

Articulations and Translations: Decentralizing Action in the Videogame

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Abstract

This study explores the relation between cognition and videogame Player Character. It uses the procedural rhetoric as its main approach, understanding the activity of playing through its inner processes. The relation playercharacter- game often appears described in terms of representation and identification. We however suggest that some concepts by Bruno Latour &??" such as articulation and translation &??" describe this relationship more accurately. They allow for a decentralization of a supposed origin of action, be it from the subject, be it from the machine. A less dichotomic way to describe such relation is presented at last, allowing us to think the playing experience as capable of reconfiguring both game and player.

Index terms— articulation, translation, actor-network theory, cognition, player character.

1 Introduction

he relationship between games, computers and cognition can be traced back to the first computer, the ENIAC, described in its own time as an electronic brain. Alan Turing, who in 1936 formalized the concept of algorithm through the Turing machine theoretical model, understood artificial intelligence as the ultimate goal of computer science. Both him and his group of collaborators believed that if a computer was able to defeat a human being in a chess match that would be a very important step towards that goal. The appeal of the game was simple: even with very well defined rules and all possible game states traceable, and even if the computer could play a million matches per second, it would still need 10108 years to play all possible games. That being said, in order to beat an expert chess player the computer would have to be able to react and anticipate the player's movements in an intelligent way. By 1947 Turing had already developed chess software for computers 1 Author ? ? : e-mails: baum.psico@gmail.com, cleci.maraschin@gmail.com (DONOVAN, 2010). With the development in 1962 of the Programmed Data Processor-1(PDP-1) -a 120thousand dollar computer, the size of a car with a small monitor and a keyboard -in the Massachusetts Institute of Technology (MIT) the development of the first electronic game was made possible: Spacewar!. In it, two gamers control spaceships around a star and try to destroy each other. Although it was known only in the academy, Spacewar! became so successful that the Digital Equipment Department started to include a copy in each PDP-1 sold, and use it as favorable argument to reflect PDP-1's potential to reach all types of consumers. After a while Spacewar! unleashed a reaction that would ten years later lead to the first domestic game console: Magnovox Odyssey, and its commercially successful sports game Pong, a simulated table tennis game in which players control paddles simulating ping-pong rackets (Donovan, 2010;Newman, 2004;Wolf & Perron, 2003).

Until the beginning of the 80s the few publications that held videogames as object of study were aimed at fans and potential consumers. At the start of the 80s the first scientific publications came out, the majority of them aimed at designers and programmers. It's worth highlighting two of them: Mind at Play: The Psychology of Videogames (Loftus & Loftus, 1983) and Mind and Media: The Effects of Television, Computers and Video Games (Greenfield, 1984). Both stand at the beginning of a tradition of psychological studies about videogames, using tests and labs as their core methodology.

Historians (Newman, 2004;Wolf & Perron, 2003) agree, however, that it was not until the end of the 90s and beginning of the 2000s that game studies gained some recognition, and electronic games became the object of study of various fields of knowledge. Whereas the first studies compare electronic games to other medias,

especially Cinema, game studies have been building an identity of their own by understanding the videogame as a media of unique traits that must be understood within the practices that are pertinent to it. The same way it is not expected that a Literature researcher will not read, it is not possible to research videogames without playing them (Squire, 2005).

Psychological or cognitive studies involving electronic games are not a novelty: works on motivation, memory and attention are among the oldest scientific publications about videogames. But the rise of game studies and their approach to videogames as interdisciplinary field where player and game design coexist is.

At the beginning of the decade these studies turned their focus to the cognitive operations within the core of the videogame playing experience, such as problem solving abilities (Squire, 2006) in an individual or collective level (Steinkuehler, 2006); patternrecognition abilities (Koster, 2005) and hypotheticodeductive reasoning (Gee, 2008). In this scenario, the videogames comes up as a field where these operations may be observed (Steinkuehler, 2008), or as metaphor to thought and abstraction (Gee, 2008).

Two elements come to the foreground and become important to this article. The first consists of thinking about how few studies there are exploring the role of the character in the playing experience and its relation to cognition (Kafai et Al., 2010;Lankoski, 2011) -although the player character (PC) is considered one of the most emblematic elements of electronic games (Newman, 2004). The second element regards the way these studies describe the relation between cognition and game, generally in terms of representation, identification and reproduction. We nevertheless suggest that some of Bruno Latour's concepts (2001, 2005a, 2005b) such as translation and articulation describe this very relationship more accurately.

2 II.

3 Methodology

With the goal of thinking the effectiveness of the concept of translation and the symmetry to comprehend the relations between cognition and videogame we explore the playing experience in matches of a game called Defense of the Ancient (DotA), a massive multiplayer online battle arena game. DotA is a customized scenario created from the real time strategy game Warcraft III (Blizzard Entertainment (Firm), 2002), in turn inspired by another game, Starcraft (Blizzard Entertainment (Firm), 1998), called Aeon of Strife". In DotA each team of maximum 5 players must destroy a heavily protected enemy structure, called "ancient", that is located in an opposite side of the map. Players control characters called "heroes", and are aided by allies controlled by artificial intelligence, called "creepers". Throughout the matches players develop their characters and use "money" (gold) to purchase equipment.

This article is written based in one of its writers' field diary, describing 32 matches played in a period of four months, totaling approximately 80 hours of game time. We approach the game mainly through the concept of Procedural Rhetoric (Bogost, 2008), understanding videogames as systems able to create, through their rule set, models of processes that make space for the possibility of action. The rules simultaneously create what is and what is not possible within the game experience, the same time they give meaning to this experience. The images, symbols -the theme -such as gunshots, soldiers and swords describe only partially this game's expressive capacity. Meaning is built from the manipulation of the symbols available to the player obeying the rules of the game. We find the meaning of a game by exploring the possibilities of that space while playing. So much that this approach privileges the rule set, and questions narrative and visual speech as they articulate and interact to this set of rules.

We however come closer to the comprehension of Voorhees (2009), in the sense that it does not understand the processes of the game as fully comprised within the machine -in which case the player's role would be to just shoot or execute. We understand the process in a broader sense, involving mechanical operations, software protocols as well as player action. We analyze games while highlighting the relation between player and other game elements, understanding that the game is not only the coauthorship of designers, writers and programmers, but it is something that unfolds simultaneously to players' actions.

The gameplay derives from a basic set of rules implemented by a programmed code, but it remains rich and multiple because each player only realizes these rules in a virtual environment that seems to be open to nearly infinite permutations. The player does not look at the underlying code of the game, but to the audiovisual and tactic results derived from it instead.

It did not take me long to realize there was little time between a creep wave and another, something like 30 seconds, and therefore it was necessary to act fast, before they grew enough in number to destroy my tower (Field Diary, Feb. 2012). But this is not to say that the player read the algorithm that generates the creep waves, like "Enemy1.PositionX = PositionX+1". What is possible to realize is a mediated state generated by the code's performance (Nitsche, 2008).

4 III.

5 Acting in the videogame

The most crucial aspect to any cognitive activity always is the last possible connection of the technical outline, its most exterior layer. Players do not assign meaning because they understand the logics of the programming,

but because they understand the functioning of the virtual world generated by it. The code itself remains hidden, unless there is an unexpected behavior or mistake. That being said we cannot state that the game code defines the space or the experience of the game. The programming code and the gameplay are different realms of experience, and there is no reduction between them.

Different from Cinema and its product, the film which can be repeated and analyzed from a stability and linearity standpoint -, the electronic game only happens as the agency of both its programming code and the player. The game cannot be reduced to its static programming code, stored at a hard disk. Neither is this code the interaction layer between game and user. The G game only exists while action, as a process; in the absence of action, what remains is a code stored in a magnetic disk (Galloway, 2006).

But how to define a statute of action on digital games? At the same time a team of players act, the software is executed. Player and computer participate together of the match, step by step, in such a way that both are indispensable for the game to happen.

The goal in this initial moment of the match is to kill enemy creeps, and mainly avoid getting killed by your opponent's heroes. Every time a hero kills a creep or destroys an enemy structure they acquire experience points (xp). Accumulating xp allows players access to new abilities; and to gold, which allows them to purchase equipment -which in turn improve existing character abilities or traits. The long-term goal is to become more capable than your opponent, so that it can be killed (or almost killed, and has to run away). With a free lane of enemy heroes it is possible, temporarily, to kill a larger amount of enemy creeps, and to move your creep wave towards enemy field. To win the game players must destroy their opponent's "Ancient". (Field Diary, Feb. 2012)

The player takes control of heroes, and makes way for his horde to move forward. Although it is possible to distinguish actions coming from the computer and from the player, such division is artificial. When a player teams up with creeps in order to destroy an enemy tower both cause damage to the same source, in a way that damage is inseparable. Machine and operator act together, in a cybernetic relationship to perform various game actions. They recurrently exist as a unique phenomenon. Even if they can be distinguished for the sake of analysis, they must be understood in a symmetric way, that is, with no privileges for either side.

Each game action is only possible through an association of all agents involved. That includes the player, availabilities of the virtual environment, and images and texts made available by other players, so that the player is, in a way, capacitated, authorized by the other agents involved. Action, as one might think, is not an exclusively human property, but rather the property of a group of agents. As Latour (2000) exemplifies, the B-52 does not fly, the American Air Force flies. That happens because flying is the property of an association of entities that include airports, airplanes, ticket counters and launch pads. Each one of these entities exchange competences and add to new functions and possibilities. The subject is no longer "(?) the source from where action comes, but is in turn the mobile target of a big array of entities swarming in the subject's direction." Latour, 2005b, P. 46) After spotting an enemy creep wave, attack is necessary; the destruction of the opponent wave allows for the allied wave to move forward. Once the allied wave advances towards an enemy hero then that hero must deal with the situation before attacking any other player character, which in turn allows for that player to attack first.

So the player's actions disturb the homeostatic state of the game. That happens because without such attack both creep waves would annihilate one another, always in the same place. The game state shift calls for a compensatory conduct of the player -no longer attacking creeps in order to attack enemy heroes -, and this compensatory conduct acts as a source of disturbance for the game and for the other user; this user acts as a source of disturbance for the game and other users, and so on indefinitely until the state necessary to the end of the game is reached. Some authors (Bogost, 2008; Galloway, 2006), while examining the relation electronic game-player, suggest that the gameplay should be understood as the player's attempt to simulate the game's algorithm, the set of rules that govern the simulation. Through a simple repetition of gamer input + game output = result, in a loop, the player would continuously come closer to the ideal action, until he reached the result predicted by the algorithm.

We assume here that playing videogames is something a lot more complicated than that. The fact that a player might know that every thirty seconds a new creep wave comes up does not mean that the player knows or is able to recognize the formula that produces these creeps on screen. The notion that the player's experience and the game's programming directly overlap may be questioned once we consider the very own action of playing. The gameplay is not a mirror for the game's set of rules, but rather a consequence of the game's and the player's dispositions.

The concept of magic circle (Huizinga, 1971) a space-time constituted by a set of specific rules that demand a certain disposition and conduct code from the player -is often brought up to describe a situation from the player's "real world". The idea of this circle, however, might mistakenly lead to the idea of a simple circular repetition. An alternative approach (Arsenault & Perron, 2009) would be to understand the game as a set of spiral circles, however not of action and reaction, but of pure reaction instead. The player reacts to the game state, which in turn reacts to the player's action. These circles gradually expand the player -it is not the game itself that is expanding, because its algorithm and its data are stored in a hard drive; it is only the gameplay, the set of possibilities that expand -as well as the player's actions and knowledge.

When we understand the importance of player's and game's actions in a symmetric way we realize that this relation takes place in a level above the generating algorithm. This relation happens in the digital world generated

by this algorithm, with its availabilities and limitations, but it cannot be reduced to it. Thus learning a new game does not mean to simply and adequately Year 2014(D D D D D D D)

G internalize its code: it means to give body to the set of relations between possible actions and scenario possibilities thorough action (Gee, 2008). In order to maintain the principle of symmetry we must also describe how it is possible to think this relation from the machine's side, in a way that is not strictly representational. Therefore we will examine the relationship player-avatar to demonstrate how the concept of articulation (Latour, 2001) describes it in a more precise way.

6 IV.

7 Goblin Technology

A fairly recurring description (both in literature and common sense) is that the avatar represents the player in a virtual world. Kafai and col. (2012), for instance, describe the use of the avatar as an opportunity for youngsters to create various self representations, and reinterpret themselves to other players. Players are thinking centers, transmitting wills through their console or keyboard, and the avatar's function is to mimic these wills, and to allow other physically distant players to understand them. Or even that the character's image evokes a form of projective identification through which subjects fantasize about a body they would like to possess. On the other hand, a more detailed examination reveals that the function of the avatar is not exactly to represent the action of a player.

DotA has 104 characters, divided into two factions: each character possesses four different abilities, and every time the character levels up it can enhance one of these abilities. The character also carries 6 items that may be purchased throughout the game, of a total of 128, elevating the number of possible combinations to an astronomical level. After few unsuccessful matches, I go to an official DotA forum (www.playdota.com), in a specific section called "Guides", and as the title suggests, I find many guides written by other players providing guidelines for beginners like me. After some reading it seems to be a consensus that the character called Goblin Techies is accessible to beginners. (?) Techies seems relatively easy; indeed, their attack hits distant enemies, and that seems safer than facing my opponents with swords and spears. I can also plant landmines that explode when an opponent is near; set stasis traps that stun the opponent; commit suicide, although I am not sure what is the use of that yet; and plant remotely controlled mine, that only activate when triggered by me (Field Diary, Mar., 2012). When clicking a certain part of the screen with the left mouse button, the Goblins start to walk in that direction. A simple keyboard command (Ctrl+h) makes them plant a bomb. Clicking the right button directly over an enemy makes my character shoot a flaming catapult of sorts. While sitting in my room hitting the keyboard and clicking the mouse I personally did not walk, neither plant bombs nor shot a catapult. And still, we cannot say I did not participate in the movements or the shots taken by the avatar. Hence it is certain that my action did modify the state of the game as a whole, and it specifically moved my avatar.

The change in the state of the avatar, however, also brings about new player actions. By crossing enemy creeps, I move my mouse to attack them; if my character's energy is low, I click so that he moves away from the battle. Character and player mutually interchange properties. The pressing of a button makes the characters use magic that wins a combat allowing the player (or would it be the game?) to move on to the next phase. What is established between both is an articulation (Latour, 2001), a negotiation of possibilities, sharing the responsibility of action among all elements involved.

Videogames make use of various ways to guide or limit the player's choices of action, and therefore direct the relation established between player and avatar. Lankoski (2011) suggest three categories of techniques to guide the gameplay: 1) Character's Goals, which limit the plausible actions in a game. If players wish to move forward, they must agree to their character's motivations. When it comes to DotA, all characters have the same goal, which is to destroy the enemy Ancient.

[2] Possible and impossible actions: What choices have been made available and what possibilities are left out; how reasonable are the choices-what is easy and what is hard? [3] Predefined functions of a PC: These are the procedures that are triggered by an event in a game or by the choices of the player (e.g., pre-designed dialogue, movement style, gestures, and facial expressions) (p. 300). Such restrictions not only stop or distort the player's operation, but also direct it. The opposite, however, also occurs: the action of the player makes room for other elements of the game to present themselves. The avatar is a sort of heritage left by game designers, one that the player receives and must deal with. There is a big array of possible actions that vary according to each game. These actions and the game's virtual world are built in a way to adjust to each other. The character, its abilities and available equipment are designed as to make it easier to reach goals in a certain way than another. The environment is projected to interact with this character's limitations and abilities with certain inclinations or availabilities. This availability is not present in that world alone, but it resides in the relation established between specific abilities of that character and the way objects from that world encourage or discourage certain possibilities of action (Gee, 2008)

It is easier to understand the relation between the character's restrictions and the player's actions if we examine the way vehicles in racing games, which obviously are not meant to resemble humans, are set apart from one another and how they are presented: in a general sense they do not have a pilot -the vehicles diverse in terms of acceleration, turning skills, top speed and so on. None of them excels in all departments. Maintaining a certain balance in the game is paramount, so much that all come close in terms of general capacity. A common organization is for cars (or aircrafts) with good acceleration not to have top speed, the same way cars with great maximum speed have poor acceleration. These functional differences are by no means trivial, and they significantly affect the way the game unfolds. For instance, narrow lanes filled with turns are significantly harder if the player chooses a car with poor turning skills. The same way a vehicle with good acceleration instead of top speed will benefit the player during races that take place in tracks filled with interconnected turns. In this case the ability to quickly regain speed after slow sections, instead of purely trusting in maximum speed which in such tracks can never be achieved -, is beneficial.

Action is displaced among the actors throughout the game. The player acts so that the character acts, once both possess active force to move the game forward. It is no longer necessary to look back the two traditional ontological sources of knowledge: subject and object. I find it more interesting to refer to propositions, in the terms suggested by Latour (2001; 2005b). Propositions are not arguments, nor objects, not even a middle ground between them. They are, above all, performance.

It is precisely what the word "pro-positions" suggests: they are not positions, things, substances or essences intrinsic to a nature constituted of mute objects in face of a talking human mind. But they are occasions to establish contact, made possible by various entities. These occasions allow entities to modify their definitions throughout an event (Latour, 2001, P. 164).

Consequently, what distinguishes player and game is not one single ontological abyss, but innumerable big and small, reductive and non-reductive, temporary and definitive differences. Treating both as propositions makes possible for all entities involved to modify their definitions throughout an even, in this case, a match. The relation established between propositions is not of correspondence, but of articulation. The player articulates the character throughout the game, but the opposite also occurs. Articulation is not the privilege of a human mind surrounded by things of the world, but a property common to propositions, one in which different kinds of entities may take part.

The level of sophistication in combining the chosen vehicle with the specific demands of each track is clearly reached only through iteration. Repetition teaches players the difficulties of a game, motivating them to reflect and be critical when it comes to considering their own style and ability. The "use" of avatars by players thus operates in this same model. Using Goblin many times, for example, teaches players the best places to plant bombs, which items are necessary in the beginning of the match and which become obsolete after some time, and which abilities should be developed first and their level of priority.

Thought / action are therefore based in the articulation of many heterogeneous operations. Various non-biological mechanisms such as technologies take place in this process. Thought is no longer the attribute of a substance that is unique and transparent to itself. We must also leave behind the idea of a free and volunteer subject in the face of a world reduced to inertia and causal mechanisms on behalf of a network of actors that replace the radical oppositions of the traditional ontology with a nuanced, mixed world, where the effects of subjectivity emerge from local and transitory processes. Thinking is a collective state, where men and things mix (Levy, 2004).

Differently from fictional characters, the "psychological motivations" of a videogame character are nearly insignificant when compared to their possibilities of action. There is a popular mistake of assuming players want main characters to have strong personalities, especially in adventure or action games. But if we look at the most popular examples of these genres we quickly realize that the character's personality is often reduced to a minimum. Let's examine Super Mario 64 (Nintendo of America Inc., 1998): although Mario has a very unique appearance, what really is his personality? He actually does not have any, making it blurred enough for players to imprint their own personality on him. What about Lara Croft, from Tomb Raider (Learning Company. et al., 1998)? Once again, distinct appearance, undefined personality. And if we take a look at the space soldier in Doom (Id Software; Activision, 2003) or Gordon Freeman in Half-Life (Valve, 2007) we will not find any personality at all (Newman, 2004).

In the guide I used to pick the Goblins, the character description was as follows:

Devilishly clever, the goblin techies, despite their small physical presence, are a force to be reckoned with. In line with their goblin brethren, the techies have the skill of laying mines in the earth, invisible to the naked eye. Also, after extensive training with the Orcish voodoo priests of Kalimdor, the Techies are adept at laying paralysis-inducing traps along with their potent explosives. Wary be the foe who takes these three lightly (XSTORM999, 2011). More than appearance or story, videogame characters are differentiated by their ability to affect the gameplay. They are plain, and might generally be Year 2014(D D D D D D D D)

G defined in one sentence; they are generally described by players in terms of abilities they possess or action skills, as can be seen in the description above.

The relation with the avatar is not exhausted in a specular relation -it is actually an inventive one, able to expand the experimentation range of players. Between them, a circulation of reciprocal effects takes place in a

zone that produces differences, thus establishing articulation. This articulation is neither an individual nor a social field; neither does it belong to the subject nor to the game, but rather it is a cognitive agency "(...) made of connections, networks, temporary creation of interfaces belonging to both sides of the traditional ontological frontiers." ??Levy, 2004, p. 183).

It is not unusual for youngsters playing with super-human heroes to replay a scene because they felt "they had failed their characters". They wish to take part in a more spectacular scene, in resonance with one of a super-hero. Players feel responsible for the character (Gee, 2007).

We indiscriminately mix our desires with things, the collective with narratives. From the moment we follow any hybrid closely, it sometimes seems like a thing, sometimes like a narrative, but it is never reduced to a simple entity (Latour, 2005b).

Players are capable of understanding the character as a project with a predictable trajectory in time, which must correspond to expectations within its own limitations. Players plan the kind of "person" they want their characters to become, the history they will have, the situations they should or should not engage (Gee, 2007). This also comes from all that is learnt from the game, and how the game is supposed to unfold for that player. In order to operate an avatar it is paramount to find a way to adjust the abilities and the limitations of the character to the game's availabilities in terms of space, in a way to adequately reach certain goals. But nevertheless the character retains a certain amount of malleability, and becomes a kind of vessel for the player's intentions and goals.

The character -with its abilities, goals and limitations -is a project the player inherits from designers, so in this sense it is an imposition. However, this very character is a vessel for players' goals and intentions, so long as they take into consideration the inheritance received. In order for both goals to be achieved it is important that players bring their understanding closer to that of the designer, so that they can come up with their own goals -keeping in mind the goals proposed by the game (Gee, 2008).

V.

9 Final Considerations

As discussed above, the role of the player character is not to represent the player, but to outline the set of possible actions within the world of the game such as opening doors, jumping or running. Treating this translation characters make of players' actions as representation is a negative mediation, because it brings up the idea of unrestricted access to the virtual world. This notion holds the possibility of discarding all intermediary recourses such as keyboard commands or joysticks, whose function would thus be to distort the will of the player.

The relation here is not the connection between two separate entities, but a movement distributed among a group of actors. The avatar is not the player's middleman in the virtual world, whose function is to simply represent the player in that environment. If the avatar's only function was to represent the action or the will of a player, limitations imposed by each kind of avatar should be considered a defect. A glitch in this representation of wills makes the avatar an unreliable middleman. But if we assume that the function of the avatar is mediation (LATOUR, 2005a(LATOUR, , 2005b)), it no longer represents the player's action, but it translates the action. The avatar no longer transports the player's will, he unfolds it, and by that constantly redefines player and game, distributing its supposed essence among the elements that comprise the action. Unexpected bifurcations unfold new universes of possibility at every action. Technologies are conceived to "as closely as possible relate to cognitive modules, sensorial-motors circuits, portions of human anatomy and other artifacts in multiple agencies of work" ??Levy, 2004, p. 181).

Player, avatar and the digital environment propagate activities in a transitory and open network, through articulations or bifurcations. Articulation is precisely this translation between two spaces or two different universes: from the analogical to digital, mechanical to human, hence building a heterogeneous collective through a deforming translation.

What we propose is the existence of interpenetration between cognition and game, in a way we can no longer take them as pure, but as hybrids instead. Technology here is the element capable of reconfiguring human operations. The encounter between subject and videogame makes it possible to reconfigure cognitive functioning, in a kind of symbiosis that articulate goals, options and perspectives. From this encounter someone or something else is born, that is not constrained by any of those two agents; a third being, a hybrid. Cognition and game establish a complex relation, in which both are redesigned through operation.

It is not about denying the diversity of reality. We do not claim that things are nothing but matter, and that for such reason brains can be connected to computers. We also do not claim that things think for themselves. We are not looking for a massive and indistinctive unification in order to claim that the game takes part in the player's thinking. On the contrary, the notion of articulation forces us to recognize the heterogeneity of reality, produced at every step taken. If articulation takes us to the notion of translation is because nothing follows the same way of functioning, the action must overcome discontinuities that transform it. Action itself is a moving discontinuity whose result is the promotion of other differences. What we suggest is "an ontology based on facts, purely relational, and therefore are neither material nor spiritual, neither objective nor subjective" ??Levy, 2004, p. 183).

Instead of using the dichotomy subject-object as a starting point, or any of its variations such as individual-medium, nature-society, body-mind as dichotomies that allow knowledge or action to take place, we take them

as the result of an action. Practice holds an ontological place in this panorama, specifically because it does not unite two distinct realities, but is responsible for the creation of two emerging poles, resulting from a network of processes, building itself reciprocally. Subject and object emerge, thought action, out of a field comprised of knowledge and things, of material, social, political, technological and linguistic elements. And each of these possesses a distinct operational structure.

We should stop focusing on the rough, specular and easy opposition between flesh and blood men and the metal machine. We should instead focus on hybrid functionings made of men, words, networks and computers. The effectiveness of actions in the virtual world depend on this very interconnection, on the alliance between biological beings and an ever-growing number of artifacts and protocols, crossings of collective hybrids and complex and ever-changing circuits.

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¹Only in 1997 IBM's Deepblue was able to beat Russian player Garry Kasparov in a game divided into six matches with two victories, three draws and one defeat.

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