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## The Language of Interaction

### Abstract

Actions, reactions, conditions, and restrictions form the basis of any game. The rules designed to conduct participation and behaviours of players and objects can be understood as a particular language. In an attempt to elucidate an expressive potential that may have been underestimated by game developers and researchers, this paper presents an approximation of game rules to linguistic concepts.

**Key words:** interaction, games studies, ludology, linguistics

### Thinking games as interactive texts

Interaction is the most inherent aspect of the game phenomenon. Not every interactive system is a game, but every instance of a game, be it a digital game, a physical sport, or a verbal riddle, has some degree of interactivity. This word means mutual or reciprocal actions and influence. In a broad sense, an action is a process that induces alteration in something else<sup>1</sup>. Interaction is, therefore, the reciprocal dynamic between systems in an action-reaction, cause-effect or call and response fashion. Players interact with each other and with the game system itself. They interact with its physical components and rules, always changing the game's state. Games are artefacts or events in which interactions are not just random or spontaneous, rather they are designed to achieve some purpose. In games, interactions are a way, a medium, to communicate ideas and create experiences.

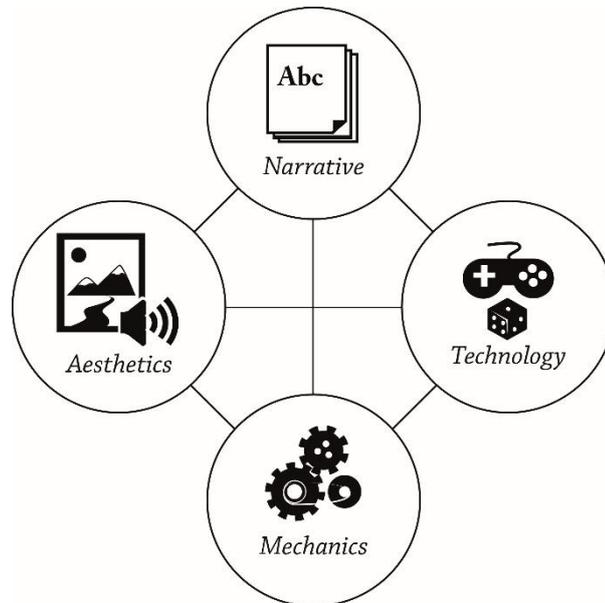
In order to situate the understanding of interaction in games, it is useful to analyse it according to Schell's *Elemental Tetrad* (Fig. 1), which states that any given game can be analysed in terms of four aspects: Aesthetics, Narrative, Technology and

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<sup>1</sup> Merriam-Webster's dictionary includes other common definitions and uses of the word action, but the interest here lies on the approximation with processes and alteration.

Mechanics<sup>2</sup>. The Aesthetics, one of the most visible aspects, is responsible for much of the sensory stimuli of the game and its nonverbal messages. Another explicit aspect is Narrative. This comprises the lore and the symbolic verbal communication of the game. In abstract games or sports, the Narrative aspect comprises the events that emerge from play. Technology is one of the two implicit aspects; it is what supports the very existence of the game. In a board game it would be paper cards, game boards, plastic tokens, and dice. In a digital game it would be the hardware and system specifications. Finally, Mechanics is the other implicit aspect. It stands for the rules of the game and the behaviour of its components and its objectives. Players engage with every one of these aspects and each of their elements foster some level of interactivity. But it is the Mechanical aspect and its elements—the rules—that account for most of the interaction in a game.

Figure 1. Elemental Tetrad of any game.



Source: made by the author, based on Schell (2008).

One can say that when Espen Aarseth defined cybertexts and ergodic literature, he shed light on the less visible aspects that are also found in other forms of texts. Aarseth was interested in the performance of the text, its material nature and the rules that bind the reader/user. Using Schell's terminology with Aarseth's perspective, one can say that judging only from the Technological aspect, a printed book would be less linear than a hypertext, since all pages and content are accessible to the reader in any given time. The material technology of paper-sheets glued or sewed together does not induce linear reading nor prevent page skipping, as a digital text might. From the mechanical aspect, however, a regular book is generally linear. The linearity of the printed text media comes from a socially established rule of

<sup>2</sup> Jesse Schell, *The Art of Game Design: a book of lenses*, (Burlington: Morgan Kaufmann) (2008), p.41.

reading, not from the attributes of the media itself. For Aarseth, a cybertext is one that promotes non-trivial interaction with the reader. The author gives examples of books that work under different reading mechanics, like the Chinese divination book, the I-Ching, or Ian Livingstone's *choose your adventure* books. Although still physically incapable of directing the reader's path through the text, these books require a non-trivial effort to be read properly<sup>3</sup>. While traditional books' mechanics only require eye-movement and sequential reading of words and turning of pages, these examples prescribe a set of actions that the reader must perform and a set of conditional reactions that also must be followed by the reader, as in a game of solitaire. It creates an interaction between the reader/player and the rules system of that particular text.

In these nonlinear books and tabletop games, both actions and reactions need to be performed by the users. Sports rely partially on the laws of physics which rule the movements of bodies in space and combine them with made-up rules that must be observed by players or referees. But in digital games, the very medium that supports the game can update the system state. The players do not need to know all the rules, neither do they have access to all its content and possible states. Instead, they are free to experiment within the designed possibilities and can learn the game rules from the designed consequences they face. In Janet Murray's words this kind of participant is called an Interactor<sup>4</sup>. She perceives that it is a different kind of audience because participant involvement is central to the development of the piece. Also, she notes that authorship of interactive texts requires different knowledge and planning than linear narratives. The procedural authorship, as she calls it, comprehends the definition of a rule-based world that must enable and respond to the interactor's performance. Acknowledging this difference from traditional participation and writing raises questions of how this affects the semiotic processes in this medium. In other words, what is the role of interaction in the meaning of games?

Pioneers of Play studies, Johan Huizinga and Eugene Fink, addressed meaning in games and play, noting that during these events objects, places, people, and actions are resignified. For a child, a wood plank may represent a doll, while a doll, in turn, may become a person<sup>5</sup>. When puppies play, biting can be part of the playful enactment of a fight. But sometimes it can also suspend such a game by breaking its implicit rules<sup>6</sup>. In play and games, a symbolic dimension overlaps reality, bringing new and temporary meanings to normal signs. For Huizinga and Fink, games and play are forms of representing and understanding the world through the symbolic dimension. Later, when Gonzalo Frasca proposed ludology as a field of study, he

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<sup>3</sup> Espen Aarseth, *Cybertext: perspectives on ergodic literature*, (Baltimore/London: The John Hopkins University Press) (1997), p.9.

<sup>4</sup> For more on this see Janet Murray, *Hamlet on the Holodeck: The future of narrative in cyberspace*. (New York: The Free Press) (1997), p.149.

<sup>5</sup> Eugen Fink, *Play as Symbol of the World: and other writings*. Ian Alexander Moore and Christopher Turner (trad.). (Bloomington: Indiana University Press) (2016), p.36.

<sup>6</sup> Johan Huizinga, *Homo Ludens: a study of the play-element in culture*. (London: Routledge & Kegan Paul) (1949), p.1.

claimed that due to their interactivity, games not only represent, but rather simulate the behaviours of objects and systems through mechanical rules<sup>7</sup>.

Closed forms of representation such as paintings or movies can only describe the properties of something in a given time, but interactive and open-ended forms of representation like games and simulators model such properties and behaviours, making it possible for the user to experience a range of situations. As with any kind of representation, simulation is always partial and biased. Frasca affirms that a “simulation is the act of modelling a system A by a less complex system B, which retains some of A's original behaviour”<sup>8</sup>. It is impossible for a simulation to retain all aspects of a given system because if it did, it would be equal to the original system and would therefore no longer be just a simulation. Thus, the modelling of a system is bound by the objectives of the simulation, by its feasibility and by the knowledge its authors have about the original system itself<sup>9</sup>. Like choosing the best angle for a photograph, selecting which properties and behaviours from the source system will be retained is a form of conveying meaning in a simulation.

It must be acknowledged that to understand meaning in games, one needs to understand them as multimedia. Multimedia conveys meaning through a combination of signs from various media or languages. The signs of each language must be appreciated together to be fully understood. In games, as in an opera, verbal language, body language, sonic language and visual language must all join forces to achieve maximum expressiveness. But, as stated, games bring yet another language into play: the language of interaction. Many game researchers are therefore trying to understand the expressive potential of this particular language and how it works.

Ian Bogost discusses how game designers transmit ideologies through the rules of their games<sup>10</sup>. He develops the concept of procedural literacy and rhetoric, which in his words is “the art of persuasion through rule-based representations and interactions”<sup>11</sup>. Building on Bogost’s work, Joris Dormans applies the Peircean triad “sign-object-interpretor” to simulations. He shows that the way game designers define the rules through which they represent objects or events in their games can have iconic, indexical, or symbolic characteristics<sup>12</sup>. James Paul Gee argues that the

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<sup>7</sup> See Gonzalo Frasca, „Ludology Meets Narratology: Similitude and differences between (video)games and narrative”, *Ludology.org* (1999) <http://ludology.org/articles/ludology.htm>, date accessed 12 June 2017.

<sup>8</sup> Gonzalo Frasca, „SIMULATION 101: Simulation versus Representation” *Ludology.org* (2001), <http://www.ludology.org/articles/sim1/simulation101.html> date accessed 12 June 2017.

<sup>9</sup> Stewart Robinson has a series of papers on modeling systems for simulations. See for example Stewart Robinson, „A Tutorial on Conceptual Modeling for Simulation”. in *Proceedings of the 2015 Winter Simulation Conference*, ed. L. Yilmaz, W. K. V. Chan, I. Moon, T. M. K. Roeder, C. Macal, and M. D. Rossetti. (Piscataway: IEEE Press, 2015), pp. 1820-1834.

<sup>10</sup> Ian Bogost, „The Rhetoric of Video Games”. in *The Ecology of Games: Connecting Youth, Games, and Learning*, ed. Katie Salen. (Cambridge: The MIT Press, 2008), pp. 117–140.

<sup>11</sup> Ian Bogost, *Persuasive Games: the expressive power of videogames*. (London: The MIT Press) (2007), p. IX.

<sup>12</sup> Joris Dormans, „Beyond Iconic Simulation”, *Simulation & Gaming*, 42:5 (2011), pp. 610-631.

meaning of signs in games is related to their function and purpose. He states that game designers construct grammars made of rules in an effort to conduct player interpretation of objects and actions. He also notes that the semantics of games will always be a negotiation between the functions that players attribute to objects, the goals they accept for themselves, and those defined by the author in the game rules<sup>13</sup>. Coming from Greimasian semiology, Óliver Pérez Latorre proposes an analysis method by which game rules are divided into three major categories of representation:

- (1) the representation of the protagonist or player
- (2) the representation of the world or environment
- (3) the representation of activities.

With this division, Latorre shows how games can be organized as a rule-based discourse. The next section of this paper will try to build upon these ideas by sketching what could be the basic grammar and semantics of the language of interaction.

## Thinking interaction as a language

First it must be declared that the purpose of this perspective is to suggest where and how meaning-making and poetics can occur in interactive pieces. The scheme presented next will borrow terms from logical languages and linguistics, but with some license to adaptation. To demonstrate how Interaction can be seen as a meaningful language, it will be compared to Verbal/Spoken language and Visual language. I will begin by looking for the very nature of the language, and then develop it into more structured elements. Each element will be explained and exemplified when possible. The table below starts this exercise by searching for the building blocks and main structure of these languages.

Table 1. Comparison between basic elements of the languages

	Verbal/Spoken	Visual	Interaction
Physical Source	Sound	Light	Time / Change
Fundamental	Phonemes	Values and	Causes and Effects

<sup>13</sup> James Paul Gee, „Proactive design theories of sign use: Reflections on Gunther Kress”, in *Multimodality and Social Semiosis: Communication, Meaning-Making, and Learning in the Work of Gunther Kress*, ed Margit Böck and Norbert Pachler. (New York: Routledge) (2013).

Contrast		Colours	
Meaningful Unit	Words	Shapes	Rules and Actions
Syntactic Categories	Nouns, Verbs, Adjectives, Prepositions, etc.	Lines, Plain Shapes, Volumetric Shapes, etc.	Inputs, Outputs, Restrictions and Conditions.
Composition structure	Linear	Spatial	Branched, multilinear

Source: made by the author

The atomic element of a spoken language would be the units of sound—as studied by phonetics and phonology—that by contrast are understood as phonemes that can be combined into words. In a visual language, the source would be just light, which by contrast becomes values of light and dark and hues of colours that are responsible for the perception of shapes and volume. Both are physical signals that affect the receiver, who in return (de)codifies them. The relative signal for Interaction language should be time as it promotes the ability to perceive change. By contrasting moments in time, we perceive changes in configurations. This enables us to understand that something happened and thus to infer cause and effect relationships. By acting in a given system, these causal relationships then inform us about general rules or laws that govern reactions in that system. As with words and shapes, so rules and actions should fall into some main categories that distinguish them by their syntactic functions or characteristics. Inputs are actions that the interactor performs or triggers. Outputs are the results of said actions. They are reactions from elements other than the interactor. Restrictions are rules that prevent actions. Conditions are contextual rules that, when met, enable, modify, or trigger other actions. An interaction piece is then constructed by creating conditional cases for each input and output that unfold into many possible scenarios. This minimal set of elements should be observable in many systems in which humans interact with designed Technologies and Mechanics.

It is worth pointing out that inputs, outputs, restrictions, and conditions can be physical rules or arbitrary rules. Taking as an example a child learning to play basketball, any move she makes would be a physical input in the game system. The movements of the ball would be then physical reactions or physical outputs. Physical restrictions would be natural forces and bodily limitations that prevent her from doing some actions. Weather is a physical condition that can modify the parameters of the game, making it easier or harder for her to play. Arbitrary inputs would be

those actions in which she relies on some level of communication and agreement, like asking for time. Arbitrary outputs would be scores and penalty shots because they are events triggered by other actions. She will also learn from other players, referees or coaches that an arbitrary restriction prevents her from running while holding the ball and that there are some arbitrary conditions that change the amount of points given for a successful throw, based on the context.

She would soon appreciate the values to each rule. Dropping the ball unintentionally, for instance, can be contextually understood as a negative input, since its output would be the loss of control. Whenever she learns that by applying the right force, the ball will bounce right back to her hand, she may understand it as a positive action, because it brings different feelings and utility. According to Gee, if actions are signs, then their functions inform their meaning. The composition of a game is always open-ended or at least undetermined between the possible outcomes. The possibility space of a game like this is infinite. At each moment of play there is a current state of points, positions of players and ball, and the available actions that each player can chose to do next. Each decision branches the play to another configuration until an ending condition such as a time limit is met.

To show how interactivity can foster aesthetic expression, we can frame the design of games and other interactive pieces as a speech act using John Austin’s concepts of locutionary, illocutionary and perlocutionary acts from verbal/spoken language<sup>14</sup>. The first concept, locutionary, refers to the spoken sentence—the actual words used by the speaker. In interaction language, it would be the material objects that support the interaction, the Technology in Schell’s Tetrad. The second term, illocutionary, is the intention of the speaker—the goal behind the message. It would be the design of such interactive objects—their behaviours and functions. The last speech act, perlocutionary, refers to the reaction produced on the listener by the sentence. These acts help to show how the intention of the speaker or designer may guide the composition of their texts. Serious messages may ask for more formality to avoid misinterpretation, while flexible structures may serve aesthetic purposes. The table below tries to demonstrate simple samples of messages in each language, split according to the formalism of their structures.

Table 2. Simple messages in order of formality

	Verbal/Spoken	Visual	Interaction
Less formal	Proverb	Doodle	Kaleidoscope
More Formal	Warning	Scheme	Hand crank

<sup>14</sup> John L. Austin, *How to do Things with Words*. (Oxford: Oxford University Press) (1980).

Source: made by the author.

Note that a hand crank on an industrial machine was probably not designed to bring emotions to those who spin it, but a hand crank on a music box certainly does. Fink stated that tools are “meaning that has been impressed” onto materials, but for him these objects do not inhabit the same symbolic dimension of toys. Tools are objects that only have the dimensions of real life<sup>15</sup>. Nonetheless, it is easy to imagine that one could subvert the function of a tool and start using it as a toy. In the language of interaction, as in other languages, the meaning of signs is constructed by the context and other signals. Gee argues that the meaning of signs is always situational, given on the go by the participants of the communication. Signifiers are not really attached to a specific idea. Their meaning is constructed by contextually inferring the objective of the communication. In his example, the idea of coffee in a sentence is changed by the presence of the words “mop” or “broom”. These other signs are responsible for resignifying “coffee” by making us imagine it as liquid or solid. For him, the meaning of a sign in a game “is what players can do with it, how they can use it in the game”<sup>16</sup>.

The presence of other media in games enhances the meaning of the interaction. Actions in a game, especially in video games, are often not just pure movements but symbolic representations of other actions or events which are completed by narrative or aesthetic aspects. Using a hammer to build something is different from using it to break something<sup>17</sup>. When a chess observer declares that the black horse was sacrificed to save the queen, he is naming actions according to the visual symbolism of the pieces. When the cartoonish character Mario smashes a turtle with his hammer, it produces dissimilar feelings than a hammer homicide in the game *Manbunt* (2003, RenderWare). Dormans would say that the difference between the horse and the hammer examples is that the first is symbolic while the latter is iconic. An icon is a sign that produces the idea of its object by sharing some of its physical attributes or qualities. When developers model a system to produce human-looking objects, aggressive-looking movements, and bone-crushing sounds, they are increasing the iconic properties of the actions. On the other hand, even if the pieces of a chess set were crafted in a detailed way, the action of killing the knight does not share any similarity with the real event. It is only understood as such by cultural convention; it is a symbolic simulation that is found in many board games.

A simulator, on the other hand, is expected to be a high-fidelity rule-based representation of a system. Simulators should be based on an adequate model—an abstraction—of complex real-world situations, with the goal of providing users with a better understanding of reality<sup>18</sup>. But while the purpose of a simulator is to be useful

<sup>15</sup> Eugen Fink, pp.35.

<sup>16</sup> James Paul Gee, pp.45-46.

<sup>17</sup> Óliver Pérez Latorre, „From Chess to StarCraft. A Comparative Analysis of Traditional Games and Videogames”. *Comunicar*, 58:19 (2012), pp.121-128.

<sup>18</sup> For more on the differences between games and simulations, see Margareth Gredler, „Games and Simulations and their Relationship to Learning”, in *Handbook of research for educational*

and educative, the purpose of a game is to be entertaining and fun. Dormans compares this difference with the one between a technical drawing and a painting<sup>19</sup>. But games such as *Goat Simulator* (2014, Coffee Stain) play with such a distinction. Despite its title and realistic three-dimensional looks, in this game you take control of a goat that can destroy anything in its way, perform amazing jumps, and other uncanny actions. This is not a case of a bad simulation; it is a game based on ironic, silly rules. Similar to Cortazar's *Instructions on How to Climb a Staircase* or Carelman's *Catalogue of Fantastic Things*, this game plays with the expected structure of this form of communication. It is possible to make intentional stylistic choices for interactive pieces.

If the meaning of an action is constructed by its contextual function and by its contextual symbology, it should be possible to devise semantic categories for actions, just as homonyms, synonyms and antonyms are categories of words. Words fill these categories not according to their syntactic function, but according to what they mean in relation to other words. This is a subjective interpretation of signs that can happen in other languages as well. The dove and the white flag are different images that both mean peace in western culture. A big black dog can be seen as the visual antonym of a little white cat. Homonyms, however, are dependent on the context. While a skull in a yellow triangle may be read as a warning, a skull in a black flag specifies the idea of pirates.

Synonyms in an interactive piece would be actions or rules that produce the same functional outcome. Their function is the same, but their symbolism is different. This kind of rule is uncommon for it can be seen as unnecessary redundancy. Nevertheless, presenting these synonyms in a game can be meaningful. In *Legacy of Kain: Soul Reaver* (1999, Crystal Dynamics), health is restored by absorbing the souls of killed enemies. It is a ranged move that attracts nearby floating souls to the protagonist's mouth. Another way to restore health is to suck blood from the necks of human bystanders. This is a close-range move, non-lethal for humans but a less effective way of gaining health. These rules encourage players to take more risks and fight more<sup>20</sup> because enemy souls restore more health than human blood. But it also adds a symbolic element. Raziel, the protagonist, used to be a vampire, so this action is there more to make this connection than to be useful from a gameplay perspective.

Antonyms would be actions or rules that have opposing functions. Basic examples are, to buy and to sell in economic simulations, or to punch and to block in a fighting

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*communications and technology*, ed. David H. Jonassen and Marcy P. Driscoll (New York: Lawrence Erlbaum Associates, 2014) pp. 571–581, and Louise Sauv e et. al., „Distinguishing between games and simulations: a systematic review”. *Journal of Educational Technology & Society*, 10:3 (2007), pp.244-256.

<sup>19</sup> Joris Dormans, p.612.

<sup>20</sup> Another example of rule-induced behaviour can be seen in *Game Maker's Toolkit: How Games do Health* [YouTube Video] Mark Brown, 1 August 2016, and in  liver P rez Latorre, „The Social Discourse of Video Games Analysis Model and Case Study: GTA IV”, *Games and Culture* 10:5 (2015), pp. 415-437.

game. The first inflicts damage on an opponent, while the second prevents damage to the player. In other example, *Undertale* (2015, Toby Fox), players can choose to fight or spare their opponents, and this opposition is central to the game’s lore and innovative gameplay.

Homonyms would be cases in which one action serves two or more purposes. Due to technical limitations, early video games had to make the most out of a few buttons and commands. In *Super Mario Bros* (1985, Nintendo), a simple jump has combat, movement, destruction, and activation functions. Recent games have a much wider set of actions. A contemporary game like *Battlefield 1* (2016, DICE), has commands for jump, crunch, dodge, aim, shoot, reload, change weapon, change secondary weapon, drive, etc. Maybe by pursuing that iconic simulation Dormans criticizes, some developers have ignored the possibilities of games with fewer but symbolic actions. As a counterexample, *Journey* (2012, That Game Company) allows players to only walk, jump, and sing. Singing serves to gather items nearby, to activate mechanisms, to communicate with and to energize fellow pilgrims. However, it also draws the attention of dangerous enemies. It is an action that has both the positive function of recovery and the negative rule of increased danger. *Journey* is poetic not only in its visual and narrative aspects, but also in its mechanics. Players can open doors by singing and avoid danger by staying quiet.

Table 3. Examples of possible semantic categories in each language.

	Verbal/Spoken	Visual	Interaction
Synonyms	<b>Different words,</b> <b>same</b> semantical meaning	<b>Different images,</b> <b>same</b> symbolic meaning	<b>Different actions,</b> <b>same</b> practical function
Antonyms	<b>Different words,</b> <b>opposite</b> semantical meaning	<b>Different images,</b> <b>opposite</b> symbolic meaning	<b>Different actions,</b> <b>opposite</b> practical function
Homonyms	<b>Same word,</b> <b>different</b> semantical meaning	<b>Same image,</b> <b>different</b> symbolic meaning	<b>Same action,</b> <b>different</b> practical function

Source: made by the author

By combining function with contextual signs, actions can hold strong meanings that can be played with by the authors of interactive pieces and games. As in poetry and

visual arts, beauty comes when words or shapes are used in clever ways which explore their characteristics. The expressive potential of this language is related to the creative use of these possibilities. Procedural authors must know when to simulate events as they are and when to subvert their behaviour. They have to decide which actions need more detail and when to make them abstract and symbolic. They need to know how to play with the expected functions of inputs, outputs, restrictions, and conditions. By creatively playing with these choices, some patterns of composition must emerge. Just as with the rule of the thirds for photography, or *redondillas* in poetry, there should be characteristic stylistic elements for interaction. These will not be covered by this paper as this theory is still in an early stage, but it presents a goal for future research.

## Conclusion

In search of how meaning is constructed in games, researchers have found that interactivity is a strong element of this media. Game studies should, therefore, pay attention to this element and its communicative properties. Games cannot be taken as just another representational media because interactivity brings at least two particularities: actions do not always represent something but meaning will still emerge from interpretations of how such actions function in a cultural system. Moreover, when actions are there to represent something else, they do this by simulating that something. Especially in this last case, actions become signs that reference ideas or concepts outside the game. They mediate the dialogue between the ideas of the creators and their interpretations by the players. They can be iconic, trying to be similar to the actions and behaviours they represent, or they can be symbolic, indicating events more by consensus than by accuracy. Choices concerning how to simulate these real or imaginary systems are rhetorical since the exclusions and adaptations made by authors are biased towards their intentions and knowledge. The final rules of an interactive piece—especially ludic pieces such as games—form an ergodic cybertext or cyberdiscourse that is materialized in a language of its own. In striving to understand such a language it has been loosely compared to other well-known languages in an attempt to discover useful similarities or differences. It seems that actions and rules can be positively thought of in linguistic terms. The development of this thought may lead to advantages in the analysis of video games and interactive art, and hopefully serve to improve the design of such works. Maybe in the future a basic grammar of interaction will help procedural authors to craft even more meaningful interactive multimedia discourses.

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