is “reset” when the ball enters into one of the goals, and the score of the team featuring the player who shot the ball is increased by one point.

Even though a match ends after 90 minutes, the outcome does not depend only on time: the team with the highest score after 90 minutes of play wins the game.

Hence the judgement allowing the outcome of the game is here tied to the goal of the game, which is to throw the ball into the opposing goal.

**3.3. Different kinds of rules**

If the target of the game is also a part of the game rules, does it mean that different “kinds” of rules exists?

The work of Gonzalo Frasca seems to indicate so, in particular his typology of the different kinds of game rules [10].

- (i) “Manipulation rules,” defining what the player can do in the game.
- (ii) “Goal Rules,” defining the goal of the game.
- (iii) “Metarules,” defining how a game can be tuned or modified.

For now, we will put aside “Metarules,” which mean that on the whole of videogame rules, we will find some rules related to the definition of a goal, and other rules defining means to reach it.

As different kinds of rules exist, and as “Game bricks” are based upon “rule templates,” we can ask the following question:

*On what kind of rules are the bricks based on?*

#### 4. BRICKS AND GAMEPLAY

##### 4.1. Game + Play = Gameplay?

In order to find which kind of rules the bricks are based on, let us analyze the definition diagrams of each brick.

We notice that the bricks CREATE, DESTROY, RANDOM, MANAGE, MOVE, SHOOT, SELECT, and WRITE all feature a *reference to the videogame’s Input within its triggers*.

Please note that these bricks assume that the received inputs are “valid.” Hence these “player’s inputs” are previously checked by additional mechanisms that are out of the scope of this article.

On the other hand, the AVOID, BLOCK, DESTROY, and MATCH bricks all feature a *feedback within its effects* [6]. (An important note about the use of the word “feedback” in this article: we are aware that within computer science, the terms “negative feedback” and “positive feedback” refer to systems with the ability to automatically correct their actual state. However in the field of game design, “positive feedback” and “negative feedback” refer to the different kinds of “rewards” a game can address to the player. We chose to use the latter definition of these terms in this paper.) This feedback is displayed by the videogame’s Output.

We could then divide bricks into two categories, according to whether they feature one or another of these characteristics.

The first category of bricks seems to be based on a principle that one could formulate in the following way: “to listen to Input and to consequently carry out modifications on game elements.”

The second category would rather correspond to: “to observe the game elements and to return an evaluation of the quality of modifications made by the first rule category.”

We retrieve here principles close to two types of rules evoked by Frasca: the first category approaches the definition of “Manipulation rules,” while the second one seems to be related to “Goal Rules.”

But, from our point of view, the difference between these two categories of bricks is also tied to the difference between the two words “Play” and “Game.”

Indeed, as the bricks of the first category are related to Input, they can be connected to the word “Play”; whereas the bricks of the second category, which are related to the goal and so to the Output, would approach a concept related to the word “Game.”

Following these observations, we can try to sort the bricks.

The difference between the two bricks categories appears all the more clear by the fact that *they are not in direct relation between each other*.

Indeed, the two categories of bricks “interact” through the “game elements”: the “Play” bricks modify them, and the “Game” bricks observe the modifications made by the first ones.

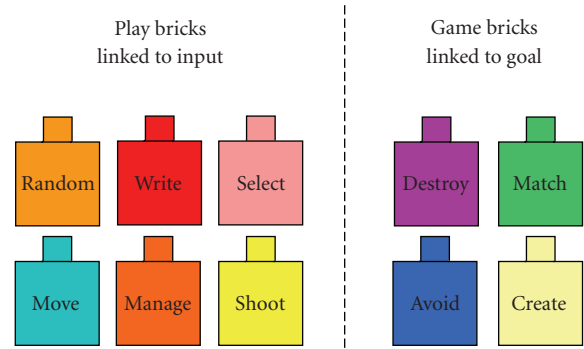


FIGURE 8: “Play” or “Game” related bricks.

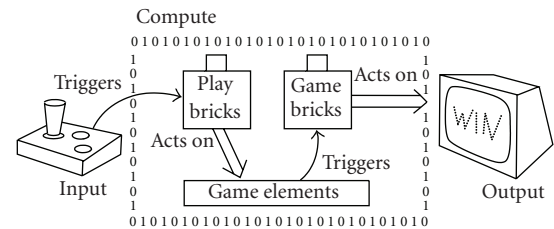


FIGURE 9: Bricks interaction with input and output.

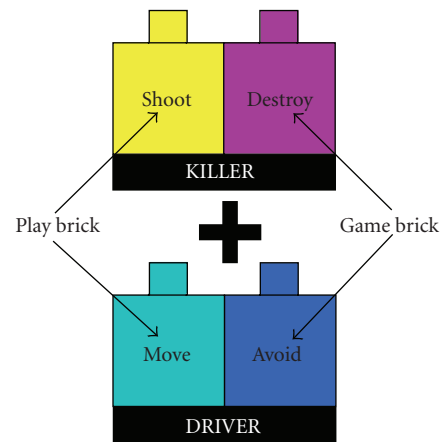


FIGURE 10: Play brick + Game Brick = Metabrick.

We could finally extend the “videogame structural diagram” (Figure 2) by detailing the “Compute” part, where the rules are located.

Unfortunately, the expression “Game brick” does not seem adequate anymore to refer to our full set of bricks, but only to the subset of bricks from the second category. We must then choose another term, which seems obvious here: we will now refer to the set of 10 identified bricks as “GamePlay bricks.”

More than a simple name change, this word leads to an important question still looking for a precise answer.

*“What is Gameplay?”*

Gameplay is empirically seen as a central element within a videogame, and seems closely related to the game quality in the mind of many players.

If the question of its nature appears of capital importance, it is unfortunately a concept which remains to be precisely defined.

Looking for a definition of gameplay, let us synthesize the points studied until now.

We identified a set of recurrences within the rules of videogames, that we named “Gameplay bricks.” After analysis, we observe two types of bricks, related to two “kinds of videogame rules.”

- (i) Rules *listening to Input* and acting on the game elements consequently, named “*Play bricks*.”
- (ii) Rules observing the state of the game elements and returning to the player an *evaluation of his performance*, named “*Game bricks*.”

*May the association of “Play bricks” with “Game bricks” be the spirit of gameplay?*

A draft answer to this question may come from the two Metabricks presented in Section 2.2, namely, DRIVER and KILLER.

If we analyze them, we notice that *they are composed of a “Play brick” associated to a “Game brick.”*

We would say that if the “Game Brick” refers to a *goal to reach*, the “Play Brick” seems to *represent a means* (or a constraint) in order to reach this goal.

For example, DRIVER asks the player to *avoid colliding* with some elements, and allows the player to *move its avatar* in order to do so. In the same way, KILLER asks to *destroy elements*, through the use of projectiles that the player can *shoot or throw*.

As these “Metabricks” represent pairs of “GamePlay bricks,” that is, rules templates, which are identified in a large group of games, *our hypothesis about the nature of gameplay seems very promising.*

## 5. CONCLUSION

Being inspired by the methodology that Propp used for his fairy tales classification, we have started a *quantitative analysis of videogames.*

Propp’s methodology leads us to *build a classification based on “recurrent templates of games rules,”* as we identified a set of recurrent rules templates formalized into ten “GamePlay bricks.”

According to the work of Frasca, these bricks can be of two kinds.

- (i) “*Game*”: if the rule template is *directly related to the goal* of the game, mainly as a feedback within the rule effects.  
In this case, the rule is characterized by a trigger based on the state of the game elements, and an effect linked to the *videogame’s Output*.
- (ii) “*Play*”: if the rule template is *independent from the goal*. The rule is then characterized by a trigger based on the *videogame’s Input*, and an effect targeting only the game elements.

We would then state as hypothesis that “Gameplay” is, at least within the videogame rules, *composed of both “Game bricks” and “Play bricks.”*

We have then been able to identify pairs of “Gameplay bricks” that have been found recurrently in our games corpus.

We have named these recurrent pairs “Metabricks,” as they are composed of “Play brick(s)” associated to “Game brick(s).”

The discovery of “Metabricks,” which are the result of pure statistical analysis over a 588 videogames corpus, seems to lean towards a validation of our hypothesis about the nature of gameplay.

However, our corpus of videogames needs to be extended to more games and to more “kinds” of games to fulfill this validation.

Moreover, the expansion of our videogames corpus should lead to the discovery of additional Metabricks: with 4 “Game bricks” and 6 “Play Bricks,” numerous new potential metabricks await.

More precisely, the next steps of our study will be based on two complementary approaches.

- (i) A “bottom-up” (*qualitative*) approach, which will lead us to pursue the development of an experimental videogame, named “*GamB.A.S*” (*a first prototype was exposed in a previous article [7]*). The aim of this game is to allow one to observe the interaction between the different kinds of videogame rules, through the ability of enabling/disabling any videogame rule at runtime. For now, this game only implements rules from the “Gameplay bricks” templates, limiting its videogame generation abilities to quite simplified versions of actual videogames.
- (ii) A “top-down” (*quantitative*) approach, which will lead us to pursue the classification of videogames.

We are modifying our classification tool in order to propose a collaborative version of our videogame classification, freely accessible on the Internet.

This improved version adds the possibility to collect and compare a large number of evaluations for each game, in order to minimize the subjectivity introduced during the analysis of videogames.

You might then freely propose, evaluate, or even consult information about any videogame on the following website: <http://www.gameclassification.com/>.

## ACKNOWLEDGMENTS

The authors wish to thank Jean-Yves Plantec and Martial Bret from the “Iode” company for their point of view on the idea of “bricks,” as well as Stéphane Bura, Art Director at “10Tacle Studio,” who directed us towards a great number of references. They also wish to offer many thanks to Annika Hammarberg for the translation of this paper from French to English, and Dominic Arsenaault for his expert corrections and suggestions. A very special thanks finally goes to Rashid Ghassempouri for his general help and thoughts in our earlier works about the game classification.

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