University of Alberta

Procedural Realism in Computer Strategy Games

by

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A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Master of Arts
in
Humanities Computing

Modern Languages and Cultural Studies

Fall 2009
Edmonton, Alberta

Examining Committee

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Abstract

Throughout the history of strategy games, the concept of realism has taken part of cultural discourses that claim such games reproduce dynamics of war. In this thesis, A. Galloway's, I. Bogost's and C. Pierce's work are used to construct the concept of *procedural realism* to support the thesis that strategy games build 'realist' fiction based on the execution of game processes through the Heads Up Display interface. Discussion on the visibility of rules will draw attention to the extra-diegetic dimensions of games, to explore how these devices promote ideological approaches to the real. The form of realism found in computer strategy games is an example of Katherine Hayles' *regime of computation*, where "[c]ode is understood as the discourse system that … generates nature itself (27). This worldview is also present in non-computational strategy wargames; however, analysis focuses on Real Time Strategy and Turn-Based Strategy games' non-diegetic devices.

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Introduction

The initial motivation of this project was to explore representations of race and ethnicities in video games. The problem was more complex than anticipated: it seemed necessary to explore how realism and simulations actually work from the point of view of a video game player in order to tackle any form of representation in video games. Much work has been done around the concepts of simulation vs. representation, but little of these theorizations approached how player actions engage in a negotiation with *algorithmic* references to ethnicities and real world cultures. I wanted to know how these ethnicities are enacted, performed or simulated in video games through game procedures, rather than focusing on audio visual or traditional narrative approaches to representations.

Because of the popular ludology vs. narratology debate—an interesting, but rather inflated discussion on whether games were rules or narrative (see Chapter 1)—much attention was being placed on aspects of game rules by video games studies. The concept of algorithm struck my attention; some authors imported it from information technologies for use in critical studies on video games. While looking into these works, I found two texts that had overcame the opposition *rules vs. narration*, and did important contributions to approaching algorithmic references to culture, hypothesizing on how games operate from the perspective of player and machine actions

Importing a notion from scientific and technological bodies of knowledge is always a delicate matter. A good place to start was to explore how scholars

were using the term algorithm, and how this term was borrowed from scientific and technological bodies of knowledge into the humanities. By reading into concepts of algorithm by general reference works, computer scientists and video game scholars, I found interesting assumptions on how algorithms relate—or not—to material conditions of the world; or, in different words, whether algorithms convey ideologies. Furthermore, in Juul Jesper's and Alexander Galloway's work, I found remarkable demonstrations of how algorithms—made of game rules and executed through game actions—can also build narratives, and even have diegetic and extra diegetic dimensions.

This point of departure was very useful to begin the construction of my approach to concepts of realism in video games. Ian Bogost's concept of procedural rhetoric constituted a great addition to my theoretical framework; his work—aimed to games with a persuasive agenda—makes a very clear distinction of rhetorical instances in video games: he argues that games in general, and video games in specific represent processes with game processes, which in his view explains why computers are so adequate for playing games. By exploring Bogost's concept of *procedural representation*, and Peirce's classification of signs according to their relationship to the referent, I constructed the concept of *procedural realism* to explore how games actions represent real world actions.

After having decided to explore how ethnicities are represented / simulated in strategy computer games (RTS and TBS), I found that the game user interface (Heads-Up-Display or HUD) was a privileged area to execute game actions in these games (this is what Galloway calls extra-diegetic player actions,

see Chapter 1). It seemed interesting to me that these games require the player to engage in a HUD-intensive interaction, while concurrently, making certain claims of realism (even though not historically accurate). For instance, how do I explain that the representation of Amerindian cultures in a game like *Age of Empires III: The War Chiefs* enables players to use the "Nature Friendship" ability in the HUD interface, while this option is not allowed for the rest of the European in-game civilizations? Why do only the European civilizations have a button to choose a "Revolution" feature to revolt against their home city and become a new nation? Why do Amerindians have to dance in a fire pit to spawn settlers, as if their reproduction was subject to ritual actions while (in some ways similar reproduction dynamics to the Zerg in *StarCraft*)? Are there any procedural cultural archetypes being implemented into certain ethnicities?

Possible answers to these realism-related questions can be found by looking into game rules and the user interface. This led me to choose the following path for researching procedural realism:

1) the history of strategy game rules;
2) concepts of realism in board and miniature wargames;
3) a brief genealogy of game's user interfaces;
4) a brief genealogy of RTS games.

This way it should be possible to track back at least part of the genealogy of strategy game rules and interfaces. It took me two chapters (Chapters 3 and 4) to complete an approach to these questions:

1) procedural realism is as old as abstract games: at least there are 3 branches of known ancient games that have been used to represent warfare procedures in history;

2) in wargames, the rulebook and the umpire constituted essential game elements to achieve a new concept of procedural realism that involved calculation and an almost legislative approach to reality;

3) the HUD interface became an extension of the rule book and the umpire in computer games; and

4) counter systems, technology trees, and unit control are important interface and rule elements that constitute modern strategy games, whose followers engage in a current debate on two concepts of procedural realism (a strategical concept of the mechanisms of reality and a more tactical, real time approach).

After having traced the proposed concept of procedural realism both in theoretical and historical sources, I then analyze interface-based procedures in the games *Rise of Nations*, *Age of Empires III: The War Chiefs* and *Medieval II: Total War Kingdoms*, making some references to racial procedural archetypes arisen in the cult RTS game *StarCraft*.

Conclusions to this research aim to show how standardization is a principle for these implementations of virtual warfare and conflict resolution, by using the HUD interface as a mediation device between the strategic and the tactical level. Western and modern warfare procedural concepts, such as the concept of military unit and the theatre of operations are applied to all cultures.

Finally, I will explore how my concept of procedural realism and the analysis of realism executed via extra-diegetic devices (such as the user interface connect to Katherine Hayles' thesis of the regime of computation) serve as a cosmology that renders the world in modern scientific knowledge world views. In her words, the regime of computation provides

> a narrative that accounts for the evolution of the universe, life, mind, and mind reflecting on mind by connecting these emergences with computational processes that operate both in human–created simulations and in the universe understood as software running on the "Universal Computer" we call reality. . . . Code is understood as the discourse system that mirrors what happens in nature and that generates nature itself. (27)

Connecting Hayles' conceptualization of the regime of computation as a worldview with Bogost's procedural representation, I argue that mimicking a selection of real-world procedures by playing these interface-intensive games constitutes both what Galloway identifies as representations of contemporary information control, and also constitutes the embodiment of an ideological paradigm that claims to "mirror" a selection of historical processes. I would, however, say that such claim of realism is embodied in the software more than in reality. On the one side, there is a representation of contemporary information control and, on the other, a representation of ideological approaches to cultural diversity. This seems to me an implementation of today's information control to

explain how cultural differences are constructed, and this is part of the ideological paradigm I want to approach.

Although all video games, and software in general, are instantiations of how code invokes material states and render a computational world view, I argue that strategy video games are concrete cases where code does not only exist in the software (nor is it only executed by computers), but also algorithms—and therefore code—is executed by player actions, assisted by interface-based execution of decisions that render a virtual possible world. Moreover, and as I will explain further, the outcomes of such decisions are indexed in *and* by the software through a feedback loop that inputs player actions to create the world represented in the computer.

Chapter 1: From Algorithm to Procedure

> What is an algorithm if not a machine for the motion of parts? And it is the artfulness of the motion that matters most. Following Deleuze and Guattari, I wish my conceptual algorithms to be as ad hoc, as provisional, as cobbled together as theirs were. Let them be what Northrop Frye once called "an interconnected group of suggestions."
>
> *A. Galloway*

Jesper Juul's, Alexander Galloway's and Ian Bogost's recent studies on video games have in common the introduction of scientific and technological jargon in their critical discourses. In their respective works,[1] these authors have constructed theoretical frameworks using computer technology's terminology to define their critical and methodological approaches to video games. In this chapter, I will explore the use of a few concepts borrowed from information technology by academics in the field of videogame studies, namely, algorithm, procedurality and interface. This theoretical exploration is necessary in the general context of my project, because these concepts will allow me to discuss how player procedures in themselves constitute cultural representations in subsequent chapters of the thesis. Also, it is important in that exploring these concepts will allow me to approach ideological aspects of computer technology from the perspective of a player.

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[1] Juul Jesper, *Half-Real: Video Games between Real Rules and Fictional Worlds* (2005); Alexander Galloway, *Gaming: Essays on Algorithmic Culture* (2006); Ian Bogost, *Unit Operations: An Approach to Video game Criticism* (2006) and *Persuasive Games: The Expressive Power of Video games* (2007).

I will explore certain negotiations between existing humanities' critical theories and computer technology discourses: how humanities scholars have adopted a concept such as algorithm and how this concept was modified to account for the concept of interpretation in literary theory. Such negotiations between the humanities and scientific discourses reexamine critical theories' appropriateness for analyzing digital culture artifacts, such as video games and other digital media. Similarly, these negotiations also explore ideological dimensions of technological discourses. In order to approach digital culture, the humanities need to understand technological discourses –at least in their ideological dimension. This, in turn, should not happen without solid interdisciplinary approaches that engage in a consistent understanding of core concepts both from scientific and technological discourses.

Finally, one must note that the study of video games requires a different approach to information processing than the one used in the study of films. The need of tackling computer cultural artifacts differs from film studies essentially in the degree of information control involved in 'playing', as opposed to the information processing involved in 'watching', which is not necessarily a passive stance, but where interaction is not equivalent to player control actions. Video games involve aspects such as code,[2] electronic hardware, game mechanics, game rules, and game fiction, just to name a few, although I will argue how some of the above entail ideological relationships. But how has academic research tackled

[2] The concept of code will play an important part in my arguments to discuss video game realism and a cognitive paradigm inherent to strategy games. I will explore this computer technology concept in Chapter 2.

such complexity? Some video game researchers like Espen Aarseth, Ian Bogost, Lev Manovich, Alexander Galloway, and many others have contributed to creating a vocabulary that works as a meeting point for humanities and information systems as a first attempt to overcome methodological requirements of technology critique. Jargon has definitely played a more than important role in theoretical and methodological approaches to video games and digital artifacts.

Before discussing the mentioned concepts, I will state some relevant aspects of my research strategy.

Play: a Dialogue between 'Two Cultures'

Many authors have already drawn attention to the complex relationships between the sciences and the humanities as major bodies of knowledge. Perspectives and tone vary. For instance, in his polemical 1959 lecture, C.P. Snow warned about a supposed communication breakdown between the "Two Cultures", including his thesis about devastating consequences following this failure to communicate. But especially, it was during the 1980s when this debate sparked the publication of numerous articles on higher education and academic matters, showing either a profound fear of technology's involvement in humanistic disciplines (Naomi Baron), certain skepticism due to humanities' perceived lack of organization (Kenneth R. Stunkel, Alan Bloom),[3] or even a

[3] In his article "Obstacles and Pathways to Coherence in the Humanities" (1989), Stunkel expresses a pessimistic perspective on the humanities' status as a cultural force: "It is clear to me that the humanities are on the brink of being given up as an influential cultural force, that there is no generally understood way of thinking among people who call themselves "humanists" and that these humanists, as custodians of the "great tradition" have defaulted on their responsibility and are

more enthusiastic interest for overcoming disciplinary boundaries, like Donna Haraway's "Cyborg Manifesto" (1985) or Katherine Hayle's thriving integration and critique of scientific and humanistic discourses in *The Cosmic Web: Scientific Field Models and Literary Strategies in the Twentieth Century* (1984) and her latter works.

Many years before, in 1969, Lévi-Strauss' published his famous discussion about the conceptual opposition between nature / culture in his *Elementary Structures of Kinship*. Lévi-Strauss' discussion of the 'dichotomy' nature / culture is not far from the 'Two Cultures' debate, and I also find it relevant in the context of a foundation of interdisciplinary discourses. In "Structure, Sign, and Play in the Discourse of the Human Sciences", Derrida discusses the value of Lévi-Strauss' strategy for language self-critique:

> Lévi-Strauss thinks that in this way he can separate method from truth, the instruments of the method and the objective significations aimed at by it. One could almost say that this is the primary affirmation of Lévi-Strauss; in any event, the first words of the *Elementary Structures* are: "One begins to understand that *the distinction between state of nature and state of society (we would be more apt to say today: state of nature and state of culture), while lacking any acceptable historical signification,*

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now eating the bitter fruits. […] My thesis is that disruptive transformations in Western civilization and disarray among humanists, especially academic ones, account for the catastrophe which has overtaken humanistic studies, but that is still possible to find a way out of the morass" (pp. 325-326).

> *presents a value which fully justifies its use by modern sociology: its value as a methodological instrument*" (230)[4] [Emphasis in the original].

Lévi-Strauss insisted, first of all, in the need to understand that the opposition between nature and culture consists in identifying it as a methodological instrument, rather than as a 'truth' value. What I would like to highlight here is that this strategy seems to me a focal point for understanding how scientific, technological and humanities' discourses perform a negotiation to create an interdisciplinary / transdisciplinary approach.[5] Lévi-Strauss's option for revealing the constructed 'limits' between two *opposed* ideas, (after having revealed that the opposition is rather a construct, not a 'reality'), is not to dismiss the unmasked structure, nor to create a new one (thus this would only replace one center for another, one "true value" for another), but to keep the structure, recognize it is a construct, and more importantly, value it as an instrument for exposure and reintegration of alleged dichotomies: always using the same language that supports them as such. This is what Lévi-Strauss called *bricolage* and Derrida

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[4] Derrida also cites Lévi-Strauss' follow-up in *The Savage Mind*: "The opposition between nature and culture which I have previously insisted on seems today to offer a value which is above all methodological. […] It would not be enough to have absorbed particular humanities into a general humanity; this first enterprise prepares the way for others […] which belong to the natural and exact sciences: to reintegrate culture into nature, and finally, to reintegrate life into the totality of its physiochemical conditions" (231).

[5] I understand an interdisciplinary approach as the identification and exploration of new areas of knowledge, which demand expertise from various disciplines and require the application of its correspondent methods. A transdisciplinary approach would also integrate those methods and concepts to create a transdisciplinary discourse.

implemented in his concept of *play*, which consists of the process of destabilizing a preexistent structure that holds a 'true value' (one of the core processes for deconstruction).

In the present work, I hope to explore some technological concepts, while trying to explain their cultural implications for the case of video games. I do not aim to 'deconstruct' these computer technology concepts, but to *use* the *differences* or *oppositions* between the scientific and the humanistic versions of these concepts as a methodological instrument. In other words, I will consider the differences between concepts in each body of knowledge not as true value, but rather as ideological values. I will adopt such strategy to explore which elements of videogames pose a boundary between scientific / technological discourses and humanistic approaches. I would also like to insist that I do not aim to use technological concepts in the original sense of their application in technical fields, but to understand their impact within the humanities in specific, and within culture in general.

In the first chapters I will explore the inclusion of the term *algorithm* –and related concepts– that have been imported into video game studies. I will focus on the work by Jesper Juul, and Alexander Galloway. I will also turn to the work by W. Daniel Hillis and Donald Knuth's for support on basic foundations on the notions of the term algorithm, given that the inclusion of this term in humanities criticism is due to a great extent to computer science's discourses.[6] I have chosen

[6] Stephen Wolfram's *A New Kind of Science* (2002), and John H. Holland's *Emergence: From Chaos to Order* (1998) would have been of great use as

to explore this particular term in response to the frequent calls of some authors who claim the humanities must get serious when approaching technology (Aarseth, Bogost, and Galloway). I will explore how have the term algorithm and similar concepts been introduced into the research carried out by humanities scholars addressing whether there is any relationship between these jargons as used in the humanities and their equivalent concepts in computer and information technology, and what are the ideological implications of the inclusion of these terms into humanities theoretical approaches.

Algorithm and Games

Different sources cite the same origin for the term algorithm: the work of the Persian mathematician Abu Abdullah abu Jafar Mohammad ebne Mūsā al Khwārazmī (780-850 A.C.). When al Khwārazmī's work spread among the Roman Empire's academies, this long name, Latinized, yielded the word *algorithmi*, or algorithm[7] (Daffa 1977).

Because of the frequent Latinization of Arabic and Persian knowledge during the so-called Middle Ages, al Khwārazmī's work yielded yet another popular mathematical term: the word *algebra*. "'[A]lgebra,' in fact, comes from *al jabr* ("the transposition"), a term in the title of one of his books" (Hillis 78). The

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background, but unfortunately I did not have access to those titles at the time of writing.

[7] It has also been suggested that al Khwarizmi's full name was the origin of the word *abracadabra*, related to the incantational word used for medical and mystical purposes. The incantation character of this term will have an important role in my argument about the executable quality of code in front of traditional executable forms of language such as speech or written language. (See "Interpreting the Algorithm".)

book cited by Hillis is *Hisab al-jabr wál-muqabala*, title translated as “rules of restoration and reduction” (Knuth 1), or "the compendious book on calculation by completion and balancing" (Hillis 78), or “the science of restoring what is missing and equating like with like” (Oxford). [8] This book was written between 820 - 830 and was translated and transliterated into Latin (three centuries after its writing) as *Liber algebrae et almucabala* (Goldsmith 4). On the other hand, Hillis’ notes that *al jabr* also has the connotation of a transposition, in other words of transferring a value to another location or context of an equation.[9]

For now, I would like to call some attention to the fact that the term algebra had a strong relationship with the sense of restoring parts of a whole, or putting together fractions of a unit.[10]

Coming back to the word algorithm, it is important to note that it has a long history of meaning modifications. According to Knuth and his classic computer science book *The Art of Computer Programming*, by the eighteenth century, the term was ‘confused’ with an umbrella term for arithmetical calculations (addition, subtraction, multiplication and division), and by 1950, the word was associated more recurrently with the Euclidian process of finding the

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[8] Some transliterations of this title are: *Hisab al-jabr wál-muqabala*, *Al-Kitāb al-muḫtaṣar fī ḥisāb al-ğabr wa-l-muqābala*, and *Kitab al-Jabr wa-l-Muqabala*.
[9] My emphasis in the origins of the term is not due to a philological purpose, but to a possible interpretation of the concept that may shed light into the current use of the word by humanities scholars. Also, I am interested in how this same concept relates to Ian Bogost’s *procedural rhetoric* and Katherine Hayles’ and Alexander Galloway’s concept of code. See below the section titled “From Algorithm to Procedural Rhetoric”.
[10] This notion survives in the Spanish language (Oxford; Diccionario de la Real Academia Española).

greatest common divisor of two numbers, the Greek "Euclid's algorithm". Knuth also states that the modern meaning is similar to that of a "*recipe*, *process*, *method*, *technique*, *procedure*, *routine*", except that the word *algorithm*, besides being "a finite set of rules which gives a sequence of operators for solving a specific type of problem" (Knuth 4), has five basic characteristics: finiteness, definiteness, input, output and effectiveness.[11]

The modern sense of algorithm presented by this computer specialist is interesting in that Knuth's are classic examples for algorithmic characterization by computer science's discourse. It displays many relevant paradigms that are entering the realm of the humanities. For now, I would like to emphasize that the modern concept of algorithm corresponds to a plan that *should be applied*; it is an *action-centered* idea that constitutes a disclosed set of instructions to *perform* a task or to *make* decisions. This action-oriented paradigm can be read in Knuth's advice for a proper understanding of the concept:

> So much for the *form* of algorithms; now let us *perform* one. It should be mentioned immediately that the reader should *not* expect to read an algorithm as he reads a novel; such an attempt would

[11] [1] **Finiteness**: the process has a defined end point, although for Knuth "A procedure that has all the characteristics of an algorithm, except that it possibly lacks finiteness, can be called a 'computational method'." [2] **Definiteness**: "Each procedure has to be rigorously and unambiguously specified for each case." [3] **Input**: an algorithm "has zero or more inputs or quantities given to it initially before the algorithm begins." [4] **Output**: "Has one or more outputs, i.e., quantities that have a specified relation to the input." [5] **Effectiveness**: "An algorithm is generally expected to be effective. This means that all of the operations to be performed in the algorithm must be sufficiently basic that they can in principle be done exactly in a finite length of time by a man using pencil and paper" (Knuth 4-6, emphasis in the original).

> make it pretty difficult to understand what is going on. An algorithm must be seen to be believed, and the best way to learn what an algorithm is all about is to try it. The reader should always take pencil and paper and work through an example of each algorithm immediately upon encountering it in the text. […] This is a simple and painless method for obtaining an understanding of a given algorithm, and all other approaches are generally unsuccessful (Knuth 4), [Emphasis in the original].

Donald E. Knuth's emphasis in the *use* of the algorithms to believe in their performance can be seen as a task of 'interpretation'. As obvious it may sound, it is worth mentioning that interpretation is to the humanities what the process of 'parsing' and 'compiling' is to computer science's jargon.

Daniel Hillis, in his work *The Pattern on the Stone*, a classic of layman's computer literature explains that the term algorithm "refers to the sequence of operations rather than the particular way they are described," and that "it is possible to express the same algorithm in many different computer languages, or even to build it into hardware by connecting the appropriate registers and logic gates" (Hillis 78). So, the same algorithm can be expressed in many different ways, but it is also important to clarify that, for a computer algorithm to be executed, it has also to be parsed, compiled and run. Even if the algorithm is written in different languages, all these processes, will always lead to the same results, or the same output, (with only a variation in execution time).

The stability of an algorithm's interpretation and its result (or output) cannot find an equivalent *vis à vis* the instability of human language interpretation and reception. This is important for the study of digital culture because in the study of literature, culture, or film, for example, the concept of interpretation has a long history of discussions about the hermeneutics of reception, which deal with the production of complex meanings drawn from the *reading* of a *text* (and text is the paradigm for the interpretation of many cultural artifacts, including architecture, painting, or multimedia to mention a few examples).

These meanings, from the perspective of contemporary hermeneutics, are then subject to the reader's personal experience and cultural knowledge. In computer language, given the same input values, an algorithm's output is always the same (although its human interpretation may vary, the computer's will not). In a nutshell, the processing work done by a computer is not the same than the results from such processing. But in the humanities traditional sense of interpretation, algorithmic output is not precisely analogous; interpretation is more similar to the process of parsing and compiling than to an algorithm's output. Both parts of 'interpretation' (parsing and output) coexist in software and, needless to say, in a complex digital system such as video games. These differences are important since they relate to procedural representation, as I will expand further in Chapter II.

Until now, I have briefly explored some characteristics of mathematical and computer science's discourses around the term of algorithm, namely the original sense of algebra as a restoration of parts of a whole, or putting together

fractions of a unit. Then, I focused on the action-centered concept of algorithm within computer science's definition; that is algorithm as the computer execution of formal language instructions, the execution of a *process*. Finally, I compared general issues in the difference of hermeneutical processes' as presented by computing science and the humanities. Next, I will discuss actual uses of the term algorithm by two video games scholars: Jesper Juul and Alexander Galloway.

Algorithms and Rules

In 2005, Jesper Juul –a theorist in the field of video games– introduced the concept of algorithm to illustrate his thesis: video games are artifacts made both of rules and fiction. Juul's work can be read as synthesis of the much discussed narratology[12] vs. ludology[13] debate. Juul located his work among the ludologists' (Espen Aarseth, Gonzalo Frasca, Markku Eskelinen, and Stuart Moulthrop, among others). This group of video game researchers have declared that "much of current game theory to be founded on a series of ill-advised analogies between computer games and the individual theorists' field of study — rather than a specific analysis of the 'gaming situation' itself" (Wardrip-Fruin and Harrigan 35). This allusion to "individual theorists' field of study" refers mostly to film and

[12] Narratology (a term coined by Tzvetan Todorov, but used in many senses by literary theory authors) is not used here in the sense of the narratological studies by Gérard Genette. Here, the term is used in its broad sense, as the study of narrative structures.

[13] Ludology is a name proposed by Gonzalo Frasca in 1999 to identify Game Studies from what the author understood as a Narratological view of games. Frasca wanted video games to be analyzed by their game rules instead of focusing on narrative aspects of games. Of course, this distinction is arbitrary and gradually has been abandoned and substituted by a view in which game rules are actually part of the narrative apparatus of video games.

literature scholars, who ludologists grouped under the title of 'narratologists'. The so-called narratologists were never a concrete 'opponent' group of researchers, but a title that functioned as the representation of a theoretical enemy, a phantom menace representing anyone who conceives games as "cultural, dramatic, narrative, psychological, emotional or otherwise semiotic experiences". (Murray no page) In other words, Narratology was a title used to group humanities' *disciplinary* approaches to video games, but probably the real motivation of ludologists was a rather political and academic interest to create a serious discipline specializing in the study of video games, separated from literature and film studies.

Underlying early ludology studies is the notion of representation as an 'irrelevant' component of games, an idea that later evolved into the substitution of the term representation for the concept of *simulation*. The ludologist agenda started by differentiating their perspective from traditional humanities approaches, and focusing their work on video game time, simulation, and meaning (Wardrip-Fruin and Harrigan 35). In *Half-Real* (2005), Juul Jesper recognizes once being part of the ludologists group in that he also denied the presence of fiction or minimized its relevance, by arguing that the "symbolic or metaphorical meaning of the game … [was] not connected to the program or the gameplay" (Juul 13). The author considered such relationship as 'arbitrary', denying the existence of a relationship between the game structure and the video game subject matter, simulated activities or even simulated settings of a game.

This naïve and crude posture may be compared to the Russian formalist school reaction against fictional content as a strategy to underline the value of formal aspects in art and literature. Despite the value of exploring formal aspects of human expression, any attempt at isolating content and form is a simplistic stance. But today, neither Juul nor other so-called ludologists agree with this posture either. For instance, in *Half Real* Juul follows several discussions concerning the debate on games as rules systems vs. games as fiction systems.[14] Juul's new thesis was precisely a response to these debates and it seeks to propose games as systems that are both rules and fiction. Nevertheless, he is very careful to give rules a higher status over fiction in games.

Juul's concept of rules relates to the concept of algorithm. He proposes rules as both *limitations* for player action and as *affordances*[15] for potential action, or affordances for gameplay (Juul 58). According to the author, rules construct a state machine that responds to player action, and this game state machine can be visualized to explore the game; thus, rules can be *visualized*. But what are game rules? To define them, Juul makes a description using classic computer science's definition of algorithm:

> The rules in games are designed to be above discussion, not in the sense that it is above discussion *what* rules to use, nor in the sense that rules are never subject to disagreement, but in the sense that

[14] See for example, Juul discussion on Goffman's 'rules of irrelevance' (1972) and Caillois' distinction between playing games *as if* vs. playing games *for real*. (Juul 12)

[15] An affordance is the perception of a possible action.

> the *application* of a specific rule *should* be above discussion. If we think exclusively in terms of games played using computers, the question of what kind of rules can be implemented in a computer program has already been specified in computer science with the concept of an algorithm. In Donald Knuth's classic computer science textbook, *The Art of Computer Programming*, he lists five important features for an algorithm … (Juul 62)

Juul cites Knuth's five basic characteristics mentioned above: finiteness, definiteness, input, output and effectiveness (see note 11). What stands out in Juul's definition of rules is a functional perspective that imports the notion of algorithm directly into the realm of video game studies. For example, one of Juul's arguments exposes a hierarchical relationship where rules are more relevant than fiction: "No matter how the pieces are shaped, the rules, gameplay, and strategies remain *identical*" (57). For Juul, game rules are algorithmic (he calls them "algorithmic rules") not only in the sense of a computer-generated game, but among games in general, in the sense that those rules are delimited by the same constraints of a mathematical algorithm: "For something to be an algorithm, it has to be usable without the *understanding* of the domain. […] it only reacts to very selected aspects of the world –the state of the system, the well defined inputs; but generally not the weather, the color of the computer case, the personality of the computer operators, or the current political climate" (Juul 63).

He proceeds then to prove the equivalence between algorithms and game rules by using Knuth's popular example of why a recipe is not an algorithm (it

lacks definiteness) and by extension, Juul sees this same relationship in two possible rules for a sports game:

> The ball is out of play when it is far away.
>
> The ball is out of play when it crosses the white line drawn on the grass.
>
> Both rules specify what aspect of the game context is relevant . . . but the first one fails to specify it in sufficient detail to be of any use …" (Juul 64).

This example appeals to a conception of game rules as systems whose inputs and outputs are strictly defined. What is interesting in this concept is the notion of algorithmic decontextualization (that Juul applies to rules as well). For Juul, rules must delineate what aspects of the game and game context are relevant to the rule, which is perhaps certain within the strict realm of computer game software. But what I want to point out is that Juul *extends* this notion of computer algorithms to the conception of game rules as universal features that are non-ideological and decontextualized. The functional perspective of game rules is also extrapolated to the realm of gameplay and therefore, the concept of irrelevance is applied to many other levels of the algorithm operation.

> For something to be an algorithm, it has to be usable without the *understanding* of the domain. […] This leads back to Goffman's notion of *rules of irrelevance*: playing a game involves ignoring many aspects of the current context: "any apparent interest in the aesthetic, sentimental, or monetary value of the equipment

> employed" (1972, 19). As such *all game rules relate only to selected parts in the context in which they are played*. In state machine terms, this is because a game has a predefined number of *input events*—the state of the game does not change because the sky becomes overcast or because someone coughs; it only changes when someone performs a permissible move*: Game rules relate to selected and easily measurable aspects of the game context*. To rephrase Goffman's description, every game rule also has a *rule of relevance*: […] The rules of relevance are a place where rules and fiction meet in that learning a game also means learning to ignore the purely decorative aspects of that game. This is part of the process *of information reduction*, discussed later [Emphasis in the original] (Juul 63).

By definition, algorithms are decontextualized in the sense that they have precise and specific definitions of what input to accept from the context. But on the other hand, decontextualizing game rules as algorithms, and leading to consider any other game aspect as purely decorative, has lead Juul to apply algorithm decontextualization and the 'rules of irrelevance' *as if* the implementation method of an algorithm was not ideological; *as if* computational language was not a construct; *as if* the game rules did not constitute a simulation (and therefore supporting a fictional word) ; *as if* those rules were not a *design* for the solution of

a problem; *as if* that problem was not a construct; and *as if* those rules were exempt of being contested by exploits or cheats.[16]

The 20th century German philosopher Martin Heidegger characterized technology "as a stance towards the world—what others might call an ideology—insofar as it constitutes an instrumental 'mode of revealing'" (quoted in McQuire 257-258). Katherine Hayles has also drawn attention on the ideological character of code: The operations of "making discrete" highlighted by digital computers clearly have ideological implications (60). Indeed, Wendy Hui Kyong Chung goes so far as to say that *software is ideology*, instancing Althusser's definition of ideology as "the representation of the subject's imaginary relationship to his or her real conditions of existence" (Hayles 60-61). Hayles writes,

> This conclusion makes abundantly clear why we cannot afford to ignore code or allow it to remain the exclusive concern of computer programmers and engineers. Strategies can emerge from a deep understanding of code that can be used to resist and subvert hegemonic control by mega corporations; ideological critiques can explore the implications of code for cultural processes, […]; readings of seminal literary texts can explore the implications of code for human thought and agency, among other concerns. Code is not the enemy, anymore than it is the savior. Rather code is

[16] An *exploit* is a software error in the system (bug), a hack or a bot (these are usually created by players) to take advantage of game software's errors and "cheat" during gameplay in ways not foreseen by developers. *Cheats* are usually advantages that might have been created by video game developers or by users to gain advantage beyond normal play.

> increasingly positioned as language's pervasive partner. Implicit in the juxtaposition is the intermediation of human thought and machine intelligence, with all the dangers, possibilities, liberations, and complexities this implies (61).

In conclusion, Juul's understanding of game rules that are "[m]eaningful inside the game, but meaningless outside," (5) can be a little bit overstated in the sense that game rules do bear ideological stances toward the material world. Nevertheless, I do acknowledge that his study is one of the most serious attempts at understanding the importance of studying game rules and their relationship to fictional elements from a formal perspective.

Interpreting the Algorithm

Alexander Galloway is an expert in media communications and informatics protocols. His theoretical work is concerned with both a formal and an ideological critique of computer technology's cultural implications. His recent work on video games also introduces computer technologies' jargon for the study of cultural technological artifacts, or what Phillip Agre called "Critical Technical Practices" to refer hybrid approaches of critical theory (philosophical, literary, cultural or film theory) and AI agent technology (Agre 1997), which Sengers developed later in her proposal of "socially situated AI" (Sengers 2004).

Galloway also uses the concept of algorithm as a recurrent conceptual metaphor in his book *Gaming: Essays on Algorithmic Culture* (2006). From the first page of this work, Galloway manifests the critical aim of his use of this concept as 'vectors of thought' or 'vehicles' for the *movement* of concepts:

> Philosophy, Gilles Delleuze and Félix Guattari wrote late in life, is about the creation of concepts. To them, a concept is always a type of vector for thought, a cognitive vehicle designed to move things from one place to another. In the five essays in this book, I try to formulate a few conceptual movements, a few conceptual algorithms, for thinking about video games. What is an algorithm if not a machine for the motion of parts? (*Gaming: Essays on Algorithmic Culture* 1).

Perhaps one of the most important contributions of this concept into the cultural study of video games is the theoretical consequence of studying them as systems that in many levels are constituted by material *actions*. In his book *Protocol*, Galloway argued that the main difference between traditional forms of writing and code is that computer code "*is the only language that is executable*" (165 emphasis in the original). This can be a questionable assumption from the perspective of speech act theory and reception theory, for example, but Galloway argues (following Friedrich Kittler) that "'no description of a machine sets the machine in motion.' The imperative voice (and what philosophers like Austin, Searle, and others talk about in the area of speech act theory) attempts to affect change without persuasion but has little material affect" (165). Finally, Galloway holds that "code *is* based on material logic, so it is predisposed to affect material change" (165).

I agree to some extent with Galloway, but to say that code is the only executable language seems a suspiciously fixed idea. I think the executable

character of code is *materially* different from the way natural languages are executed; to deny speech or writing the possibility of being executable does not seem to satisfy the performative character of natural language in general. Following Katherine Hayles:

> When language is said to be performative, the kinds of actions it 'performs' happen in the minds of humans, as when someone says 'I declare this legislative session open' or 'I pronounce you husband and wife.' Granted, these changes in minds can and do result in behavioral effects, but the performative force of language is nonetheless tied to the external changes through complex chains of mediation. By contrast, code running in a digital computer causes changes in machine behavior and, through networked ports and other interfaces, may initiate other changes, all implemented through transmission and execution of code. Although code originates with human writers and readers, once entered into the machine it has as its primary reader the machine itself. […] Regardless of what humans think of a piece of code, the machine is the final arbiter of whether the code is intelligible. (Hayles 50)

I think both code and natural language are executable, but their material consequences differ. An important difference seems to be that code can be both read and executed by a machine, while natural language can be read and interpreted, and not necessarily executed. I argue that both kinds of

'interpretation' (machine and human interpretations) coexist in a complex digital system such as video games.

I agree with Galloway, however, in that code, and its algorithm instances are created according to certain material logics predisposed to "affect material change" in specific hardware. Another way of explaining the difference between the performative character of code vs. the performative character of speech or writing is that code has a similarity (at least by definition) with incantational words. An incantation's function is to *summon* material states or actions, and performing an algorithm or executing code in general, supposes the materialization of a state. In other words, code and incantations have in common that they name what they want to materialize; while speech and writing's referentiality remains in a representational dimension, code instantiates its references *materially invoking* the referent. And this is not too far from the algorithm's old association with mystical relationships to algebra. But what is important here is algorithms written in code, constitute instructions meant to be executed *materially*, as invocations of material action referents. Drama texts and scripts in general are also very close to this possibility to perform a material execution of instructions and states. Another parallel regarding "incantation as executable code" is the relation between incantations and recipes. But the difference is that recipes, as incantations may lack definitiveness, or at least this is not a requirement for their definition.

Coming back to Galloway's use of the concept algorithm for video game studies, this emphasis on action can be also found in his book *Gaming: Essays on*

Algorithmic Culture. Video games are actions and emerge "when the machine is powered up, and the software is executed; they exist when enacted" (*Gaming: Essays on Algorithmic Culture* 2). In the first part of this chapter I suggested to place emphasis on three characteristics that are recurrent for algorithm and algebraic discourses in computer science and mathematics. Two of those characteristics are the action-centered concept of algorithm within computer science's discourse; and a comparison between notions of interpretation in computing science and the humanities. Both notions are central in Galloway's study on video games, where he discusses four formal axes that will be the basis for the 'conceptual algorithm' he proposes: *machine acts*, *operator acts*, *diegetic acts*, and *non-diegetic acts*.

"Machine acts" are actions performed by the system (the machine and the software), while "operator acts" are actions performed by the player. On the other hand, "diegetic" and "non-diegetic" acts relate to the performance within the fictional world and out of the fictional world (notions imported from narratology). According to Galloway, these four axes determine the algorithmic quality of games. For example, RTS games like *Civilization* or RPG games like *Final Fantasy* would be nearer to non-diegetic acts (such as the manipulation of the HUD) and to an operator-centered action. On the other hand, a game like *Ico* would be closer to diegetic acts (inside the fictional world), and to an action more dependent on the machine performance (see Figure 1).

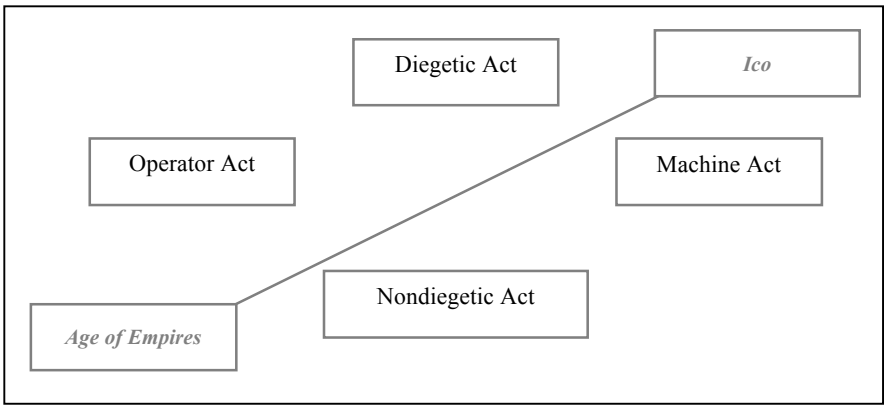

Figure 1. The diagram shows the four axis that are part of Galloway's gamic action model. Adaptation from Gaming: Essays on Algorithmic Culture (4-6).

The author perceives games as algorithmic machines, or as *algorithmic cultural objects* from the perspective of computer software (*Gaming: Essays on Algorithmic Culture* 4-6). But interestingly, he takes on the enterprise of analyzing the ideological implications of those algorithmic cultural objects by exploring the relationships of control that are established by the video game algorithmic machines and its players. For example, games like real-time strategy (RTS), role-playing games (RPG) or turn-based strategy games (all of these are non-diegetic operator-act games) are considered as having an algorithm "shape of action" (*Gaming: Essays on Algorithmic Culture* 38). What this means is that these games are what he calls allegories of control or *allegorithms*: playful and critical commentaries on contemporary's society mechanisms of control, more specifically, information control. Galloway argues that RTS and TBS games often privilege actions of setup and configuration (like using pull-down menus, making setup decisions and configuring system preferences) as part of the gameplay, not only of pre, post or interplay. These actions are part of the narrative, but at the same time, they "eschew the diegetic completely" (14).

That is one of Galloway's arguments for critiquing the diegetic video game action worlds: games of ambience act (ruled by machine act and the diegetic world) are for Galloway "the action experience of being at the mercy of abstract informatic rules" (like in *Ico*). Games of 'menu acts' (ruled by the operator's acts and non diegetic world) like RTS or RPGs, are "the action experience of structuring subjective play, of working with rules and configurations." Within these games, Galloway thinks that

> instead of penetrating into the logic of the game, the operator hovers above the game, one step removed from its diegesis, tweaking knobs and adjusting menus. Instead of being submissive, one speaks of these as "God games." Instead of experiencing the algorithm as algorithm, one *enacts* the algorithm. In both cases, the operator has a distinct relationship to informatics, but it is a question of the composition of that relationship. (*Gaming* 18)

For Galloway, playing video games can range from the possibility of the player *experiencing* the algorithm on one hand, to the possibility of *enacting* the algorithm on the other. Experiencing the algorithm would be like watching the computer performs actions in the game world, while enacting the algorithm would be like actively making decisions to tweak the system and configure the course of action and therefore the game story.

To recap, algorithm is a notion that helps understanding the action-oriented quality of video games as cultural objects, but also can help us understand the materiality involved in the act of executing video games. Finally,

the algorithm concept gives us a third characteristic: video games' performative character differs from previous forms of fiction in that it allows *the execution of a process*, rather than *experiencing a process*.

Galloway uses the term algorithm to critique the politics of technology within video games as cultural objects, and simultaneously introduces computer technology to discussions in the humanities. His critique consists on what he calls "interpreting the algorithm", a procedure that he explains by appealing to Clifford Geertz's work on Balinese cockfight events,[17] a traditional event where play becomes an allegory of cultural structures. In this case, the cockfight is a "means of expression [for] a powerful rendering of life … Play is a symbolic action for larger issues in culture" (Geertz 436). What Geertz' work contributes to Galloway's argument is the suggestion about acts of configuration –the non-diegetic operator acts– are *allegorithms* of cultural processes, or expressive simulations of cultural, social, political or historical events. These processes,

[17] ". . . I turn to Clifford Geertz and his gloss on the concept of 'deep play.' In the essay 'Deep Play: Notes on the Balinese Cockfight,' Geertz offers a fantastically evocative phrase: 'culture, this acted document.' There is culture, but culture is a document, a text that follows the various logics of a semiotic system, and finally it is an acted document. This places culture on quite a different footing than other nonacted semiotic systems, (Certainly with literature or cinema there are important connections to the action of the author, or with the structure of discourse and its acted utterances, or with the structure of discourse and its acted utterances, or with the action of reading, but as texts they are not action-based media in the same sense that culture is and, I suggest here, video games are, Geertz's observation, then, is not to say that culture is a text but to say that the action is a text. In subsequent years this has resonated greatly in cultural studies, particularly in theories of performance.) In 'Deep Play,' Geertz describes play as a cultural phenomenon that has meaning. Because play is a cultural act and because action is textual, play is subject to interpretation just like any other text" (Galloway 14-16).

Galloway claims, can be "large, unknown, dangerous and painful," for example war or colonization processes. He argues that these are processes that 'require' to be expressed indirectly, through the indirect non-diegetic acts (not inside the represented world). In other words, war can be expressed through pull-down-menus-decision-making, to give an example.

An accurate representation of political control, for Galloway, requires an allegorical interpretation of *informatic* control. To play with the algorithm means to become involved with the information that controls our play, and to win is to know the system. To interpret the algorithm is to interpret the game itself, to discover the technological and simulated configuration of the enacted world. Galloway finishes this part of his essay by arguing that games that render acts of configuration (or menu acts) are an allegory of the information age has portrayed the social immersion of individuals in an economy "mediated by machines and other information artifacts […] to live today is to know how to use menus," Galloway writes (17).

> Acts of configuration in video games are but a footnote to this general transformation. […] just as the cockfight is a site for enacting various dramas of social relations, so these nondiegetic operator acts in video games are an allegory for the algorithmic structure of today's informatic culture. Video games render social realities into social form. (*Gaming: Essays on Algorithmic Culture* 17)

This basic analysis of Galloway's and Juul's discourses is an exploration of how the computer is influencing humanities approaches to cultural artifacts. Our processes of reading, our concepts of text and our understanding of culture in general are being affected by a tendency to computerize aspects of non-digital organization, which Ian Bogost explains as a transition from material capital to intellectual capital (*Unit Operations* ix). I would also add that the humanities are assuming more openly their status as an ideological instance; the humanities are recognizing their own perspective as a representation of its imaginary relationship to its "real conditions of existence", (Althusser 162) and one example is engaging in understanding the material conditions of cultural productions. And this includes understanding hardware and software's involvement in the production of digital culture.

Research in the humanities is changing, and there is a need of integrating discourses with an interdisciplinary perspective. Many other humanities' and sciences' authors could be read to understand how our jargon is being modified by the increasing centrality of technology within our cultures. The humanities are both assimilating technological knowledge and criticizing it. The work of Katherine Hayles, Evelyn Fox Keller, Stephen Wolfram, John Holland, Ian Bogost, Mathew Fuller and Mathew Krischenbaum, Friedrich Kittler and many others is needed in order to continue the exploration of digital media interdisciplinary discourses.

Although the concept of algorithm has not by any means been exhausted, I would like to add one final concept as it relates to the context of video games:

Hillis' explanation of *heuristic*[18] as an algorithmic example is more adequate to explain human learning processes involved in play than the concept of algorithm (he strictly differentiates heuristics from algorithm as exclusive terms):

> A rule that tends to give the right answer, but is not guaranteed to do so, is a heuristic. (Hillis 3) […] a method that almost always works is not an algorithm. […] There are many problems for which we do not need exactly the right answer every time—problems for which we can accept a less-than-perfect solution. Even when we want a perfect answer, we may not be able to afford it. For such problems, computers can produce an educated and well-considered guess. Because the computer is able to consider an enormous number of combinations and possibilities, such a guess will often surprise the programmer. *When a computer uses heuristics, it is capable both of surprises and mistakes—which makes it a little more like a person and a little less like a machine.* (Hillis 90) [Emphasis added]

Hillis separates the concept of algorithm from heuristics (he strictly differentiates them as exclusive terms). Whether heuristics is also an algorithm or not (I would say it is), is not part of my discussion. But I must say that if we are to consider the convenience of these terms to approach the experience of playing

[18] I understand heuristic as a strategy for problem-solving used both by human and machines, sometimes by humans through machines. This strategy works using available information, intuitive guesses, trial and error techniques. Experimentation might be one of the core characteristics of this approach to problem-solving. I will return to this topic on my chapter on Strategy.

video games and their cultural implications, I would say that to play a game involves always to test "less-than-perfect" solutions to a given problem, or to act in situations that do not necessarily require a fixed and unique answer or action to advance in the game (for example in Massive Multi Online Role Play Games (MMORPG) like *World of Warcraft*). Games offer both a fictional world and certain mechanisms and constraints (rules), which allow the player to perform *processes*. The player also has to learn how those processes affect a given fictional environment. In other words, what I would like to argue is that the concept of algorithm (specifically a heuristic algorithm) is a useful concept to approach how we, as players, experience the processes of interacting with a rule-based fictional world, built upon the execution of code. We interpret these processes by means of the game rules. And interpreting the rules of a game, along with implementing possible actions or solutions does have an effect in the overall fictional world we are immersed in. Interpreting the rules of a game involves the player engaged in a 'heuristic' process of search, trial and error, or "guess and check".

A heuristic algorithm seems to me an interesting approach to describe the dynamics of a rule-based fictional system such as video games, in other words, how rules are part of fiction an interpretation. I will come back to this in a future chapter, as an argument towards the cognitive paradigm I mentioned before.

Chapter 2. Procedural Realism

From Al-Khwārizmī all the way to Donald Knuth to Daniel Hillis to Juul Jesper to Alexander Galloway to Ian Bogost, there seems a constant interest in the execution of instructions and in the mobility between the states of a game or software, both from the perspective of the program and the player. Are we looking here at a cosmology or a worldview paradigm? Ian Bogost does not treat this phenomenon (which he calls procedurality) as a cosmological paradigm but rather as a rhetorical one.[19] If the notion of algorithm seems to be a helpful approach to understand our interactive experiences with digital artifacts—like the execution of digital processes when playing a video game—it seems to me that we need to devote attention to how a critical study can address the algorithmic character of play in its ideological dimension, in other words, how can we look at the expressive aspects of video games using this theoretical framework? And what can we say about algorithmic fiction, or, more specifically, about an algorithmic form of realism?

Procedurality as Ideology

We could say that all three authors Bogost, Juul, and Galloway are motivated by a common interest in the sequential, executable, instruction-driven, and routine-like character of both running the software and playing a video game.

[19] Toward the end, I will argue that Bogost's concept of procedural rhetoric identifies a concrete case of a cosmological paradigm proposed by Katherine Hayles in her work *My Mother Was a Computer*. The following chapters will progressively explore specific video game examples to construct some arguments around this hypothesis.

Bogost does not explicitly use the term algorithm to articulate his concept of procedural rhetoric, but he does address the many layers of procedure executions involved in play (code execution –AI, graphics, interface– and player execution).[20] I think that we are looking here at an attempt to articulating an analogous relationship between the way a programmer *communicates* with a computer on one side, and the way a player/user *communicates* with a system in the other. These two exchanges between computers and humans have in common that they constitute *procedural representations*. In popular technical literature, the source code, written by a programmer in a computer language, is often referred as a means of communication between a human (a programmer) and a computer. Furthermore, algorithm –understood as a conceptual machine (Deleuze and Guattari, Galloway) – seems to be a privileged term to name the communication between a player and a game, or between a user and software. This communication is similar to what Bogost would call *procedurality*.

Bogost borrowed the term *procedural* from Janet Murray's popular book *Hamlet on the Holodeck*, where she defines *procedurality* as an essential characteristic of digital artifacts.[21] Her definition refers to the computer's "defining ability to execute a series of rules." Janet Murray argues that "[t]o be a computer scientist means to think in terms of algorithms and heuristics, that is, to be constantly identifying the exact or general rules of behavior that describe any

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[20] Bogost does not refer to *procedural programming*, a term used in computing science to refer a programming paradigm, which precedes object-oriented programming.

[21] She cites four essential properties of digital artifacts: procedurality, participation, spatiality, and encyclopedic scope (Murray 71).

process, from running a payroll to flying an airplane" (72). Bogost then explains that Murray's definition of procedurality is more focused in programming authorship, and less in the perspective of a computer user, given that a programmer "authors code that enforces rules to generate some kind of representation" (*Persuasive Games* 4).

Following Murray's statement, it seems that she refers to programming as an ideology in itself; an imaginary relationship with the material world, i.e. programming as an approach to the world that consists of a constant search for "the exact or general rules of behavior" that describes real life processes. Because this research project will focus on player actions, what is relevant for this thesis is less concerned with the procedures of authorship than the procedures carried out by the execution of software by the user/player (i.e. reception). As Bogost himself puts it, if computational expression is procedural (i.e. programming), and computational expression is written in code, the *execution* of that expression by the user is also procedural.[22] Therefore, I would add that the execution of that expression by the user is also ideological.

> Computers run processes that invoke interpretations of processes in the material world. […] Computation is representation, and procedurality in the computational sense is a means to produce that expression… Because computers function procedurally, they are particularly adept at representing real or imagined systems that themselves function in some particular way –that is, that operate

[22] See "Black and White Boxes" in Bogost's *Persuasive Games*, pp. 62-63.

> according to a set of processes. The computer magnifies the ability to create representation of processes. […] The type of procedures that interest me here are those that present or comment on processes inherent to human experience. (5) […] However, procedural representation takes a different form than written or spoken representation. Procedural representation explains processes *with other processes* (*Persuasive Games* 9) [Emphasis in the original].

I agree with Bogost in that *procedural representation* —meaning the representation of processes "*with other processes*"— conveys an important difference from written or spoken representation, but I would add that another difference is that procedural representation depicts processes with [the material execution] of other processes.[23] I agree also in that they are a particularly adept strategy for illustrating other systems and behaviours. Such procedural representation is not exclusive to digital culture, but this type of representation, which involves the implementation of rules in a fictional process (that in turn simulates a fictional or real process) can be traced back to the notion of play. Having this in mind, we can follow Bogost in that computers are able to magnify or intensify the representation of procedures, but are not an exclusive medium for these practices.

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[23] In the light of previous discussions in video game studies, where authors have neglected the use of the concept of representation in favor of simulation (Gonzalo Frasca, Simon Penny), I would like to clarify that I disagree in thinking one concept excludes the other. I think of the concept of simulation as a complex procedural representation, as I will explain further.

Visibility of Rules

Bogost's tactic to analyze "videogame-based procedural rhetoric" (9) is to *describe* the function of processes; in other words, to describe video games rules.[24] But video game rules are not always visible to the player, at least not the code that describes those rules. So, how can be these rules described from the perspective of the user? Some authors have tackled before this 'lack' of perceptibility: in *Protocol*, Galloway reviews this aspect, and cites authors like

[24] It seems also interesting to me that Bogost does not contextualize his approach around related critical theory concepts like simulation and performance. Some examples of this decontextualization are his illustrations of non-digital procedural representation:

"*Procedural representation itself* requires inscription in a medium that actually enacts processes rather than merely describe them. Human behavior is one mode of procedural inscription. Human actors can enact processes; we do so all the time. The clerk, the supervisor, and the army private all enact procedures. Even very young children can consciously enact procedures with great success: crossing the street, tying one's shoes, and setting the table are all unit operations in cultural and social processes. Nondigital board and card games offer further examples of human-enacted processes; the people playing the game execute its rules. But human behavior is a challenging medium to muster for arbitrary expression. It is difficult to coerce even a small group of people to execute a process again and again, without rest and without incentive. Because procedurality is intrinsic and fundamental to computers, and because computers are much more flexible as an inscription medium than human agents, they are particularly suited to procedural expression. (Bogost, *Persuasive Games* 11-12) [Emphasis in the original]"

There is no mention to the concept of performance, but as I discussed before, Bogost does state that he will focus on the execution of those procedures *by the user*. What is at stake here is that Bogost argues that computers are best suited to procedural expression because humans are less flexible as an inscription medium than computers. Now, the thing is that Bogost wants to center his attention precisely in the users (the players), who execute those digital procedures and are not as flexible as computers, but who do enact processes in their daily life. I think this is a point that needs more attention in order to include performance theories in a discussion about how we as players execute, enact, perform the processes simulated by a computer. However, I will not tackle this subject given that it would require special attention in a separate section.

Katherine Hayles, who uses the term "flickering signifiers" to name the digital images that work as *perceptible* manifestations of sub layers of code (quoted in *Protocol* 165). Galloway also cites Friedrich Kittler who defines software as a "logical abstraction" that exists "in the negative space between people and the hardware they use" (Galloway 165). Also Ian Bogost, in *Persuasive Games*, reminds us that in software development and testing, there exists a term to name the action of experiencing software without having access to code: "To watch a program's effects and extrapolate potential approaches or problems (in the case of testing) in its code is called *black-box analysis*. Such analysis makes assumptions about the actual operation of the software system, assumptions that may or may not be true" (*Persuasive Games* 62). The importance of black box analysis is that it is ultimately the version of the system that is visible to the player, together with the mechanisms that allow the players to 'game' or trick the system. It is essential to address this issue, given that any attempt to perform a critical study of popular digital culture involving artifacts such as video games needs to approach this visible dimension of any interactive system in question.

> Rather than addressing this problem from the bottom up through code literacy, we need to address it *from the top down through procedural literacy* […] Part of that practice is learning to read processes as a critic. This means playing a video game … with an eye toward identifying and interpreting the rules that drive that system. […] *one notion worth keeping is that of dissemination, the*

> *irreversible movement of the text away from the act of authorship*. (*Persuasive Games* 64) [Emphasis added]

My own approach to describe game rules and procedures from the top down will be an attempt at implementing what Bogost calls critical procedural literacy. In other words, I will try to move away from describing video game authorship processes, moving toward a 'black box' reading, in which I will focus on describing the processes involved in the execution of video games; specifically I will make a critical reading of 1) rules, 2) play processes and 3) values promoted by these processes, in order to address video games' ideological dimension. Now, the question is *where* are these procedures inscribed? Exactly *where* can I read these processes / rules and values? More specifically: how can I visualize rules?

Procedural Rhetoric: Interface Logics

Until now, I have described some concepts that I will use as part of the methodological and theoretical framework to describe my perspective in this critical analysis. As a final note, I would like to state some tactical procedures that illustrate in a more concrete way what I am looking for in the following chapters, and of course, how am I going to perform these readings.

First of all, I will assume the position of a player. Play will be the concrete data gathering method and will also be the relationship I will establish with the video games. During play, I will use Galloway's gamic action diagram (see Chapter 1) as a formal framework to understand the interactive formal characteristics of gameplay and game action; this framework will allow me to

identify both narratological and ludological aspects of video game procedural representations.

But, *where* are these procedures inscribed? Exactly *where* can I read these processes / rules and values? Video games can be read in so many different dimensions (AI, graphics, interface, storytelling, cinematics, etc.), and as I want to focus on play, I will take on an action-centered approach: action as the place (or state?) maybe "site" of inscription.

Following Galloway's gamic action (see Chapter 1), rules are executed via procedures, and procedures are executed via actions, and the *places* where these actions occur in are both a diegetic dimension (game world) and an extra diegetic dimension (for example, in the HUD interface). [25] For Juul, "fiction in video games plays an important role in making the player understand the rules of the game. A statement about a fictional character in a game is *half-real*, since it may describe both a fictional entity and the actual rules of a game" (163). [Emphasis in the original] To continue with this idea, I would like to explore in which other ways the players perceive game rules.

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[25] Heads-Up-Display (HUD) is a name originally given to military information display technologies. HUDs were basically transparent visual displays (similar to gun sights) that allowed users of a military transportation vehicle to perform shooting operations with the "head up." In other words, aviators were able to aim and shoot without being distracted from their objectives. This technology was ported for use by different transportation vehicles, cars and video games. The transparency factor is not a constant characteristic (most HUD interfaces surround the user's visible space) but the importance of keeping the driver/user focused in the terrain/space ahead while commanding, controlling operations for the accomplishment of a mission is a basic quality of HUDs.

It seems to me that there are at least three *visible* or *perceptible* places for the player to perceive and experience the rules that build the game world: graphic procedures/states, play processes and the HUD game interface. Because of my interest in the extradigetic aspects of video games, I chose to examine game procedures and the video games' HUD interfaces and explore the latter's procedural tropes (action buttons, menus, etc.).[26] These common models of graphical logics entail ideological relationships too, and I will take a look at the processes and graphical representations that promote certain values in the interface to identify how these logics –develop or establish arguments.[27] As Bogost explains it, in order "[t]o address the possibilities of a new medium as a type of rhetoric, we must identify how inscription works in that medium, and then how arguments can be constructed through those modes of inscription" (*Persuasive Games* 24). I will answer to such observation by examining how arguments are constructed by inscribing processes in the game's HUD interface.

I will explore the following 'places' of ideological inscription: 1) *Rules*: What rules build the logic of a game world? How are these rules constituted and in what way are they perceptible to the player? 2) *Processes*: What processes / steps / procedures / sequences are involved in executing rules and performing game actions? 3) *Interface*: What is the role of the game HUD interface in the visualization of rules and in the execution of procedures involved? 4) *Promoted*

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[26] The game interface will be the concrete focus for `construction my arguments in favor of the worldview, cosmology or ideological paradigm I mentioned before as the main thesis of my research project.

[27] I will expand on the notion of promoted values in my Chapter on Strategy.

values: What can a player do in the game and what actions are not allowed? What actions are valued for the progress of the game and which suggest less valuable or worthless actions?

Gameplay procedures that occur during play, focusing mostly in what Bogost calls *interface logics*. Bogost adapted this term from Noah Wardrip-Fruin's *operational logics*, which the latter used to refer to the individual operations that are very frequently found executing similar roles in different procedural representations (*Persuasive Games* 13). For example, the scrollbar is an example of an interface element that is frequently found in different software; this element constitutes a common mode of user interaction with a system and can be considered a procedural trope:

> [P]rocedural tropes often take the form of common models of user interaction. Elements of a graphical user interface could be understood as procedural tropes, for example, the scrollbar or push-button. These elements facilitate a wide range of user interactions in a variety of content domains. Operational logics for opening and saving files are also reasonable candidates; these tropes encapsulate lower –level logics for getting handles to file streams and reading or writing byte data. We might call the former group of procedural tropes *interface logics*, and the latter *input/output (IO) logics*. (Bogost, *Persuasive Games* 13-14) [Emphasis in the original]

There are certain games that require more interaction with a HUD than others. For example, popular role playing games (RPG) such as *Final Fantasy*, *Oblivion* or *World of Warcraft*, require the player to engage in an interface-intensive game; interacting with the game's HUD becomes a game in itself. Galloway argues that in this type of gameplay "non-diegetic acts" (play acts outside of the fictional world, such as interacting with menus or inventories) are predominant (see Chapter 1: Interpreting the Algorithm). I think this type of nondiegetic interaction is very important for games that portray a particular type of realism I want to explore, in which non-diegetic procedures have a significant ideological role (see "Procedural Realism" below). For this reason, I chose to look at computer strategy games, specifically Real Time Strategy games (RTS), given that their HUD interaction and their rule-intensive play mode constitute an appropriate example of this realism concept. I am also interested in these games because of their genealogy: back from the origins of tabletop wargames in the 19th century, the role of rules in traditional strategy games is an excellent example of how this concept of realism evolved.[28]

In summary, I will focus on how game rules build realism, a practice I will call *procedural realism*. My first intention is to explore this idea in war-themed video games, such as turn-based strategy computer game (Sid-Meyer's *Civilization IV*), real-time strategy (RTS) computer games (*Rise of Nations*, *Age of Empires III* and *Medieval II*) and drawing parallels as comparison to popular RTS games (*StarCraft*, *Rise of Legends* and *Sins of a Solar Empire*). However, for

[28] I will include a discussion on the evolution of these rules in Chapter 3.

reasons of space, I will only analyze Microsoft's *Age of Empires III* and its expansion *The War Chiefs*. Before analyzing these games, I will articulate the basic notion of procedural rhetoric, and the following chapters will constitute an investigation of the ideological aspects involved in this type of rhetoric.

The interface extra-diegetic dimension is a key element in achieving a particular concept of realism popular in strategy games. This form of realism, is built by interacting with game rules (in the case of tabletop wargames); interacting with interfaces that represent game rules (in the case of computer war games); and in general, enacting procedures / executing algorithmic performances / embodying heuristic behaviours for the reproduction of 'real' world outcomes. In the case of wargames, these outcomes have a historical background, which also contributes to the construction of this type of realism. Further discussion on the role of historical settings will be included in Chapter 3.

Procedural Realism

There are certain realism claims in certain video games. These realism claims consist in the execution of processes that imitate material processes, i.e., processes in the so-called real or non-fictional world. In other words, I want to know what relationship that a given video game process establishes with the material process simulated by the video game, specifically with the 'real world' process that a game claims to refer.

I coin the concept of *procedural realism*[29] as an algorithmic / procedural paradigm for simulating other processes with emphasis in a concept of realism.[30] However, procedural realism also constitutes an instance of a particular worldview, similar to Katherine Hayle's "Regime of Computation"; moreover, as I will argue in the following chapters, it is an expression of a cosmology. For now, and in general, it will be enough to say that in this worldview, code itself is a model or a paradigm for representing and simulating the material world, or more specifically, for simulating material processes. In particular, procedural realism is a mode of inscription that aims to reproducing real-world *processes* and their *outcomes* as I will propose below.

Procedural Realism: Iconicity and Indexicality

> There is probably no critical term with a more unruly and confusing lineage than that of realism.
>
> *Hill*

Exploring realism as a concept turns any search into a Borgesian labyrinth. I found several discussions on visual and textual realism disorienting, probably because I want to explore the possibility of constructing a concept that builds on Bogost's work on the procedural aspect of games as the execution of processes to represent other processes. I decided to work from a more basic level to construct

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[29] I coin the term procedural realism to refer a type of fictional realism, derived from Ian Bogost's concept of *procedural rhetoric*. As described above (in the first part of this chapter), in Bogost's view, procedural representation is part of a rhetorical discursive practice different from literary and aesthetic realism.

[30] I will not join the debate about video games as representation vs. games as simulation in this chapter, because I think both forms coexist in digital media in general. Also, simulation can be seen as a type of representation as I will explain in further chapters.

my understanding of what I believe to be a form of realism that works through procedural representation.

My proposal of procedural realism is based on 1) Juul's notion that rules are in direct relationship with fiction, "cuing fiction" (176), 2) Bogost's procedural rhetoric concept, and 3) because I am exploring and constructing a concept of realism, I will also use Charles S. Peirce's basic sign typology—in particular Peirce's classification of signs according to the signs' manners of denoting an object. In other words, I will use Peirce's categories based in what the relationship established by the sign in direction to the referred object is.[31]

Peirce explains the basic structure of the sign as follows: "I define a *sign* as anything which is so determined by something else, called its *Object*, and so determines an effect upon a person, which effect I call its *interpretant*, that the later is thereby mediately determined by the former" (*Essential Peirce* 2: 478) [Emphasis added]. Here, Peirce identifies three different elements in his concept of sign: a 'sign', an object and an interpretant. But it is important to clarify what are these basic elements of a sign, because it can be somewhat confusing the fact that Peirce uses the word "sign" both for his concept of sign as a whole and also as an element enclosed in his overall concept of sign.[32] For the sake of clarity we

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[31] Galloway's action model will be used in conjunction with the procedural realism concept to expand on the games I will analyze in further chapters.

[32] This terminological difficulty is noted in the *Stanford Encyclopedia of Philosophy*: "We appear to be saying that there are three elements of a sign, one of which is the sign. . . . Strictly speaking, for Peirce, we are interested in the *signifying element*, and it is not the sign as a whole that signifies. In speaking of the sign as the signifying element, then, he is more properly speaking of the sign refined to those elements most crucial to its functioning as a signifier. Peirce uses

can begin by saying that a sign is composed of three elements: 1) an *object*, which is anything that can be thought; 2) the *interpretant*, or the meaning produced by the interpreter; and 3) the *sign* aka *sign-vehicle* (or Saussure's "signifier), which is the signifying element, the perceptible 'thing' that refers the object. "For Peirce, then, [the sign as an element] is only some element of a sign that enables it to signify its object, and when speaking of the signifying element of the sign, or rather, the *sign-vehicle*, it is this qualified sign that he means" (*Stanford Encyclopedia of Philosophy)* [Emphasis added].

In summary, a sign is for Charles Peirce a representation, anything that establishes a meaningful relationship with an interpretant (a meaning) and an object: "The being of a sign is merely *being represented*" (*Essential Peirce* 2: 303) [Emphasis in original]. This representation refers to an object, which can be material, but this object can be also a concept, an idea; for example from the concept of *love* or the word 'apple' to the Eiffel Tower.[33] Then, we have that a

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numerous terms for the signifying element including "sign," "representamen," "representation," and "ground." Here we shall refer to that element of the sign responsible for signification as the "sign-vehicle" or "signifier" [Emphasis in original].

[33] "The being of a sign is merely *being represented*. Now *really being* and *being represented* are very different. Giving to the word *sign* the full scope that reasonably belongs to it for logical purposes, a whole book is a sign; and a translation of it is a replica of the same sign. A whole literature is a sign. The sentence 'Roxana was the queen of Alexander' is a sign of Roxana and of Alexander, and though there is a grammatical emphasis on the former, logically the name 'Alexander' is as much a *subject* as is the name 'Roxana'; and the real persons Roxana and Alexander are *real objects* of the sign. Every sign that /304/ is sufficiently complete refers to sundry real objects. All these objects, even if we are talking of Hamlet's madness, are parts of one and the same Universe of being, the 'Truth. But so far as the 'Truth' is merely the *object* of a sign, it is merely the

sign is defined by the relationship established by three entities: the referred object (i.e. the material form of *wind*), the interpretant (i.e. the idea of *wind*) and the sign (i.e. the word 'wind'). What is important here is the cultural convention between the word 'wind' and the phenomenon or object it names. To avoid ambiguity, in the rest of this chapter, I will use the following concepts: *sign-vehicle* (to refer the material form of a sign, similar to Saussure's *signifier*), *object* (the object being referred, similar to Saussure's *referent*) and *interpretant* (the meaning or the interpretation of the sign, similar to Saussure's *signified*).

To explore the topic of realism, it is important to approach possible relationships between a representation and its real referent. Peirce articulated several classes of signs; the most popular classification, however, is the typology that classifies signs according to their way of referring an object:[34]

Peirce calls *index* a sign that has an *existential* or *material* relationship with the object; in other words, a relationship of contiguity. The most popular examples are the smoke that indexes the presence of fire, or a footprint that signifies a former presence and a present absence of a person or an animal. Another type of sign is an *icon*; these signs establish a relationship of *imitation* or *resemblance* with an object (for example, a map, onomatopoeia or a painted portrait). Finally, Peirce uses the term *symbol* to refer those signs that have an

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Aristotelian *Matter* of it that is so. In addition however to *denoting* objects, every sign sufficiently complete *signifies characters*, or qualities" (Peirce 303-4).

[34] Peirce also classified signs according to their own *phenomenological category* and according to that which the *interpretant* signifies to be the sign's relationship with its object (in fewer words, the sign's relation to its interpretant). See *Collected Papers of Charles Sanders Peirce*, vol. 2, 254-263.

arbitrary relationship with the designed object; these signs are based in cultural conventions and might have different meanings in different cultures (for example, the image of a white dove used to signify the concept of peace in Occident, flowers to signify love, or a non onomatopoeic word).[35]

Any form of communication, including communication throughout digital media cannot be reduced or classified to only one class of sign. One cannot say that digital media is iconic or symbolic exclusively, for example. But one can take an example of sign references to real world objects and try to identify what is the main tendency of a communicative utterance towards the referred object. In other words, one can try to identify a tendency to privilege some kind of relationship between objects and signs; likewise, onomatopoeias privilege iconic relationships to the object over symbolic relationships, though one class does not exclude another. And identifying this tendency seems to me a way for reading or approaching the ideological relationships to the material world as entailed by the use of a sign. This leads to the question: what is the imaginary relationship entailed by the use of a sign toward the real world object it refers to? In the case of video games, what can we tell about ideology by looking at the use of iconic procedures to imitate real life events—assuming some kind of symmetry with real life events and, in this sense, claiming some level of realism?

Signs can entail complex relationships and interactions. A single sign can be a placeholder for the coexistence of different relationships to the real object. For example, smoke signals hold both indexical and symbolic relationships

[35] The concepts of index and icon are discussed in more detail below.

(material and arbitrary): we can look at smoke signal as an index of fire, and/or as a symbol of danger. And this coexistence is generally (if not always) dynamic, in the sense that both classes of signs can coexist and fulfill different functions in the same sign. My interest in emphasizing signs as dynamic entities is due to the fact that the procedural realism concept I want to articulate privileges two relationships to different referred objects: iconicity and indexicality. I will explain myself first with some video game examples in order to articulate the dynamic processes entailed in the concept of procedural realism. In the following chapters I will discuss wargames and computer strategy games in particular.

Iconic Procedures

When one plays a tabletop strategy game such as a wargame, or a video game simulation like a sports video game for example, one cannot avoid perceiving that the game aims to achieving some kind of realism—perhaps not with historical accuracy—but there is indeed some degree of *imitation* of reality. For instance, in a sports video game like *FIFA Soccer 08*, sports game rules are imitated in detail to reproduce player actions such as running and kicking, permissible actions are analogous to the official soccer rules, but players can also perform illegal tricks that occur in real soccer games, and obtain analogous consequences in the game. In addition to the simulation of these actions, a television spectator perspective is also simulated to attain the mediated realism we are used to watching in a TV sports channel.

This interest in imitating real processes has an important relationship to the general idea of representation, and more specifically to mathematical

representation. In the *Encyclopedia of Computer Science*, Roger D. Smith explains that in order to understand the behaviour of a real-world system, "[a]ssumptions are made about this system and mathematical algorithms and relationships are derived to describe these assumptions—this constitutes a "model" that can reveal how the system works" (Smith, no page in electronic version). The complexity of the system / process to be imitated (say a soccer match, a battle between two armies, flipping a coin in the air, or the movement of a car from point A to point B), will determine whether the system can be reduced to an analytical solution like a mathematical equation. For instance, Smith mentions that "the distance traveled by an object at constant rate for a given period of time" can be simply represented by "[a] single equation such as DISTANCE = (RATE * TIME)". However, Smith continues, real world processes are usually far more complex than simpler systems that can be imitated with a single equation.

> [P]roblems of interest in the real world are usually much more complex than this. In fact, they may be so complex that a simple mathematical model can not be constructed to represent them. In this case, the behavior of the system must be estimated with a simulation. *Exact representation is seldom possible in a model, constraining us to approximations to a degree of fidelity that is acceptable for the purposes of the study.* Models have been constructed for almost every system imaginable, to include factories, communications and computer networks, integrated

> circuits, highway systems, flight dynamics, national economies, social interactions, and imaginary worlds. (Smith) [Emphasis added]

It seems interesting to me how "simple mathematical models" and "simple equations" are regarded as inappropriate representations of a real world system's behaviour or a system process. Here, the concept of *simulation* is opposed to the idea of analytical solutions and to "simple mathematical models". But the concept of representation is not excluded from the concept of simulation and it becomes an important aspect for approaching how simulations attempt to achieve realism, I would like to focus on *how representation occurs in simulations* instead of treating simulation and representation as opposed and / or separated systems.

Because my thesis is an approach to procedural rhetoric rather than to textual or visual rhetoric, I would like to emphasize the following statement: *rules are representations*. The reason is that in order to understand game processes, one has to understand that game processes work under the parameters of game rules, which in turn represent guidelines to simulate the real world. In short, I should focus on *how representation works in the simulation of processes*. Furthermore, I think that if we are to read how signs work in procedures, we should read a) how rules define the way processes are to be executed, and b) how these rules imitate real world possible actions, routes of actions and outcomes. If rules are representations, and following Peirce's sign classes, I should look at what is the relationship established by rules in direction to real world processes.

In the football example, there is in place an imitation of the real game rules of a football game. These rules will define the player actions and computer actions as well. For instance, there will be rules that define what the player is allowed to do (i.e. kicking a ball with a foot), and what the player is not allowed to do (i.e. touching the ball with the avatar's hands). Thus, we can say that player action rules (in simulation video games) are representations of real world actions that exist and are executed in real football games. Here, rules are the representation of *how to* execute changes of state of objects like the position of the players or the position of the ball, and all this is articulated in rules in order to imitate how this would happen in real football games, and of course, considering decisions made by the players. My point here is that the relationship that simulation game rules establish with the real world is essentially a relationship of imitation, which is often referred in critical theory as a mimetic[36] or iconic relationship in Peirce's terms.

Philip Simpson, in the *Critical Dictionary of Film and Television Theory* describes mimesis as follows:

> In the loose usage of the term, 'mimesis' is another word for imitation . . . the concept can be seen as relevant to an understanding of such terms as realism and reflection. Mimesis

[36] The concept of mimesis is discussed in several works from Plato in *The Republic*, Aristotle in his *Poetics*, Erich Auerbach's *Mimesis: The Representation of Reality in Western Literature* (a historicist account of mimesis in that the author treats representation in relationship with the context of production), Eisenstein's essay collection *Film Form* and Hyden Whyte's *Figural Realism: Studies in the Mimesis Effect* among others. I will not touch on Eisentstein's work here because the imitation I will focus on is procedural rather than visual.

> refers to the view that it is the function of art to reproduce appearances, a view which underemphasizes or denies the active nature of production and response" (Simpson 283).

Simpson's observation summarizes a problematic aspect of traditional concepts of mimesis: from Plato to Aristotle to Samuel Johnson in the nineteenth century, mimesis was conceived as the reproduction of appearances, in other words, as the reproduction of *perceivable* aspects of the real world. Bagkstein later notes that in the "late nineteenth century, modernist painters were seen as challenging the mimetic importance of painting head on, and *writers from Gustave Flaubert to Virginia Woolf used language which drew attention to the ways in which it constructed, rather than mirrored, reality as experienced*" (283) [Emphasis added]. Simpson chooses Flaubert and Woolf to suggest how mimesis evolved from a traditional view, based on the reproduction of what Eisenstein called 'surface appearances' to a model that distinguishes mimesis as a process that *constructs* reality.[37]

After having made this distinction about mimesis as a productive process, I would like to come back to procedural realism in its mimetic aspect. It is important to note that this iconic relationship with the represented objects entails a selection of certain characteristics possessed by the imitated object / process. "Thus, an 'icon'' is a semiotic function that invites attention to some character contained in or expressed by an instance, . . . " (Sheriff 67) Not every

[37] Cited in Bordwell (1985).

characteristic of the imitated object is represented, and this is what Juul calls *stylized simulations*:

> Simulations can have varying degrees of fidelity to what is being simulated. *Tekken 3* simulates fighting in general and capoeira with the character of Eddy [Gordo]. A practitioner of capoeira, however, would undoubtedly feel that the game was an extreme simplification. […] If we assumed that the quality of a game hinged on its degree of realism and the detail of its simulation of the real world, this would be a serious detriment to the experience of playing *Tekken 3*. […] Game fictions and rules are not perfect and complete simulations of the real world; they are flickering and provisional by nature. But stylization is an expressive device that games can use. […] By removing detail from the source domain, the game focuses on a specific idea of what the game is about . . . A game does not as much attempt to implement the real world activity as it attempts to implement a specific stylized *concept* of a real-world activity. (Juul 170-172) [Emphasis in original]

In a simulation, the selection of what is interesting and what is not is arbitrary. What is remarkable about simulations, though, is that—as complex procedural representations—, the selection of the 'parts' that will represent a whole process is made depending on the outcomes that the simulation is built to imitate only certain processes will be selected for outcome imitation. I will argue in the following chapters that looking at this selection also reveals the promotion of

certain values. Peirce called the icon a "degenerate form", arguing that an "*icon* can only be a fragment of a completer sign" (*Essential Peirce* 2: 306).[38] It seems that Peirce is suggesting here that icons rely on a synecdochic relationship with the referent, and that the selection of fragments would offer partial representations of more complete signs. An example of iconic selection: in EA's video game *FIFA Soccer 08*, the simulation is built to imitate soccer player actions, but interestingly, the outcomes are represented from the point of view of a TV spectator (i.e. broadcasted events only). The sports match grammar that we usually perceive in TV is privileged for representation of outcomes, as opposed to privileging the perspectives of players, referees or even the coaches'.

These are *adaptations* of "real world" elements. The simulation is oriented toward those aspects of soccer, tennis, or being a criminal in a contemporary city that are perceived as relevant *vis à vis*, those which provide entertainment or that constitute part of rhetorical strategies. In the case of sports games, the fact that sports are typically experienced on television also shapes the game:

> Most sports games contain slow-motion replays of the most dramatic moments in the game. The stylization of a simulation is, of course, a subjective art that must take into account common

[38] "Of signs there are two different degenerate forms. . . . The more degenerate of the two forms (as I look upon it) is the *icon*. This is defined as a sign of which the character that fits it to become a sign of the sort that it is, is simply inherent in it as a quality of it. . . . A pure icon is independent of any purpose. It serves as a sign solely and simply by exhibiting the quality it serves to signify. The relation to its object is a degenerate relation. It asserts nothing. If it conveys information, it is only in the sense in which the object that it is used to represent may be said to convey information. An *icon* can only be a fragment of a completer sign" (*Essential Peirce* 2: 306).

> perceptions of whatever domain is being simulated. *Virtua Tennis* simulates lobs, smashes, and other dramatic aspects of tennis, whereas tennis elbow and broken rackets are omitted. In many strategy games, humans pop into existence within a few seconds; in *Age of Empires II*, a villager can be created at the click of a button. (Juul 72)

What is important about iconic representation in a simulation is that only certain processes are selected for representation. This adaptation is made by putting together a selection of outcomes that are considered relevant for the purpose of a simulation. For example, in Juul's example of *Age of Empires II*, processes involved in the creation of a villager, such as the processes of pregnancy, childbirth, breeding, childhood, education, etc. are not considered relevant for procedural representation given the purposes of the simulation: exploration, exploitation, extermination (in some cases), and expansion are the focus of these particular forms of procedural representation; and therefore convey an ideological approach to realism.

Indexical Processes

The last point leads us to a second sign class involved in procedural realism: indexicality. Peirce calls *index* a sign that has an *existential* or *material* relationship with the object. I gave some popular examples above, like the footprint indexing the presence of a person in a terrain. Indexes also occur in video games, but the material bond is not as obvious as it is in the footprint example. For instance, in the game *GTA IV: Liberty City Stories*, when the player

hits the *run* button to imitate the process of *running*, the computer system produces a representation of the outcome of such process: the avatar's spatial location in the game world has changed. The representation of the outcome has a material bond with the player's use of the hardware interface because by using the game controller by hitting the *run* button, the player is triggering code in the system, which in turn produces a graphical representation in the screen. This physical interaction with the hardware and the software system creates a graphical representation of the process' outcome. Another example: in the popular game *Rock Band*, the player uses a controller whose form is analogous to real guitars. When the player presses a controller 'fret' and strums the 'chords', sound and images represent the outcome of the player's accuracy with musical rhythm. These sounds and images are indexes of the player's procedural performance because there is a material bond between such sounds and images and the iconic procedures that triggered them.

In summary, if executions of rules by the player are icons of real world processes, such executions should *produce* an imitation of real world outcomes. These outcomes, like the new location of the GTA main character is both an index and an icon. I will focus only in the indexical aspect of these outcome signs. The representation of analogous outcomes in the play process is triggered by the user at the moment of process execution, and this entails an indexical relationship with the electronic representation of the outcomes. This electronic representation of the outcomes is most of the time perceptible to the player. The process of shooting at an enemy will be 'rewarded' by the graphical splatter of blood in a game like

Doom. I am interested in the execution of a process (like decision of shooting at an enemy), and how the outcome is represented (the splatter of blood meaning the blank has been hit).

It is also important to note that the splatter example has a second relationship with the real world. This second relationship with the 'real' is more along the lines of traditional representation. I have only covered the relationship of iconic processes with the real and with digital index, in other words of procedural representations: for example, the process of shooting and its blood index. The relationship of blood with the 'real' exists as an ideological dimension. I will explore the iconic procedures involved in play, and will mention some relationships between the iconic process and the indexical representation of outcomes; then, I will make observations on their ideological relationship to real world objects (not the specific relation to real world objects, but the general ideological import, as ideology is, in a way, part of the so-called real place).

In summary, I think it is important to emphasize that procedural realism occurs in the dialogic relationship between iconic procedures (imitation of real world procedures via other analogous procedures) and indexical outcomes (the representation of outcomes in the computer system; this representation has a material bond with the iconic procedure that triggered it).

Figure 2 is a simple illustration of how procedural realism occurs in procedure signs, which, first, imitate a process in the real world, *and*, then, this procedure sign is represented in the game by an indexical outcome. As shown in Figure 2, the sign-vehicle, a play process for example, has a double referential

relationship. Let me come back to the running example. First, as in the case of the game *GTA IV: Liberty City Stories*, the player can execute the play process of *running*, which clearly appeals to the player's knowledge that 'most people can run', that 'some solid objects can be used as platforms to boost movement', that 'some solid objects can be an obstacle for movement', etc. All these considerations are iconic representations of the real process of running because they enable the possibility to imitate such process.

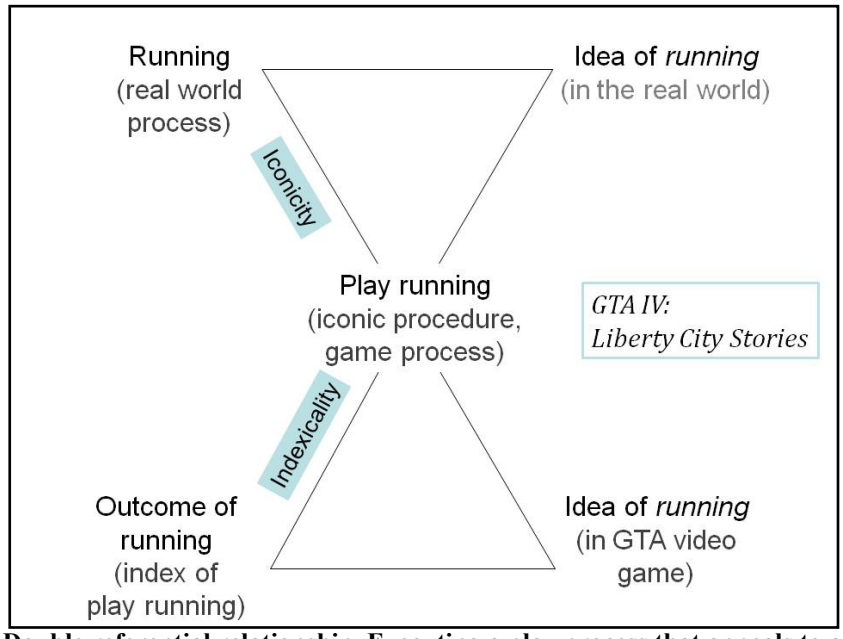

Figure 2. Double referential relationship. Executing a play process that appeals to a player's knowledge of analogous processes in the real world.

Also, the computer system produces a representation of the outcome of such process: the new position of the game character controlled by the player. The relationship between the process of 'play running' and the new location of the character is indexical, for the material interaction with the hardware and the software system has a material bond with the graphical representation of the avatar's new location.

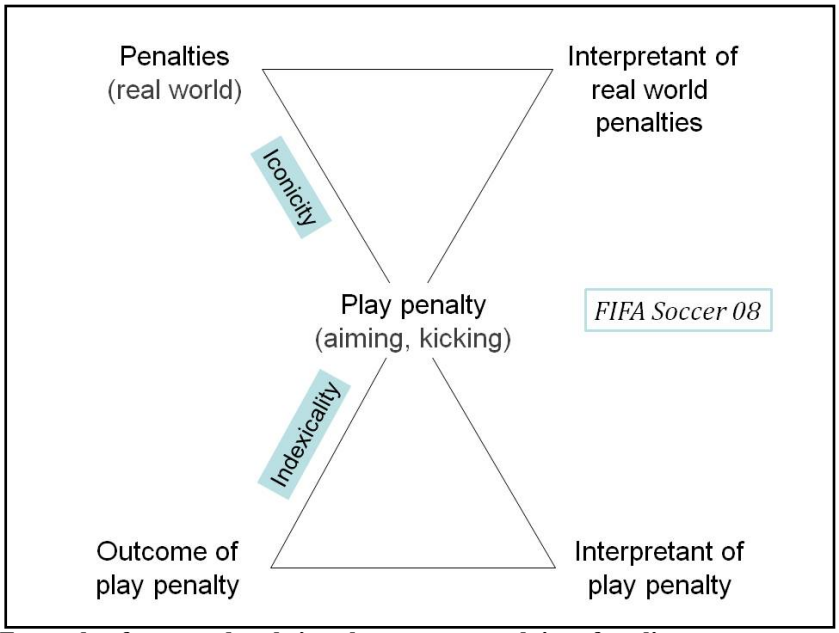

Figure 3. Example of a procedural sign that conveys a claim of realism.

Figure 3 shows a second example of a procedural sign with a realist claim. As Bogost points out, "[p]rocedural rhetorics afford a new and promising way to make claims about *how things work*" (*Persuasive Games* 29). In *FIFA Soccer 08*, the game process of executing penalties claims in some way that the player reproduces certain aspects of real soccer games penalties. Later, when the play penalty has been executed, the outcome of the video game player's penalty produces what looks like a possible result of a real player's aiming and kicking decisions. This result, in the video game, has an indexical (and therefore existential) relationship with the player's performance.

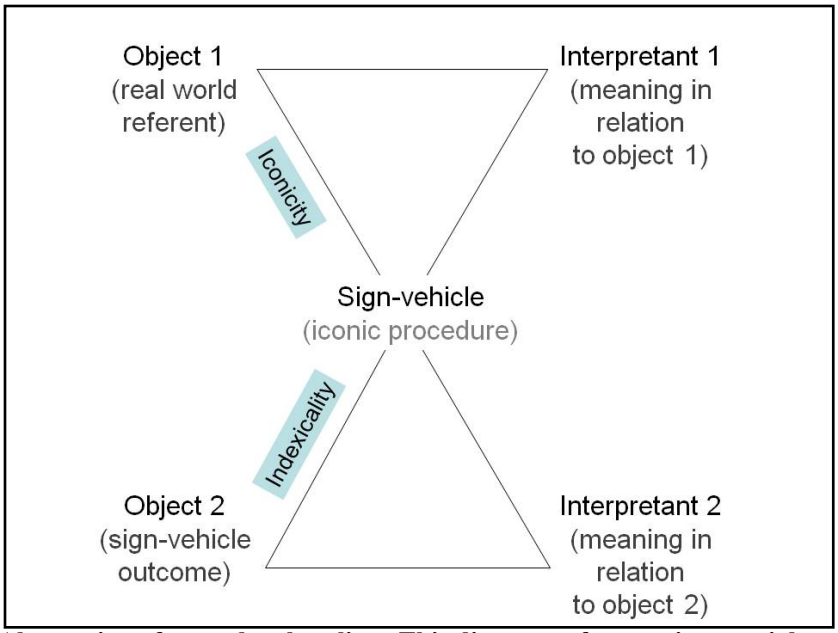

Figure 4. Abstraction of procedural realism. This diagram, of course is a partial representation, focusing in player actions and their indexical relationship with the representation of outcomes by the computer.

Figure 4 offers a generalization of procedural realism as seen in previous examples. I would like to point out that the semiotic relationships of reference are not nearly exhausted, but this thesis looks at the iconic and indexical aspects described above. One relationship of reference that this diagram ignores is the referential status between the indexical outcome and the 'possible' or hypothetical outcomes that it represents, for example, the connection between the penalty outcome and hypothetical soccer outcomes, or the connection between play running outcomes and real running outcomes.

Procedural realism is not a new rhetorical approach. Procedural representation in general is as old as games are. In the next chapter, I will discuss the origins and developments of these types of representation, with special emphasis on the development of non-diegetic aspects of procedural realism.

Chapter 3. Technology and Developments of Real Time Strategy Games: The Rules, the Umpire and the Interface of War

When playing the popular RTS video game *Age of Empires III: The War Chiefs* (developed by Ensemble Studios and published by Microsoft) for the first time, one can watch an introductory and epic Hollywood-like cinematic opening. The video represents European Conquistadors traveling by sea and landing on the shores of the New World. A narrative accompanies the video, introducing the user to the aims of this war game: the player must "explore, fight, and conquer" as "the victorious will control the New World." It is possible to select the group she/he would like to play: maps of New World territories are provided for the location one would like to colonize. The aim of the player is to establish a settlement, obtain natural resources, and produce and train soldiers for combat. The player/director can then delegate various activities to his settlers such as chopping down trees (transforming the landscape); hunting animals or picking berries; mining for silver or gold, building structures such as houses, forts, farms etc.; or they can be trained in order to engage in defensive or offensive combat. The objective of the game is to build powerful settlements and armies (possibly an entire empire) in order to eventually and inevitably engage in war with the enemy. Everything is presented with the assistance of a Heads Up Display (HUD). [39]

[39] Heads-Up-Display (HUD) is a name originally given to military information display technologies. HUDs were basically transparent visual displays (similar to gun sights) that allowed users of a military transportation vehicle to perform shooting operations with the “head up.” In other words, aviators were able to aim

The importance of the HUD in computer strategy games is crucial as the player spends a long part of her/his time in this game plane. In computer strategy games, this interface's visible controls, buttons, menus and options, are superimposed on a higher surface level over the battlespace and thus provide the player with a puppet-master or a Panopticon god-like view. For instance, by using the HUD, the player can watch what is going on in the game and can direct characters, but can also engage in the manipulation of an inventory behind the scenes: the HUD enables the player to exercise authority and direction over her/his forces to accomplish the game objectives.

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and shoot without being distracted from their objectives. This technology was ported for use by different transportation vehicles, cars and video games. The transparency factor is not a constant characteristic (most HUD interfaces surround the user's visible space) but the importance of keeping the driver/user focused in the terrain/space ahead while commanding, controlling operations for the accomplishment of a mission is a basic quality of HUDs.

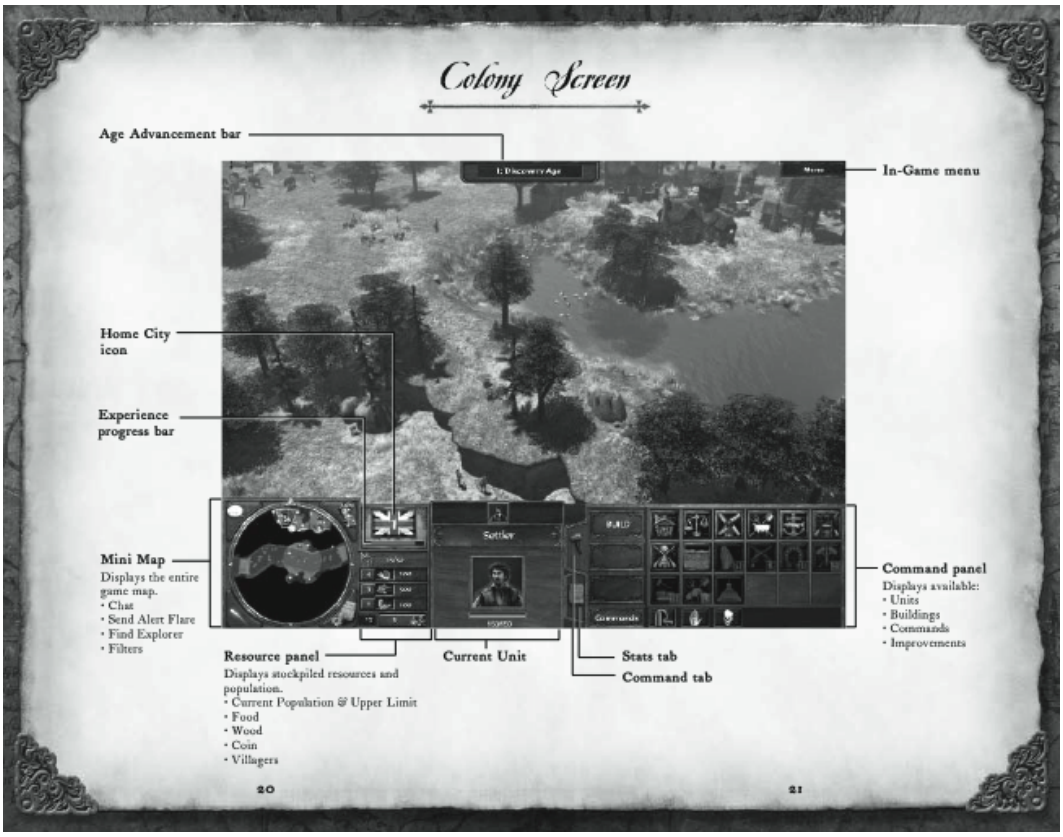

Figure 5. *Age of Empires III*'s Colony Screen. The bottom and surrounding areas show the Heads-Up Display interface. In "*Age of Empires III* User's Manual." *Age of Empires III*. Ensemble Studios. Plymouth: Mac Soft, 2005.

In these video games, command and control functions are performed by using this interface, which is designed for the arrangement of military units, equipment, in some cases communication with advisors, buildings, and the execution of procedures in planning, giving commands, and controlling forces. As one can see in Figure 5, one of the functions of the Heads Up Display is to enable the player to visualize and document the inventory of resources and settlers / soldiers under one's command.

But why is this HUD interface so important in computer strategy games and other video games such as role playing games (RPG)? This aspect should be examined in detail for the following reasons:

- *Procedural rhetoric*: if one wants to explore the procedural rhetoric of these games, one cannot avoid noting that most processes (player actions) are executer via in the interface.
- *The HUD as rulebook*: game rules are traditionally an important aspect of miniature, tabletop or board wargames in general, and their computer counterparts are no exception, but these rules (instead of being contained in rulebooks) are generally displayed in the HUD. As I mentioned in my previous chapter, the visibility of rules in quite a few video games is most often reserved to professional game designers, developers, expert users and programmers in general, and the player can only infer how these rules operate and how these rules calculate the outcome of the player's decision. Wargames and RPGs are an exception in that the HUD functions similarly to a rulebook. But what are the ideological implications of such use of the interface?
- *The HUD as an umpire*: as I will explain in the evolution of modern wargaming, the introduction of an umpire player in games led to an important function later substituted by the computer in general and by the HUD specifically.
- *Extra-diegetic actions and realism*: If one is interested in the procedural and fictional aspect of games (in this case I am interested in procedural

> realism, see Chapter II), both the actions occurring in the game world (diegetic actions) and procedures executed out of the game world (extradiegetic or non-diegetic actions) have to be taken into account. After all, in nineteenth-century novels the omniscient narrator also played a large role in the story, and critical studies of realism have also placed great attention to this ideological approach to what realism meant for writers of that time.

HUD-intensive games: wargames, RTSs and RPGs pay a great deal of attention to the functions performed on this game level. Anyone interested in these games should focus on the roles played by the HUD in the visibility of rules and the execution of procedures.

The next step in exploring why HUDs are so important for these games and how do they contribute to game experience will be to look—under the light of the concept of procedural realism—at the origins of strategy games in general and wargames in particular. How rules evolved and how the HUD came to be the substitute of rulebooks? Through a brief discussion of the evolution of wargames, I will emphasize the relevant aspects to the history of strategy games and wargame rules pertinent to the genealogy of the HUD.

Playing War: Ancient Games

Playing war may suggest a paradoxical thought: war is an activity with large-scale material consequences; on the other hand, popular notions of game conceive such activities as actions in which decision-making processes do not have significant *material* outcomes (except for the practice of gambling in games

and in corporate sport, where procedures of monetary exchange are arbitrarily involved to play and its in-game outcomes). Video games are certainly not the first type of games to deal with representations of war. The first prototypes of war simulations were probably training or planning simulations with grains or stones in an improvised soil board. Representation of war in game culture is a vast and old tradition that could be traced back to ancient practices of preparation for combat. Peter Perla, an expert both in recreational and professional wargaming, notes that even though there is little historical knowledge about the origins of wargaming, we do know the existence of ancient war-themed toys and games representing armies from Sumerian and Egyptian civilizations (Perla 15; Halter 6). Other authors discussing the origins of wargames, like Andrew Wilson, place great emphasis on the evolution of abstract strategy games popularly associated with military concepts, like chess, the Hindu game Chaturanga, and the Chinese game known as *Wei-Hai* (Perla 18) or *weiqi* (Halter 19), which is played today under the Japanese name of Go (Wilson 1-2). Earliest evidence suggests that Wei-Hai originated around 3000 B. C., and Abe Greenberg in "An Outline of Wargaming" credits Sun Tzu with the authorship of the first version of the game) (quoted in Perla 93).

The rules and elements of these games may differ, but they share some basic characteristics, like the use of a board to represent territory and the use of game pieces to represent military forces. In these games, game pieces provide another element for representing game states: it is possible to interpret the outcome of previous decisions made by the player by observing the piece in

relation to other pieces and in relation to the board. Even though these observations may seem obvious to the casual player, it may be interesting indeed to remember how games have been shaped to simulate certain operational aspects of conflict resolution in history.

Since ancient games, the goals and dynamics of abstract strategy games have been traditionally related to military strategies. For instance, Wei-Hai's strategies of "encirclement" of the pieces, or the strategy of surrounding one's stones to capture the opponent's is reportedly considered a representation of military maneuvers, resembling Sun-Tzu's "philosophy of resorting to the chances of battle only as a last resort" (18). In this strategy, Perla continues, "victory could go not to the player who could bludgeon his opponent, but to the first player who could outflank his enemy" (18). According to Ed Halter, the games' name, "weiqi", "was originally a term for a method of hunting large animals" and "it could likewise refer to an analogous out-flanking maneuver that is peculiarly central to ancient Chinese military tactics" (19). In this sense, strategy games' objectives and sub objectives may imitate military strategies, such as Sun-Tzu's encirclement of the opponent pieces. Other examples are strategies analogous to warfare stratagems such as removing pieces from the board, capturing them, taking control over the opponent's resources, reducing the opponent's resources (attrition) or controlling space on the fictional terrain. These movements may be considered as procedures that mimic real world military mechanics by abstracting the essential processes down to a manageable number of

steps. Thus, this selection of essential processes is how most strategy game rules entail the enunciation of ideological approaches to real world processes.

There seem to have been at least three game branches that morphed into several game variants around the world: *Wei-Ha* in China, the Greek *petteia* (possibly invented by the Egyptians according to Plato), and the Indian *chaturanga*.[40] As we may know, this last game evolved into chess when—after being introduced to Europe—gained popularity as the pastime of kings. It is interesting how wargaming specialists refer to chess as the ancestor of wargames, but the different paths followed by strategy games in history are numerous.

Most sources attribute the inauguration of modern wargames as a strategy sub-genre to the Prussian game *Kriegsspiel* ('war game' in German) used to train strategists for the Prussian army in the early nineteenth century (Halter, Leeson, Schramm passim). However, before the Kriegsspiel, the genealogy of this

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[40] *Wei-Ha's* evolution into *Go* was briefly mentioned above (Perla, Halter, Wilson, Greenberg). The Greek *petteia* ("pebbles" or "game pieces") is one of the first known games in which players determined the movement by strategy rather than chance; in the *Republic,* Plato uses this game as an example of the process of learning in general (Halter 13). In Rome, *petteia* was adapted to form a new game called *ludus latrunculum* or *latrunculi*, which according to Halter means "the game of mercenaries"; game pieces were called mercenaries (*latrones*) or soldiers (*milites*). The *petteia-latrunculi* game branch was introduced in the north of Europe; there is some evidence that suggests that the Viking game *hnefatafl* is a variation of the Roman game, which is mentioned in passages of Scandinavian, Welsh and Icelandic sagas (Halter 17-8). I cannot avoid mentioning the Indian *chaturanga*, which in Sanskrit means "four armed", referring to the four different soldiers in an Indian army: foot soldiers, light cavalry, elephant-riders, and chariots, (Halter 23; Wilson 2). It is widely known that *chaturanga* evolved into *shatranj* when introduced in the Persian Empire. Later, when *shatranj* was introduced to Europe, "its vizier piece became the queen, elephants evolved into bishops; and the chariot (in Persian *rukh*) changed into the castle (Halter 24; Wilson 2). Today, we play this game under the name of chess.

tradition has many important sources of development: the most significant aspects for my thesis are concerned with the evolution of wargame rules. I will account briefly for what I consider to be milestones in the creation of these game regulation systems: the Prussian tradition—including the *kriegsspiel*—, the wargaming hobby, the Wargaming Research Group (WRG) and a brief mention to game theory.

Playing War: Modern Games

The first step from ancient strategy games towards the Kriegsspiel was the transition between chess and modern wargames. It is indeed common to find references to chess as the immediate predecessor of the modern wargame tradition, but some sources skip over the actual evolution on the way to the Kriegsspiel.[41] In the late eighteenth century, a popular notion among military philosophers was that the fundamental concepts of war "could be reduced to basic concepts and formal rules" (Perla 19).

In the late 1960 decade, a time when the interest in the use of wargames for military training was likely fueled by Game Theory and both the Second World War and Cold War periods, Andrew Wilson, a wargame critic, explored how games had been used with military objectives in his book *The Bomb and the Computer* published in 1968. The purpose of this book may have led him to describe the often-omitted evolution. Also, Andrew Wilson notes that the design

[41] This transition is briefly documented by Andrew Wilson (1968), Peter Perla (1990) and Ed Halter(2006). Another source (not consulted for this document): Thomas B. Allen, *War Games: The Secret World of the Creators, Players and Policy Makers Rehearsing World War II Today*. New York: McGraw Hill 1987.

of more complicated rules was stimulated by the belief that "war was an exact science" and that the army should engage in a "quest for 'true principles' to guide its conduct" (Wilson 3).

> It was not until the Age of Reason when men decided that the conduct of war, like other human pursuits, was subject to scientific laws, that games reappeared which consciously reproduced the elements of war for play. [. . .] [I]n the seventeenth century . . . chess gave birth to a variety of chesslike games which reflected the military developments of a new age. Their pieces included not only Knights and Castles, but also pikemen, halberdiers, and the new light artillery invented by the English in the form of the longbow. In 1644[42] a Christopher Weikhmann at Ulm, developed a war chess called the "King's Game." It had fourteen fixed moves and thirty pieces on each side, including the king, a marshal, two chaplains, and eight private soldiers. It is said to have been highly regarded as an aid in military training (Wilson 2-3).

Weikhmann's "King's Game" (or *Koenigspiel* in German) was created with a clear realistic approach. Or more specifically, in this game it is evident an iconic approach to visual realism: it was meant to be played on a larger board than chess' and each player used thirty pieces that included "a modern array of martial

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[42] Perla cites 1664 as the year the *Koenigspiel* was invented. There is no information in Perla, Halter or Wilson, however, on Weikhmann's rulebook or publication title. Both Perla and Halter obtained Weikhmann's quotes from Francis J. McHugh in his *Fundamentals of Wargaming*, p. 2-1.

characters: a king, his marshal, a pair of chaplains, chancellors, heralds, couriers, lieutenants, adjucants, body guards, halberdiers, and a set of eight private soldiers, which were given sixteen different powers of movement on the board" (Halter 36). A move towards visual realism is clear in this game; as Perla notes, Koenigspiel--and war chess games in general—were indeed more complex in surface elements like the types of arms used in the period's game, what Perla calls "'chrome' (or period color, if you like)" but did not introduce complexity to "technical military content" (17). What Perla implies here is that the Koenigspiel's rules were not very different from chess. In addition, we can say that the design of these rules was not very concerned with modern procedural realism yet.

A more mature version of modern procedural realism was an edition of Koenigspiel, invented in 1780 by Dr. C. L. Helwig Master of Pages to the Duke of Brunswick (Wilson 3). Perla notes that this game introduced three fundamental concepts that became essential to modern wargaming: a) *aggregation* (using a single piece to represent a plural number of military units rather than individual soldiers), b) representation of different types of terrain, and c) the introduction of an umpire (Perla 18; Halter 37).

The role of the umpire in this game was to mediate conflicts between the player's interpretation of game events and game rules. Another function was to supervise the interpretation (not calculation yet) of outcomes and to supervise the observation of game rules. Despite the game's complexity in the representation of diverse military units, weapons and terrains, the game board and the pieces'

movements still maintained basic characteristics of chess. The game's design was oriented to young nobles, and was designed to be both entertaining and educational—a reason for which it had a positive reception and achieved popularity in France, Italy, and Austria (Perla 19).

Around 1800, another game known as the *Neues Kriegsspiel* designed by Viturinus (Wilson)—aka Venturini (Perla) or Virturnius (Halter)—was published in a sixty-page rulebook under the title *Rules for a New Wargame for the Use of Military Schools*. The innovations of this game added to territorial realism by using a square grid laying on top of a real terrain map (the border between France and Belgium, a disputed territorial demarcation of the period). Another innovation in procedural realism was that the game included not only the representation of armed military units but also the representation of logistical aspects of war operations such as field bakeries, supply magazines, wagon convoys, and bridges (Halter 38). The complexity of the rules and the introduction of accurate maps made the game popular among military organizations, but the entertainment aspect was intentionally sacrificed in favor of a more accurate representation of vital aspects in the logistics of warfare.

Finally, the most popular game in the history of modern wargames is the German *Kriegsspiel*; the first version developed around 1811 by Baron von Reisswitz,[43] a civilian war counselor to the Prussian court at Breslau. In 1824, his

[43] Baron von Reisswitz was invited to make a live demonstration of the Kriegsspiel to King Friedrich Wilhelm III. His game originally used a sand table to model terrain in relief and wood blocks with symbols pasted representing military units, but according to a famous anecdote, the Baron demonstrated only

son, the Lieutenant George Heinrich Rudolph Johann von Reisswitz, adapted and developed his father's game and released the second version of the game; the revised rules were published in a rulebook entitled *Instructions for the Representation of Tactical Maneuvers under the Guise of a Wargame*. Such theatrical aspect of wargames was never so central before. When the first version was presented to King Friedrich Wilhelm III,[44] he was positively impressed with the Baron's theatrical apparatus, and Prince Wilhelm "was soon contesting his friend the Czarevich Nicholas in their diplomatic trips between Moscow and Berlin, the two young royals acting out little conflicts just as their elders had ordered men of flesh and blood into battle" (Halter 41).

In 1924, Lieutenant von Reisswitz finished the revisions to his father's game. He replaced the terrain with topographic maps drawn to the scale of 1:8000. According to Perla, the new rules "attempted to codify actual military experience and introduced the details of real-life military operations lacking in his father's game. In particular, he quantified the effects of combat so that results of engagements were *calculated* rather than discussed" (25). For the first time, game rules depicted instructions for most military operations, almost to the point of exhaustion. When the revised version of the game was presented to the General Karl von Muffling, the king's chief of staff, he made his legendary verdict: "This

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his game one year after the invitation because of his desire of polishing the presentation of the game (Perla 24). The game was presented in a six feet square area table with pieces made of porcelain and "movable plaster reliefs, depicting various types of terrain" (Halter 40-41).

[44] German title: *Anleitung sur Darstelling militarische manover mit dem Apparat des Krieggspiels*.

is not a game! This is training for war! I must recommend it to the whole army" (Perla 26, Halter 42, Wilson 6).

Because of a manifest realism agenda (the game was designed for the military), elements of chance and strategy were introduced in the new version of the game by playing with a dice, an umpire and a code of rules. In von Reisswitz rulebook he explains that

> [a]ll movements or positions of the enemy *which would remain concealed in reality are similarly undisclosed in the game. The troops in such cases are not put on the map, but the player (umpire) who designed the manoeuvre and who controls the game records their positions*. As soon as they reach some point where they could be seen by their opponents they are placed on the map. To simplify the game, and to affect the players as in reality, by considerations of good luck and bad luck in the outcome of battles, the results based on experience, for the effect of fire weapons in good or bad circumstances, are stuck onto dice and determine the losses. The attacks with hand-to-hand weapons are similarly noted on the dice so that equal or unequal strength or forces can be considered. [Emphasis added]

The contribution made by Reisswitz's rules is notable in terms of its focus in the *calculation* of the outcomes, which took into account chance, rules and strategy. This approach to reality attempted to provide a sense of balance between stratagems and unforeseen circumstances. It seems that previous games suggested

the notion that in order to achieve realism, rules should imitate the vast typological array of pieces, movements, attributes of the terrain to name some elements, but the estimation and representation of outcomes still preserved the form of statements where rules were guidelines for the interpretation of a specific situation. In other words, we can say that games preceding the Kriegsspiel (including the first version of this game by the Baron von Reisswitz) imply an early notion of procedural realism more inclined to representational realism than to the simulation of procedures.[45]

Even though the game was received by the military with mixed judgments, game rules were subject to modification by officers of the Prussian army during the years following its publication. The calculation of outcomes aspect in the Kriegsspiel was the center of attention: in 1877, 50 years after the rules were published, a captain under the name of Naummann released a new version of the Kriegsspiel rules (*Das Regiment Kriegsspiel*) in which "the usual method of calculating outcomes evolved into a particular pattern [:] [. . .] a particular, recurring, basic combat event was defined as the standard" (Perla 30). The mathematical complexity of these rules led to calculation-intensive matches due to the constant addition of new standard cases for several situations. Play became very slow and tiresome for the sake of achieving an arithmetical form of procedural realism. As Perla notes, "the role of the umpire evolved into virtually that of a computer" (31).

[45] This deductive notion of realism can still be found in computer strategy games, as I will explain in Chapter 4.

Free Kriegsspiel and Modern Hobby Wargaming: Learning vs. Entertainment, Strategy vs. Tactics.

In a nutshell, modern hobby wargaming brought the importance of playability to the realism agenda, contesting the notion of an arithmetical-oriented realism and proposing that player actions also contribute to realism. Verdy in Germany and H.G. Wells in Britain started this shift, and I would say that their proposals were an early form of a still current debate on concepts of how realism should be achieved (procedural realism). These positions grant a "higher" level of realism either to strategic player actions or to tactical player actions.

Between the development of Kriegsspiel and of computer games, many transformations occurred[46] that caused a bifurcation in the purpose of these games: learning (for military purposes) and entertainment. The first transformation was a move away from arithmetical notions of procedural realism: two game rules were released—first in Prussia (Germany since 1871) and later in Britain—that proposed changes in the concept of realism in rules. In 1876, General Jules von Verdy du Vernois edited a rules manual for a wargame that would be later known as "free Kriegsspiel." The manual was very brief, and outlined a system to determine outcomes by the umpire's sole own judgment; as Neil Thomas, a wargaming expert notes in *Wargaming: An Introduction* (2005), the umpire's word "was law . . . with the umpire determining what was military feasible, there was no need for a rulebook" (3). According to Halter, there were

[46] See Perla and Halter for a detailed account of the wargames as a modern hobby, wargames during the First and Second World Wars and wargames in the Postwar Period.

indeed a number of tacticians that opposed arithmetical-oriented game rules "arguing that seemingly logical mathematical results could often contradict tactical sense and historical indications. The elegance of the rules, they feared, might overtake the experience of reality" (45). Verdi's game might as well have been a product of such critiques and Perla goes so far as to say that von Verdi's approach can be described as the transformation of the umpire from computer to 'God'" (32).

Verdi's approach seems to propose that a holistic interpretation of outcomes would be more realistic that an analytical one. His arguments advocate for a non-arithmetical realism that privileges realism in decision-making over realism in the calculation of outcomes, which should not be performed "by the cast of the die . . . All that is necessary is to reach the general result, to determine if a body of troops have had great losses, if it has been so badly broken that its power of resistance has been sensibly diminished" (32).[47]

Another wargame that contested "rigid" rules was proposed in Britain in 1913. The writer H.G. Wells was interested in developing wargames with the intention of engaging in a pleasurable activity. Complex arithmetical and geometrical realism was not a preoccupation for his games. H.G. Wells wrote in an appendix to a later edition of *Little Wars* (first edition was published in 1913) that "Kriegspiel, as it is played by the British Army, is a very dull and unsatisfactory exercise, *lacking in realism*, in stir and the unexpected, *obsessed by the umpire* at every turn, and of very doubtful value in waking up the imagination,

[47] Quoted in Perla 32.

which should be its chief function."[48] Furthermore, Wells was not known for a pro-war or a patriotic attitude, and his references to real war were more on the ironic or satirical side:

> Here is the premeditation, the thrill, the strain of accumulating victory or disaster—and not smashed bodies, no shattered fine buildings nor devastated country sides, no petty cruelties, none of that awful universal boredom and embitterment, that tiresome delay or stoppage or embarrassment of every gracious, sweet, and charming thing that we who are old enough to remember a real modern war know to be the reality of belligerence. [. . .] This world is for ample living; we want security and freedom, all of us in every country, except for a few dull-witted, energetic bores want to see the manhood of the world at something better than apeing the little lead toys our children buy in boxes. [. . .] Let us put this prancing monarch and that silly scaremonger, and these excitable 'patriots,' and those adventurers, and all the practitioners of Welt Politik, into one vast Temple of War, with cork carpets everywhere, and plenty of little trees and little houses to knock down, and cities and fortresses, and unlimited soldiers—tons, cellars-full—and let them lead their own lives there away from us. (Wells 97-99) [49]

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[48] Quoted in Halter 61. Emphasis added.
[49] From *Little Wars*. The idea of wargames as a method to undermine war is

Wells' satirical tone is marked, and his remarks suggest a vision of procedural realism that conceives it as an approach to *revealing* and *fulfilling* the need of an apparatus of war. Wells' approach does not necessarily promote the values of war, but attempts to undermine them. His agenda is also educational and *civilizing*. According to Ed Halter, Wells proposal consisted of three basic notions: a) Wells insisted that games should be more entertaining that real world war by discarding the "horrible downsides—death and boredom"; b) *Little Wars* could be used to replace the waging of real wars; and c) playing his game should result in a *civilizing* experience (61-63).

Both Verdy's and Wells proposals suggest a trend that was to be developed in modern hobby wargaming: mathematical calculations were useless attempts to achieving accurate representations of processes and material conditions of war. Verdi, on his part wanted to modify the role of the umpire to include a holistic interpretation of outcomes. And as Perla observes, Wells wanted to replace the role of the umpire in "free" and "rigid" Kriegsspiel[50] with physical representations of processes and outcomes. For example, the player imitated the

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repeated in his book: "Great War is at present, I am convinced, not only the most expensive game in the universe, but it is a game out of all proportion. Not only are the masses of men and material and suffering and inconvenience too monstrously big for reason, but—the available heads we have for it, are too small. That, I think, is the most pacific realization conceivable, and Little War brings you to it as nothing else but Great War can do" (Wells 100).

[50] In "free" Kriegsspiel the umpire either decided the outcome based in his/her experiences, personal criteria and presumptions, whereas in "rigid" Kriegsspiel the umpire calculated outcomes using charts and tables with fixed values.

shooting of projectiles with toy-like cannons that actually fired wooden ammunition. Wells argued, "things should *happen* and not be *decided*."[51]

Game Theory and Computer Strategy Games

The military purposes of the first wargames evolved into a tradition of commercial entertainment *wargames* with tabletop games on one side, and professional *war games* used by official military organizations on the other. Popular computer strategy games followed a trend of entertainment wargames in which both decision making and player actions were as important as the calculation of precise outcomes. The arithmetical form of procedural realism still enjoyed popularity among professional military circles: during both World Wars professional war games spread especially in Germany, Japan, Russia, Britain and North America.[52]

These games were adapted to recreate different historical periods and real battles, and some guidelines were established; but the standardization of game rules happened in the post Second World-War period, and tabletop wargames reached their commercial success during the late 1960s and the 1970s decades. These were also the times for the development of the mathematical study of decision-making popularly known as Game Theory. Oscar Morgenstern and John Von Neumann initiated this approach with the classic book *Theory of Games and Economic Behavior* (1942) and the decisive work of John Nash in later years.

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[51] Quoted in Perla 35. Emphasis added.
[52] See Perla 40-59 for a detailed account.

Katie Salen and Eric Zimmerman in *Rules of Play: Game Design Fundamentals*, state that

> [t]he founders of game theory intended to create a new kind of mathematical approach to the study of economics. Morganstern and Von Neumann were writing during a time when Marxism was very much in vogue in the field of economics, and *Theory of Games and Economic Behavior* was, in many ways, an attempt to *replace the ideological approach of Marxism* with a more rational and scientific set of techniques (electronic resource, no page) [emphasis added].

Salen and Zimmerman's assertion might immediately strike as biased by the fallacy of scientific objectivity—as if scientific approaches or any theory in general could be non-ideological. It is unclear however, whether Salem and Zimmerman express this notion from their own judgment or if they are making a paraphrase of Morganstern and Von Neumann's statements. In any case, it is interesting to think how the old scientific claim of "objective" knowledge—and therefore "true" knowledge—could have been influenced by the overall anti-communist agenda during the Cold War period. If that is the case, this supports the fact than the development of wargames during the late 1960's and the 1970's decades can be seen in the light of a capitalist political and economical agenda.

The last game rules milestone that pertains to this project is the Wargames Research Group (WRG), founded in 1969 with the publication of *Ancient Wargames Rules*. This was a set of game rules that introduced a focus in historical

accuracy as an approach to procedural realism. The research component of these games was very firm in terms of using primary sources whenever possible; according to Neil Thomas, these primary sources were "army drill and tactical manuals", the second choice being "contemporary accounts" (7). From the WRG rulebook's introduction:

> These rules are the result of some six months discussion and testing, embodying research and experiment covering just over two years. We regard them as a step forward to realism and interest, and are confident that they can cover Ancient Wargaming needs in the period, approximately 1,000 B.C. to 500 A.D. . . . This 2nd Edition is modified to incorporate playing experience and information from unpublished translations from Greek and Roman military manuals made available to us privately (Barker 1).

The result was a very complex array of units equipped with specific weapons and armor depending on the period (which is usually divided in ancient, pike and shot, Napoleonic, Ancient, Pike and Shot, Napoleonic, American Civil War, Skirmish and Second World War wargames rules). Another important characteristic is that these games introduced for the first time a method for calculating outcomes in the morale of the units. Combat resolution and the introduction of morale tests was received positively by wargamers; Thomas points out that this overall reception was related to the perception of realism by players: "many gamers thought that they were enjoying the most realistic experience possible when playing by these rules" (7).

The complexity of the rules and the time and effort required to implement them during play was also critiqued by some players that questioned whether "less complexity might actually result in greater realism, given that detailed rules sometimes had bizarre effects" (8). The WRG released a very simple set of rules for a game that could be played in 10-15 minutes called *De Bellis Antiquitatis* (DBA), and as noted by Neil Thomas,

> "players soon saw that what appeared to be grotesque simplicity actually produced greater realism . . . Most important of all, combat is simplified. Under DBA, the result is more important than the process. For example, it no longer matters that barbarian units have light spears. . . . All that matters is that barbarian warriors could sweep the enemy infantry away in the first charge, but were very vulnerable if the defenders stood their ground" (Thomas 8).

A game that focuses on enjoyment instead of complexity also has a realism value among some wargamers. This simplification of rules will be important for the analysis on computer strategy games in the next chapter.

Computer Strategy Games

In this final section, I will explore computer strategy games focusing on the development of interfaces. Having traced a brief history of modern wargames, I will explore the connections between strategy games' history—early and modern—and how the HUD has replaced the figure of the umpire and the rulebook in commercial computer strategy games.

There is not much literature on the evolution of interfaces in strategy games history. Even though Ed Halter's book *From Sun Tzu to Xbox: War and Video Games* does not focus on the development of interfaces, his book contains some scattered mention of the evolution of computer displays and their relationships with game visualizations. I will summarize briefly these references and comment on important aspects that will assist me in the task of re/creating the connections between the rulebooks, the umpire and the HUD.

Halter mentions the Igloo White[53] operation in Vietnam as one of the first computerized representations of combat elements. According to Halter, "[i]n the spirit of an updated electronic kriegsspiel, human elements became reduced to mere tokens, but this game was played real-time, with powerfully real results" (70). Signals of military equipment, soldiers or movement across the Ho Chi Minh Trail were transmitted by these sensors from the Vietnam jungle to the "climate-controlled clean-room sanctuary" at the Infiltration Surveillance Center's where "two IBM 360/65 computers translated the incoming information "onto a display terminal as white streaks of light, called 'worms,' that moved across a superimposed map grid in real time" (Halter 69). Paul Dickinson, in *The*

[53] The Operation Igloo White was covertly conducted during the Vietnam War (from 1968 until 1973) by the United States Air Force, and is considered one of the first examples of electronic warfare. The operation consisted in the use of electronic sensors, computers, and communications relay aircraft in an attempt to automate intelligence collection. Sensors were collocated in the front line terrain to detect sound, motion, body-heat and even the presence of chemicals common in human urine. The system would then assist in directing aircraft to their targets. The objective of those attacks was the logistical system of the People's Army of Vietnam (PAVN) that snaked through southeastern Laos and was known as the Ho Chi Minh Trail (the Truong Son Road to the North Vietnamese).

Electronic Battlefield (1976) wrote that "such nasty considerations as pain, civilian casualties, blood and death (foreign or American) were deleted."[54] Halter mentions that sometimes American attacks exterminated animals instead of military units, for the blip "was a visible monad of pure information, a dot that simply says 'there'" (72).

The implications of using such an impersonal visualization of potential human targets during the Vietnam War caused several "erroneous" casualties and environmental damage. The need of creating more specific ways to interpret and visualize information was evident, which, as we will see, eventually evolved from the development of hardware and graphical interfaces to the use of the Heads-Up-Display.

Early Computer Interfaces of War and the Computer Mouse's Genealogy

It seems that game visualization's early experiments centered on exploring the perspective of a spectator. For example, the first computer iteration of a tennis match simulation, entitled *Tennis for Two* represented tennis from the side, as if the player was sitting in the public seats. The game was visualized in an early circle-shaped oscilloscope (a device used to visualize signal voltages in two dimensions).

In 1961, the popular game *Spacewar!* was created by a group of programmers in Maynard, Massachusetts. This game was the first popular video game; nevertheless, the game *PONG*, is frequently mentioned as the first computer game in several video game history books, perhaps because a tennis

[54] Quoted in Halter 72.

simulation may well have a more positive widespread reception than a war-themed game. The developers of *Spacewar!* were funded by a military agency to develop not a game, but the first "compact" computer (this still meant a computer that occupied an area of around 1.5 square meters) known as PDP-1. *Spacewar!* spread very quickly to other programming centers for various reasons; for example, the game was used to perform some tests to the PDP-1 system, plus, it was fun: Stanford's Department of Computer Science had to forbid the use of the game during office hours. The game simulated spaceship battles and was played in the PDP-1 computer, which was equipped with a "primitive monitor, then simply called a Visual CRT (cathode-ray-tube) Display, a device for graphical and textual presentation directly descended from the radar screens of World War II" (Halter 75). The monitor had a circular screen set into a hexagonal body; the hardware's design also influenced the game's graphics that were produced around a gravitational centre at the middle of the circular screen. While two player ships were attracted by a star's gravity, the player's objective was to shoot at the second ship and avoid colliding with the star. This is an example of early computer games that did not use a heads-up-display to present the outcomes' information to the player, nor the possibilities of action in forms of buttons or menus.

Figure 6. Dan Edwards and Peter Samson playing *Spacewar!* on the PDP-1 hexagonal display. An example of early games (no HUD, or displaying any extra-diegetic information in the screen). "Spacewar!" *Computer History Museum: PDP-1 Restoration Project.* Cambridge, MA: Digital Equipment Corporation, 1962 ca. 19 Sept. 2009. <http://pdp-1.computerhistory.org/pdp-1/?f=theme&s=4&ss=3>.

Sanders Associates, a private electronic company hired by the military in New Hampshire, created the first box-shaped display. Halter explains how Ralph. H. Baer, the chief engineer of product design proposed the idea of using TVs for game interaction. In 1972 he released the "Brown Box", also known as the Magnavox Odyssey console, the very first home video game system. The hardware consisted of the console box, two controllers and a *light gun* (see Figure 7) "shaped like a small hunting rifle" (Halter 83). Baer's gun was not the first of its kind, but it was the first light gun used with a computer game (as Halter points out, non-computerized arcade games used early versions of this device). This "light rifle" was used as a pointing device for interacting with a CRT screen (imagine using a touch screen by pointing with an external device sensible to light, or if familiar with the first Nintendo system, you will remember the NES Zapper which is a later design of a light gun). Baer's design was later used to

construct the light pen[55], which is the direct antecedent of the computer mouse. It may be surprising to find that the mouse's family tree points that its invention was related to a gun-like hardware interface.

Figure 7. The ancestor of the computer mouse. Light guns, invented by Ralph H. Baer in 1967 were sold as point-and-shoot devices both for computerized and non-computerized arcade entertainment games. The gun was used by aiming at a CRT screen area. Source: Baer, Ralph H. "Inventions and Products," *Ralph H. Baer* (website). 19 Sept. 2009 <http://www.ralphbaer.com/>.

The importance of explaining the genealogy of the computer mouse is related to two aspects. First, Baer's implementation of gun-like devices to shoot at fictional targets was later developed in shooting training systems for the military; Baer wrote that "shooting at targets in an arcade game is not too different technically from shooting at targets in a weapons training exercise. . . . The same interactive technology works well in both scenarios."[56] My point is that an iconic form of procedural realism was initiated, in which the process of shooting using

[55] A pen-shaped computer input device that is sensitive to light and is used to transmit signals to a computer by pointing to the CRT or TV monitor.
[56] Quoted in Halter 85.

computer devices was procedurally similar to real shooting. The second aspect is that the mouse, as a control device, is a fundamental element in HUD-interface procedural realism in contemporary strategy games. The mouse is specifically important to execute the indexical aspect of procedural realism, and the imagined form of producing indexes in computer graphics output.

In a brief but well organized history of wargames document prepared collaboratively by students at the University of Virginia for a class entitled "How We Get into Wars," the authors note that hardware "limitations on processing power and graphics led to games that concentrated more on reflexes than intelligence." It is noteworthy, however, that the consensus is to consider reflex actions or reactions as separate from intelligence. The authors were probably equating strategy (or AI) to intelligence, but their use of the concept possibly reveals they privilege the value of strategic thinking over the embodiment of tactical aspects of war. As I will explain briefly in Chapter 4 and in the Conclusions section, this might suggest a relationship between HUD interfaces and nineteenth century realism, which privileged omnipresent grand narratives over subjective experiences of reality.

Heads-Up-Display

The antecedents of the first HUDs were no more than physical scoreboard controls in form of sliders (see Figure 8). In 1975, Magnavox a growing video games company created another version of the popular console called Odyssey 100 and Odyssey 200. This system included two sliders in the central area to provide an easy score-keeping mechanism for the players.

Figure 8. The Magnavox Odyssey 200 console featured two sliders to provide a manual scoreboard. Picture of a Magnavox Odyssey 200 console. In "Magnavox Odyssey 200," *Wikipedia Commons*. 19 Sept. 2009 <http://en.wikipedia.org/wiki/File:ODYSSEY200_Konsole.JPG>.

The first versions of *PONG* used no graphical user interface yet (see Figure 9), but the hardware used to play it featured one of the first hardware control panels. These arcade control panels were implemented first as part of the interface hardware, in the same fashion as arcade video game machines. These panels provided interfaces for basic logistic functions such as "start "buttons, instructions to begin the game and customization of game difficulty, functions that now are generally controlled via the software HUD.

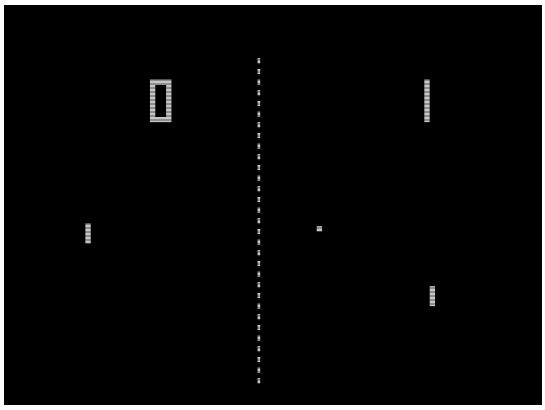

Figure 9. Screenshot of *PONG* (video game). Atari Inc. Arcade. Sunnyvale: Atari Inc.; Hasbro Interactive, 1972. From the Atari Arcade Hits #1 software title released in 1972 by Hasbro Interactive. In "History of Video Game Consoles (first generation)," *Wikipedia Commons*. 19 Sept. 2009 <http://en.wikipedia.org/wiki/File:Pong.png>.

Eventually, the same need that motivated the creation of an umpire in wargames (that is the calculation of outcomes), motivated the addition of a visual interface for score-keeping purposes in video games. Figure 10 shows an example of the way early forms of hardware extra-diegetic interfaces fulfilled the need of scoreboards and game statistics.

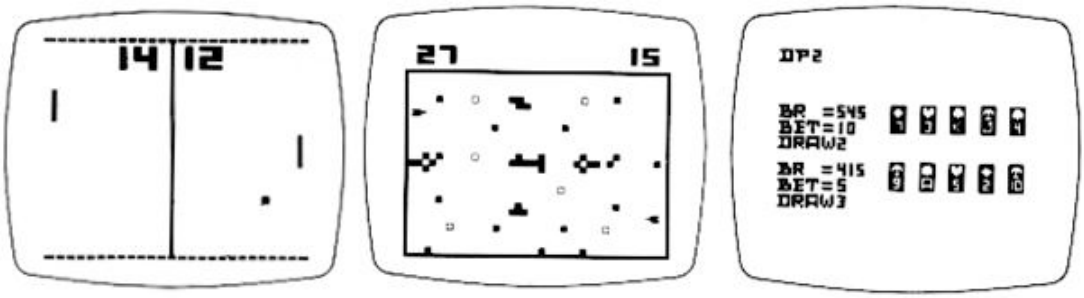

Figure 10. From left to right: *Tennis* (1976), *Battle* (1978), and *Draw Poker* (1977). Des. Ralph. H. Baer. Horsham: General Instruments (GI), 1976; 1977; 1978. In "PONG in a chip," *PONG-Story: The Site of the First Video Game*. David Winter, 2008. 19 Sept. 2009 <http://www.pong-story.com/gi.htm>.

The first HUDs were more informative and less interactive than the complex groups of menus, buttons, textboxes, hyperlinks, lists, checkboxes, etc., that we use today with much familiarity. For a while, information complexity in video games led to more interactive interfaces, sometimes very intricate HUDs

(this tendency was reversed in the 2000s with the advent of "immersive" games and minimalist design trends). From the 1980s to the 1990s, game development companies like Avalon Hill, Strategic Simulations, Talon Soft and Strategic Studies Group produced computerized imitations of board and miniature wargames. A good example of HUD development is the arcade game *Battlezone*, released by Atari in 1980; the game is the first shooter with a first-person perspective in a 3D scenario. *Battlezone*'s hardware (cabinets and controllers) was designed in the shape of a tank-gunner. "Since its vector display was monochrome, the game's colors were provided by cellophane overlays: green for the terrain and red for a top navigational panel that held a crudely rendered radar-style map and a scoreboard" (Halter 121). For the first time, a positional system for moving in a 3D space was included in a game's HUD, as well as some information such as the presence of an enemy in the surrounding area.

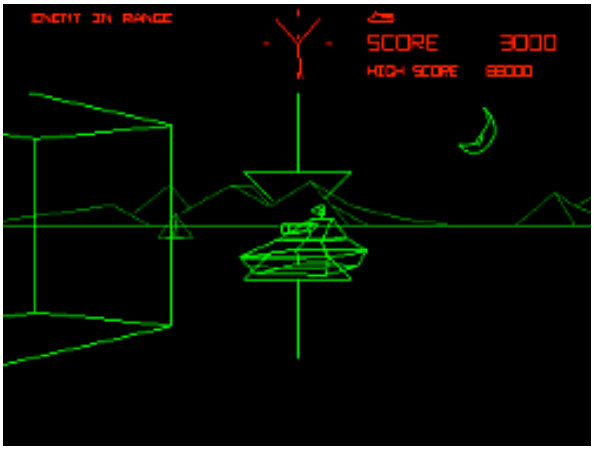

Figure 11. Screenshot of *Battlezone*. Atari Inc. Sunnyvale: Atari Inc., 1980.. The HUD shows movement outcomes displayed in the radar-like mini map. In "Battlezone (1980 video game)," *Wikipedia Commons*. 19 Sept. 2009 <http://en.wikipedia.org/wiki/File:Atari_BattleZone_Screenshot.png>.

The game had a positive reception by the public, especially because of its clever mimesis of real military equipment: controllers and viewfinder windows similar to a real tank, and the introduction of an interface that enhanced the feel of being immersed in a virtual space. Many versions were later created, some for the army and some for commercial arcade entertainment.

Wargames, War Games, and War-Themed Games

During the 1980s other games introduced some innovations to video game HUDs in graphic user interfaces, like *Castle Wolfenstein*'s narrative interaction with the player in form of text messages. But *Battlezone* and *Castle Wolfenstein* are not wargames in the strict sense of the term. Wargames have been adapted to many formats like miniature games, board games, card games and computer games. However, the computer gaming industry had a more flexible approach to historical accuracy to privilege playability over complexity. As a result, the term "wargame" is not used without controversy in the context of computer games, but the wargaming tradition is an important ancestor of what today is considered more loosely as "strategy computer games."

The question of what computer games to include in the "wargame" category is still a heated debate among users. As I mentioned before, "wargames" have been differentiated from "war games" and "war-themed games" both by professional designers and by users in general; their criteria are often based on the purpose and the dynamics of each game. The latter differences are relevant for this study, especially to exclude simulations with military purposes: *war games* constitute 'professional' studies of war; in other words, games produced for a

military training agenda. I will also exclude some *war-themed games* that do not use some relevant elements of wargames, like many first-person-shooter games (FPS).

Wargames are considered a sub-genre on computer strategy games, and their variations depend mostly on how the game manages time (by turns or real-time) and whether the game focuses on military tactics or military strategic operations. Furthermore, wargames are also characterized by a set of factors like having maps that represent often real or pseudo real terrains; playing with pieces that represent military units; a well defined set of rules to reproduce real warfare conditions; and the use of references to some historical personages. The narration is often divided into "campaigns" that "recreate" military events (battles, operations or whole wars) in historical settings. In this sense, Real-Time Strategy games (RTS) like *StarCraft*, *Rise of Nations* or the *Total War* series, and Turn-Based Strategy games such as Sid Meyer's *Civilization* series are the most similar computer games to traditional wargames. Nonetheless, as mentioned before, the category of wargames is controversial, especially because of disagreements between views that promote accurate realism and views that privilege playability over historical pretentions. In the next chapter I will analyze RTS and TBS strategy games interfaces to understand how they contribute to contemporary conceptions of realism in popular culture.

TBS vs. RTS Games: Two Concepts of Realism

Turn-Based Strategy (TBS) and Real-Time Strategy (RTS)[57] games are the two most popular computer strategy games subgenres. These games share the same lineage in their wargaming hobby ancestor but have a different approach to realism caused by their rules on management of playtime. Such differences affect the management level (strategic, tactic) and the use of non-diegetic information (displayed separately from the game world). For instance, turn-based gameplay is divided into *rounds* or *turns*, which are discrete time segments conceded to the players to execute decisions. Very much like in chess and other abstract strategy games, players take turns to move their pieces around the board; but often, in TBS games, more than one unit can be moved or used. Each turn represents units of time for the game world. For example, in Sid Meyer's *Civilization IV*, one turn represents 40 years in the fictional history of the game. Moreover, turns have a second temporal dimension: the player is granted an interval of analysis before executing her/his decision. As such, turn-based games have rules to divide playing time in two parts: time for game actions and time for the "thinking process" of the player. In this sense, TBS games preserve more time management characteristics from their strategy games ancestors. There is a very interesting difference between board games and their computerized counterparts: in computer TBS games, the time for the "thinking process" of the player is spent on the HUD interface.

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[57] For a comprehensive (but rather informal) description of the first RTS games and a history of this game genre, see "The History of Real Time Strategy: A *GameReplays.org* Special Feature," in *GameReplays.org*, August 7, 2008 <http://downloads.gamereplays.org/history_of_rts/The_History_of_Real_Time_Strategy.pdf>.

On the other hand, RTS (real-time strategy) games do not determine game progress by turn units of time, but rather the player issues commands *and* visualizes the outcomes as they unfold: in real-time. For example, in games like *Age of Empires* or *Rise of Nations*, the player can order her/his units to move and align in an offensive formation. The player will actually witness the military units moving across the terrain in real time, and gradually align in the terrain (as opposed to ordering units to move in a TBS game: by the end of the turn, TBS units will be located in the destination location, skipping the tactical processes in between). These differences also affect the scale of the decisions made by the player. In a RTS, deploying units and aligning them in an offensive formation would involve tactical decisions, such as ordering pikemen to advance slower than the rest of the units. But in a TBS, ordering units to occupy a terrain is a strategic objective (without witnessing the unit's movement step by step). In RTS games, the player also spends most of her/his time in the HUD interface, but the time allocated to the "thinking process" or analysis by the player is not separated from the gameworld action (as it happens in TBSs). In other words, in RTS games, the time spent "backstage" (at the HUD interface) does not pause the gameworld's time or the progress of actions occurring in the fictional world. The result is a game that combines strategic thinking with tactical operations, in which the player manages both long term decisions like building new cities (*macromanagement*) and small-scale decisions like directing the actions of individual citizens and military units (*micromanagement*).

In narratology, the difference between time management game rules in TBS and RTS games may be formally explained as a difference in *narrative rhythm*, an element that has a great impact in the reception of a reader, spectator or player. Even though someone playing *Age of Empires* is not necessarily focusing in the narrative elements of a given battle, her/his play actions (building, attacking, exploring, exploiting, etc.) construct a story in the most basic sense of what a narration is: the assemblage of a sequence of events. Narrative rhythm is the relationship between the pace of time in the story (time of the story) and the time it takes to present that pace of time (time of the narration). For example, Flaubert's *Madame Bovary*'s narrative rhythm is much faster (the book covers around 19 years) than Joyce's *Ulysses*' (the complete book covers one day).[58]

Perceptions of realism are affected by narrative rhythm (among other aspects) in different media. Depending on the receptor's concept of what realism is—or should be—either Flaubert's *Madame Bovary* or Joyce's *Ulysses* is more realistic. For some, *Madame Bovary*'s encompassing narration is more realistic because it attempts to make a faithful imitation of reality (i.e. detailed descriptions of the environment and characters from the point of view of an omnipresent narrator). For others, *Ulysses* is more realistic because it tracks closely a character's flow of consciousness, the same way one's thoughts guide us through

[58] Mieke Bal in her book *Narratology*, explains that narrative rhythm can be estimated by juxtaposing the amount of text with the time it covers in the narrated fictional world, drawing an analogy with the concept of speed (juxtaposition of the time involved with the distance covered) proposed by the German sound artist Günther Müller (99-111). Then, *time of the story* (TS), is the amount of text involved in presenting the events of a story, and *time of the fabula* (TF), is the amount of fictional time covered by the events of a story.

our subjective perceptions of reality. Notions of realism are as vast and as different as our ideologies, and of course, computer game media is not an exception.

But how have these differences in narrative rhythm and in concepts of realism emerged in computer strategy games? What are the rules that make a RTS game different to a TBS game?

The Birth of RTS Game Rules

Before RTS and TBS games existed, the first attempts to bring the wargaming hobby to the realm of computer games were adaptations of existing board wargames to an electronic format. Many games simply offered the same mechanics as board games with a very weak artificial intelligence system. The computer did prove to be an effective substitution and an effective umpire, however these possibilities did not add any innovation to gameplay other than a faster calculation of outcomes. There was one thing that was not possible in board wargames: to witness a depiction of the actual combat (as opposed to making a strategic decision, and immediately calculating its outcomes, thus, skipping over the combat itself).

Existing histories of the computer strategy pastime are made by players, hobby enthusiasts and game designers and are available in gaming websites, forums and databases (*HMGS East*, *GameSpot*, *IGN* and *GameReplays.org* are some examples). There are not many print publications on the history of hobby

strategy games evolution (most works focus on professional war games).[59] These sources mention that innovations were slowly introduced by games. As I will propose later, it seems that three particular branches of developments defined the genre: counter systems, technology trees, and unit control.

Counter Systems, Technology Trees and Unit Control

Stonkers (Imagine Software 1983) brought in some primitive RTS elements, the most important of them was a basic *counter system*, which serves as a coordination scheme for assigning values and weaknesses to different military units. As put by *GameReplays'* history of RTS games, it was the first time in computer strategy games that units were designed to interact in a rock-paper-and-scissors-like system: "Armor beat Artillery, which beat Infantry, which, in turn, beat Armor" (*GameReplays*). The *Stonkers*' HUD interface introduces two innovations: a visualization of each player's military units and a status bar to display messages about unit's current actions. This status bar contributed to the feel of witnessing the procedures being executed in real-time—a rather primitive solution to achieving real-time procedural realism: instead of visualizing these outcome events with detailed graphics, the player monitors progress by reading descriptions from the backstage, from a non-diegetic perspective. *Stonkers*' in-game economic procedures were based on the transportation and delivery of

[59] For these reasons, I found myself in the need of constructing a brief genealogy of these game subgenres by using information offered by informal or unsupervised sources such as hobby sites and *Wikipedia* and by assembling information from personal playing experience. Most sources do not offer specific authorship responsibility information, for they were created collaboratively. Given that this can become rather an exhaustive task, I will focus on the genealogy of non-diegetic devices for game rules delivery.

resources rather than on the creation and exploitation of resources in the game world. In 1991, *Mega-Lo-Mania* (developed by Sensible Software), also known as *Tyrants: Fight Through Time* in the United States, introduced a more complex system for economic macro and micromanagement, but still lacked detailed a complex individual control over population and military units. The most important contribution by this game was adding up to the counter system introduced by *Stonkers* and extending it to the economic and historical aspects of *Mega-Lo-Mania*.

Figure 12. Screenshot of *Stonkers*. Imagine Software. Des. D. H. Lawson and John Gibson. Magnetic Tape. Liverpool: Imagine Software. 1983. This game introduced the use of a counter system and a real-time resources management system. The HUD interface shows a visualization of military units and a status bar that contributed to the feel of experiencing processes in real-time. In *Moby Games*, 2009. 19 Sept. 2009 <http://www.mobygames.com/game/zx-spectrum/stonkers/screenshots>.

While the *Stonkers*' counter system affected military units, *Mega-Lo-Mania*'s provided structural complexity not only to the resolution of combat, but also to the advancement of a civilization toward a new historical "epoch". Moreover, this system provided narrative and strategic complexity by offering multiple paths for "researching" newer units and defense technologies. This was an early form of a *technology tree* (called "design" in *Mega-Lo-Mania)*. The technology tree in computer strategy games is one of the most important non-diegetic aspects that guide the player through the development of a play strategy.

In most RTS and TBS games the player can research upgrades to improve the overall economy, military and civilian units abilities and techno-scientific knowledge (sometimes a branch called "culture" is part of the technology tree as we'll see later). In Game Replays, a hobby RTS gamer defines the tech tree as "[a] diagram of the complete list of technologies and upgrades available to a race in a RTS game" (Fleay "Glossary"). *GameReplays.org*'s version of RTS games history does not mention this transition from *Stonkers*' counter system to *Mega-Lo-Mania*'s early version of a technology tree, but their examples illustrate the basics of the "design" system:

> The epoch determines the starting technology level (tech level) for a castle, and the highest possible tech level. When a castle discovers a certain number of designs it will reach a new tech level. This means that all the buildings in the sector get increased armor, designs get discovered faster and, for certain epochs, more buildings become available. Examples of these buildings are the factory, which is used to build the more complex weapons. (*GameReplays.org*)

Figure 13. Screenshots of *Mega-Lo-Mania*. Sensible Software. Chelmsford: Virgin Interactive, 1991. The game introduced the transition from combat counter systems to technology trees, an important non-diegetic device for visualizing game rules in both RTS and TBS games nowadays. In *Moby Games*, 2009. 19 Sept. 2009 <http://www.mobygames.com/game/mega-lo-mania/screenshots>.

The addition of these "designs" added a new layer of possible decisions by the player, and enhanced the exercise of strategy. The course of the story as well as the civilization's particular advancement to a different epoch was determined by the player's choices on how to develop their own civilizations. However, the playable "ethnicities"—red, yellow, green and blue people, (who were under the command of four different gods or demigods called Scarlet, Oberon, Caesar and Madcap respectively)—all shared the same technology tree. The concept of ethnicities in these games was only visually diverse, for their structural characteristics were homogeneous. In contemporary computer strategy games, the

player perceives the diversity of races and ethnicities both via the game graphics and—most importantly—via each civilization's technology tree; their behaviour and possible actions vary, therefore offering different experiences chosen by the player. Realism in these games (including TBS) is heavily concentrated in the use of extra-diegetic devices, which are visual representations of game rules. Further, these technology trees provide a playground for strategic thought. For example, in the TBS game *Civilization III*, the decision to research either Pottery or the Alphabet determined the progress in the technology tree; for instance, a civilization will be able to develop Poetry only if players choose to research the Alphabet instead of Pottery in the early stages of game. The use of a technology tree implies that such concepts of realism also rely on a worldview that conceives reality as a structure that can be assembled by different "algorithms" (See Chapter 1), like the example of strategic decisions in Civilization III and their long-term consequences in the development of "Poetry."

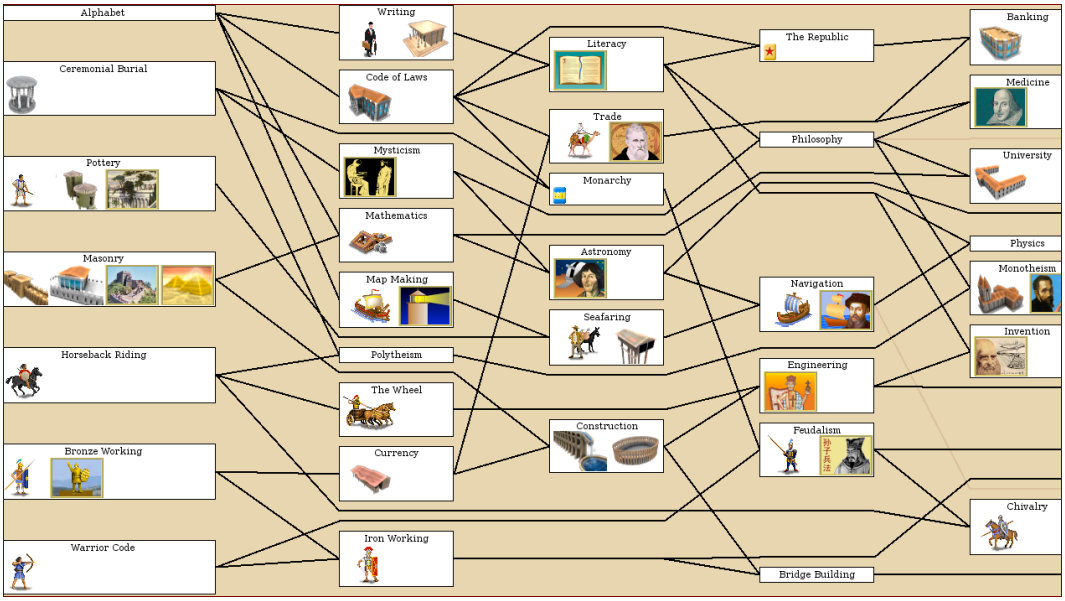

Figure 14. Screenshot of *Freeciv*'s technology tree. The Freeciv Developers. The Freeciv Project, 1996. In "Technology tree," *Wikipedia Commons*. 19 Sept. 2009 <http://en.wikipedia.org/wiki/File:Freeciv-2.1.8_technology_tree.png>.

The third innovation in RS games was introduced with the release of *Herzog Zwei* (Sega Genesis, 1989): the concept of commanding individual units. Bruce Geryck from *GameSpot* argues that this was "the first instance of real-time strategy." Even though it is a "hybrid action/strategy game" and a console game (most RTS were born as computer games), Geryck considers that it was the first time a game implemented the idea of "commanding individual units in real time by giving them orders and then letting them go" (Geryck no page). To the editors at GameReplays, this game is considered among modern "hero-centric" RTS games because the player impersonates a central unit that is capable of great control over all military elements. I would like to highlight here that I am including this game not because of its contributions to the HUD interface or to extra-diegetic aspects, but because this game is a pioneer in achieving an illusion of player control over one's units and at the same time giving the player a more concrete character in the plot of the game: the player is a unit herself. For instance, the player character (a robot capable of flying and carrying other units) can manipulate the location of her/his units by picking and dropping them in different positions. The player can also give orders to individual units: "fight from a fixed position", "patrol this area", "fight in fixed radius," "go to/attack/occupy intermediate base", "guard this area," "attack enemy main base," and "attack closest enemy base" (GameReplays' website and *Wikipedia*).

In summary, *Stonkers* contributed to the RTS subgenre with a counter system as a form of combat balance, *Mega-Lo-Mania* with an early technology tree, and *Herzog Zwei* with developing the player's unit's mechanisms of control over other units. However, *Stonkers*, *Mega-Lo-Mania* and *Herzog Zwei* are seldom mentioned by histories of RTS games.[60] *GameReplays.org*'s is one of them, but even though it mentions important characteristics of these games as precursors of the RTS subgenre, it doesn't summarize specifically what is the contribution by each of these games. However, GameReplays' version's merit resides in having highlighted significant characteristics of these games from the perspective of a player.

A common factor that technical developments of RTS games share is that all are related to the idea of having total control of the virtual world. Some players reportedly state that total command and control of the game's units result in games with an intense realism. Total control is not realist in the sense of resembling our material conditions of existence. But then, why is this idea so important for many players in considering a game as being "realist"? In the next chapter analysis on the current state of video games will shed some light on how these technical developments relate to the particular form of procedural realism found in RTS games.

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[60] Bruce Geryk (*GameSpot*) mentions the game *Herzog Zwei* (released in 1989 in Japan and 1990 in the U.S.) as the first RTS, while Dan Adams (*IGN*) credits *The Ancient Art of War* (1984), *GameRepalys.org* and *Wikipedia* credit *Stonkers* (1983). The rest of the sources mention the popular game *Dune 2* as the first game of the subgenre (1992).

Chapter 4. Procedural Realism and Scenes of Knowledge

Control: The Commander vs. the Ruler

When Westwood Studios published *Dune 2* in 1992, things took a completely new direction. The contributions made by the games mentioned above were implemented a single game that became a cult among RTS fans. Plus, the game allowed exploiting natural resources from the map. *GameReplays.org* history describes how each game permitted the player to experience different levels of control over the game world:

> In the arcade-like *Stonkers*, *you were a low-level commander* incapable of receiving reinforcements. In the somewhat simulation-like *Mega-Lo-Mania*, *you were more of an overseer with no direct control over your population*. In the individualistic *Herzog Zwei*, *you were a single combatant* with the ability to exert limited influence over computer-controlled allies. In *Dune 2*, *you were none of these, yet you were all of them*. You took care of everything, from the larger, more strategic decisions, all the way down to the smallest tactical details. You were free from dice, from AI behavior, and from the perspective of a single unit. Total control was yours, all yours. (*GameReplays.org*) [Emphasis added].

These fan-made statements reveal how the figure of the player or the impersonation of a concrete character such as a general, a combatant, commander

or governor became an important issue for the culture of RTS and TBS games. It is also remarkable that for RTS games there is a deep interest on having both strategic *and* tactical control over the world *and* units. Increased control over a wider range of world aspects became an important criterion for RTS games, and therefore for a particular notion of realism. This wide range of control actions in the world—from tactical to strategic decision-making—is frequently used as an argument for conceding a superior status of realism to RTS over TBS games; however, these discussions are still part of a heated ongoing debate on whether RTS or TBS games are more realistic.[61] A good example of players' fascination with total control is *GameReplays.org*'s version of how *Dune* 2 contributed to the history of RTS:

> *Herzog Zwei* only allowed you to directly control a single unit, *Stonkers* did not allow you to buy new units, and *Mega-Lo-Mania* did not allow you to directly control units within map sectors. . . . [*Dune 2*] gave you control over everything your forces could do. The units could be sent anywhere on the map, ordered to fire at specific things, and you could build as many as you wanted. [. . .] Westwood borrowed, either directly or indirectly, some things from previous strategy games such as *Stonkers*, *Mega-Lo-Mania*, and *Herzog Zwei*. But what Westwood did was to take the great

[61] See "Point-CounterPoint: Turn Based vs. Real Time Strategy," in *StrategyPlanet. June 27, 2001*. <http://www.strategyplanet.com/features/articles/pcp-turnvsreal>, "Real-time vs. turn-based gameplay," in *Wikipedia*. December 27, 2008 <http://en.wikipedia.org/wiki/Real-time_vs._turn-based_gameplay>.

> ideas of these games, overcome their shortcomings, fuse their styles of gameplay together, and add one single new idea: *total control*. That one concept permeated the entire *Dune 2* experience and still permeates every strategy game that has followed in its footsteps. (*GameReplays.org*) [Emphasis added]

Overall, total control means having a wealth of possible actions to perform in a game world. Also, total control in computer strategy games means to have information on different aspects of the game world, such as the state of a civilization's economy, its cultural influence over other civilizations, territorial possessions, military units, etc. Finally, total control means also having access to a set of control devices that enhance the execution of game actions. All these actions and information are available in the HUD interface. For complex games such as RTS and TBS, having no HUD interface can result in a loss of control over the game world. A reason is probably that game rules and the calculation of decision outcomes are so complex in these games that the player needs a control device to manage information and execute actions. Even though *Dune 2* implemented most elements of the RTS genre, it lacked a complex interface for the exercise of player control over the world. As put by *GameReplays.org*:

> For a game that allowed you unprecedented control of your forces, it was a shame that the interface of *Dune 2* was so basic. The game only allowed you to control a single unit at a time (there was no way to select a group). There were no options for waypoints and no ways to give strings of orders. The idea of secondary abilities

had also not yet been introduced into the RTS genre, so the units were fairly one-dimensional. Nonetheless, *Dune 2* succeeded where other games had failed—it created a feeling of being in control of an actual army. You were the commander, not merely a single unit or just one link in the chain of power.

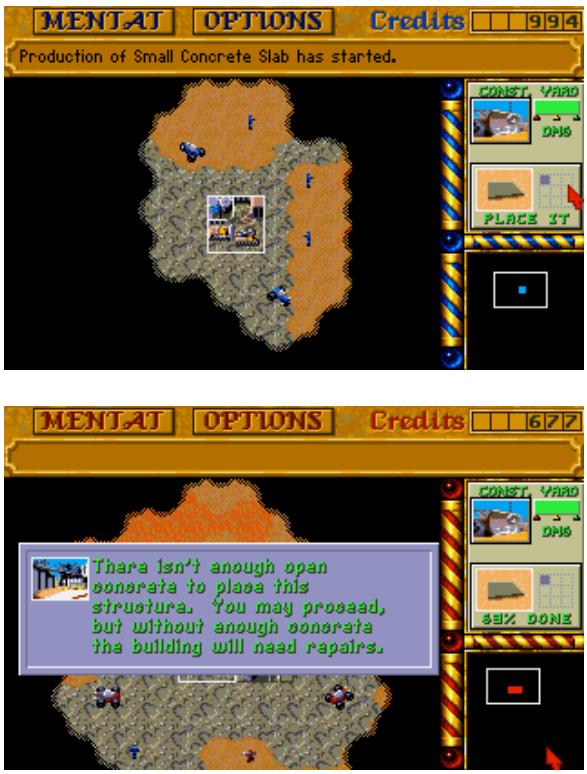

Figure 15. Screenshots of *Dune 2: The Building of a Dynasty*. Las Vegas: Westwood; Virgin Interactive: 1992. In *Moby Games*, 2009. 19 Sept. 2009 <http://www.mobygames.com/game/amiga/dune-ii-the-building-of-a-dynasty/screenshots>.

According to these players, the figure of the commander was better achieved by *Dune 2* than by its predecessors. It became evident that it was important for the player to be able to impersonate characters in power positions such as rulers, governors, generals, commanders and personalities whose role is to execute and implement control. This also has consequences on RTS and TBS different notions

of realism: most RTS games are focused on the figure of a general or a commander (civilizations almost inevitably engage in war), gameplay is action-oriented, decisions and outcomes are represented in real time and units are more dependant from micromanaging their actions. And TBS games focus in the figure of higher status strategy commands: rulers, governors, and sometimes generals. Gameplay requires more abstract planning, and some players think that TBS' turn pace allows the player to "input more realistic and detailed plans" (from the point of view of a general or a ruler, I would add).

Players who grant superior achievement of realism to TBS games often refer to *human and computer intelligence* as arguments. Human intelligence, players argue, is better used in TBS systems: "[i]n turn-based you are given plenty of opportunity to use real strategy since you have time to take in everything that is going on. Most units in real time are wasted because of this. . . . There is no time for fine tuning your strategy. The fastest mouse wins!" (Dragon). As for computer artificial intelligence (AI), players argue that current computer systems are constrained by their own processing power, which doesn't help RTS' artificial intelligence at all (Dragon; Walker). But the slower pace of TBS games, allows the computer to execute a more complex AI system that matches the more intelligent decision making process of the player. Mark H. Walker, a columnist in *GameSpy* (a game website operated by *IGN*) explains it as follows: "it should come as no surprise that turn-based games have a better artificial intelligence. Pure and simple, the computer running a turn-based game has more time to "think." Couple that with our visual expectations of real-time strategy—i.e. no

one wants to mouse around an ugly game (which requires even more processing power)" (Walker).

Helmar Schramm in his introduction to *Collection – Laboratory – Theater*—an essay collection on representations of science in the eighteenth century—argues that the history of modern scientific knowledge has important roots in certain "scenes of knowledge" portrayed in artistic interventions such as the *Wunderkammer* or Cabinet of Wonders, the laboratory and the modern theater stage, "which exemplify . . . local settings for the production of knowledge" (xii). Schramm also writes that the concept of play is indispensable for exploring these scenes and the development of scientific knowledge because of the importance of experimentation, which I would add is a basic procedural element in scientific realism as well (to which I will come back later in the Conclusions section). All three scenes—the Cabinet of Wonders, the laboratory and the theater stage—can be explored in computer strategy games, and relate to the concept of procedural realism. As I will illustrate with examples from the game *Age of Empires III*, the theatre as a scene of knowledge relates to the referential (iconic) aspect of procedural realism, while procedures of play relate to the operational (indexical) part of procedural realism.

In this chapter, I will tie the theoretical issues of procedural realism to RTS games by advancing game analysis and comment on cultural factors. For instance, why is it that the representation of Amerindian cultures in a game like *Age of Empires III: The War Chiefs* enables players to use the "Nature Friendship" ability in the HUD interface, while this option is not allowed for the

rest of the European in-game civilizations? Why do only the European civilizations have a button to choose a "Revolution" feature to revolt against their home city and become a new nation? Why do Amerindians have to dance in a fire pit to spawn settlers, as if their reproduction was subject to ritual actions (which are in some ways similar to the reproduction dynamics of the Zerg in *StarCraft*?[62] Are there procedural cultural archetypes being implemented to certain ethnicities?

The question is not whether RTS or TBS games are more or less realistic—or if they are realistic at all—but rather it is how these different conceptions of realism implement their ideological approaches to the simulation of historical procedures? In Chapter 2 I argue that the roles of the rulebook and of the umpire are related to the character of procedural representation (proposed by Bogost)[63]. Secondly, I have described in Chapter 3 that the genesis of the HUD interface points both to the role of the rulebook and the umpire in traditional board and miniature wargames. Finally, also in Chapter 3, I presented the genesis of the most important characteristics of the RTS genre (some of them having been absorbed by TBS games as well), and stressed the importance of the aspect of

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[62] *StarCraft* is a RTS strategy game developed by Blizzard in 1992. It has become a cult game among players because of the accomplished "balance" of strength types (a very effective counter-system) between the in-game races (Zerg, Terrans and Protoss). The Zerg are an alien race whose military abilities are based in massive numbers of units as opposed to the strength of an individual military unit.

[63] The HUD interface is a mediating device between the two basic stages of procedural realism: 1) serves as a rulebook to guide the play procedures, that imitate real life procedures (i.e. giving a unit the order to attack the enemy), and 2) functions as an umpire at the moment the computer represents outcomes in the computer system (i.e. a representation of combat outcomes via stats, possibly obtaining experience points, and computer graphics representing outcomes in an iconic manner).

player *total control* in such games. Having these three aspects in mind (HUD as extension of rulebook, HUD as extension of the umpire, and HUD for player total control) I will advance examples of a popular RTS game and some references to TBS to illustrate how these games (through the HUD and game rules) assemble modern and occidental concepts of warfare to all the cultures represented in these games.

In-Game Units and Historical References

The concept of unit is very important for RTS games; it is crucial for understanding HUD-based game procedures. Also, the HUD interface provides a spatially organized knowledge not only of the material elements of the world, but most importantly a spatially organized knowledge of possible actions to exercise command and control over units, and—through units—of the virtual world. Some units are used by all cultures, and other units are used to make civilizations different from each other. *Age of Empires III* provides a good example to discuss the way this concept is generally implemented in RTS games. First, consider *Age of Empires III*'s HUD interface: Figure 5 (in Chapter 3) and Figure 16 (below) show screenshots of a game in its first stages. The HUD interface, called "Colony Screen" in the game's user manual is composed (from left to right) of the following elements:

Figure 16. Screenshot of the RTS game *Age of Empires III*. Dallas: Ensemble Studios; Microsoft Game Studios, 2005.

- A Mini Map showing the terrain that has been explored by one's units.
- The Home City icon, usually a flag that represents the time left to receive a shipment from the home city (a concept introduced to stand for the colonial relationships between the explorers and the home Empire).
- The Resource Panel shows the "stockpiled resources" and population, (current population and upper limit, food, wood, coin and villagers) (*User's Manual* 25, 27).
- The Current Unit area is located at the center of the HUD, and it serves as an interface placeholder to show the unit currently selected by the player (units can be buildings, equipment, military units, and civilian units, just

to name some). This area displays statistical information, the unit's name, classification, hit points and other important information related to the game rules governing the selected unit.

- The Command Panel (which switches from Command Tab to Stats Tab) is a very important area for assigning orders to units and visualizing the current progress or outcomes of such commands. This area displays the possible orders or tasks that can be allocated to a specific unit. Actions such as constructing a building, attacking, retreating, exploiting natural resources, researching technologies, advancing to a new age, etc., are made visible to the player in the Command Panel. Expert players normally assign these actions to keyboard shortcuts and abandon the use of HUD buttons to a great extent, but information like economic stats, outcomes of combat, progress of commands, etc. is still obtained from the HUD interface.

In Figure 16, the Town Center has been selected by the player—therefore is featured in the HUD's Current Unit area (centre). This building, more than just an edifice, works in the game as a civilian unit with the function of reproducing other civilian units (settlers). For example, in Figure 16, the Command Panel (to the right) shows a couple of citizen units being "trained," which is a replacement term for "unit creation" or "birth." The screenshot shows that the player decided to command the creation of two new citizens (civilian units). This process is done in two steps: 1) the player clicks on the Town Center (a building unit), which will cause the HUD to display two types of available actions: "train" settlers, and

"improve" the civilization (which means advancing to a new historical age). 2) The player selects the button "train" settler: this will command the Town Center to produce civilian "human resources." Settlers, in turn, are also units that will receive orders from the player. Their function is related to economic aspects of the civilization). In the top portion of the panel, the player can visualize the progress of her/his command, in this case, the progress of training.

All active resources under a player's command will be treated as units and managed via the HUD. The civilization being played in Figure 16 are the English, but no matter what civilization the player chose, its infrastructure and human resources are managed by the concept of unit in most (if not all) computer strategy games. Even if a player chooses to play a civilization such as the Sioux or the Aztecs—for whom the concept of military unit did not exist in the real world civilization—their resources will be managed as such: hierarchically and individually. The term *unit* is a Western concept. It was coined by the Roman Army to administer and manipulate military organizations in manageable groups. For example, "a *legion* was made up of ten *cohorts*, each of whom was further divided into six *centuries* of eighty men, commanded by a centurion." Therefore, a legion was a unit formed by 4800 men in total (*Illustrated History*, sec. "The Roman Army"). In this sense, the concept of unit is an organizational and administrative term that served for the purposes of commanders and men in charge of each hierarchical level. This concept spread to territories occupied by the Roman Empire, and its use survived in modern military forces. Today, a military unit refers to either a definite number of soldiers of the same rank, a

group of equipment, or to a group of service non-combat personnel (i.e. medics and units in charge of logistic procedures).[64]

Examining the units of a specific in-game society will help clarify these processes. In the "Instruction Manual" for *AoE III: The War Chiefs*, the real world Aztec society is briefly depicted by mentioning the capital city and its inhabitant's membership to the *calpulli* (see below). In a separate paragraph, the "in-game Aztec civilization" is described as "based around a strong infantry consisting of several units, including elite infantry troops" (7). Both concepts of units and infantry are coined in Western traditions. Aztec (or *Mexica*) warfare was not organized in units, or at least, if a notion similar to unit were to be found in Aztec traditions, maybe *calpulli* would be a vaguely closer concept, but would be far from equivalent to the concept of unit. People with lower social status were organized into *calpulli* or neighborhoods ("large houses") and their activities were not exclusive to warfare, but rather included other social and economic roles, such as cultivating their territories, and running public schools (*telpochcalli*). Therefore, a commoner citizen-warrior's group was subject to the location of the territory he and his family inhabited, not to the assignment of a warrior to a specific organization. All calpulli were organized under the larger group *Altepetl*

[64] The *DOD Dictionary of Military and Associated Terms* defines the term unit as: "1. Any military element whose structure is prescribed by competent authority, such as a table of organization and equipment; specifically, part of an organization. 2. An organization title of a subdivision of a group in a task force. . . . 4. With regard to Reserve Components of the Armed Forces, denotes a Selected Reserve unit organized, equipped, and trained for mobilization to serve on active duty as a unit or to augment or be augmented by another unit. Headquarters and support functions without wartime missions are not considered units."

or “city-state”. The commoners were organized apart from the nobles, whose military group depended on their attachment to warrior elite societies: Eagle warriors (*cuacuahuhtin*), Jaguar warriors (*ocelomeh*), Otomi warriors (*otontin*) and the Shoven warriors (c*uahchicqueh*) (Hassig 36, 45).

Civilian and military Aztec life was not separated to the same extent it was in Western traditions; citizens were both economic and military forces of their own calpulli. The player manages the in-game Aztecs by separating human resources in three different functions: settlers, commoner military units and elite military units. There is indeed some historical accuracy in separating warriors in commoners and elite societies, but the separation according to economic or military functions remains faithful to the Western paradigm (see Figure 17). At the same time, Native American civilizations operate in relatively the same way as Europeans: the player has to get the largest number of villagers possible to gather the three primary resources (food, wood, and gold), build a strong enough economy to recruit military units, research upgrades to different aspects of the economy and military life, and to advance to the next technological age.

How does this relate to procedural realism? The particular form of procedural realism in the *AoE* series occurs in a negotiation between iconic historical references to real-world cultures (such as the Aztec division of elite and commoner warriors) and iconic procedures of Western / modern paradigms (such as the division between military and civilian life). This is interesting in the sense that processes used to simulate the Aztec civilization are both an interpretation of the Aztec civilization, *and* a representation of Western culture. In the example of

Aztec units, there are iconic procedures that resemble accurate historical references, such as the division of elite and commoner armed forces. Also, there is a representation of Western (or modern?) paradigms in the division between military and civilian life.

Figure 17. Screenshot of *Age of Empires III: The War Chiefs*. Dallas: Ensemble Studios; MacSoft, 2006. Civilian units are working in farms or dancing in the fire pit while military units are waiting for combat orders (top left).

Even though historical accuracy for representing the Aztecs is not the objective, there is an inherent claim that the represented procedures portray real-world historical processes. One may ask why then are real cultures depicted with so much detail and (most of the time) with relatively accurate historical research? What is the appeal of re-producing historical processes? Historical research was evidently part of game design; this is shown most of the time through the game's graphics portraying iconic representations such as the looks, characteristics, historical information and names of military ranks and architectural aspects.

Historical referentiality, we may say, is a promoted value. In Aztec civilizations this can be perceived mostly in the adaptation of military ranks, types of military units, looks and visual characteristics, the civilization's architectural style, units' names, or function of units. But *most* processes such as gathering resources, training units, engaging in combat remain similar to the rest of the in-game civilizations. In addition, there are some unique procedures that should provide a civilization with their own distinctive characteristics. Coming back to procedural realism and the negotiation between icons of Western paradigms vs. interpretations of the represented cultures, I will illustrate these aspects with two more examples on how standard processes (applicable to all in-game civilizations) coexist with unique processes (singular traits of an in-game civilization.

In-game history making suggests that the purpose and concepts of war in *AoE III* and most RTS games do not differ across in-game civilizations. One case is that real-world Aztecs practiced the Flower Wars (*xoxhiyaoyotl*), whose purpose was not the resolution of a conflict, or accomplishing territorial objectives, but instead were exercised with what we may perceive as unconventional warfare motives from a Western view point: training and securing captives for religious sacrifices (Hassig 10). Nevertheless, the purposes of war in the game are mostly resolving conflicts related to territorial, resources and political supremacy.

In-game Campaign Heroes are examples of unique processes implemented for specific civilizations' units. Even though game designers reportedly state that historical accuracy is not an objective in hobby RTS or TBS development, they

place great importance to historical research during game design, and even include glossaries and informative features to be included in the software. In Figure 18 the in-game character is described as follows: “Bolivar attacks with a rifle and sword. He has a lot of hit points, but if he falls in a fight, he collapses and has to regenerate enough health to be recovered by allies. Bolivar can collect treasures, but cannot build Trading Posts” (*The War Chiefs* “History”). Below the character’s traits there is a description of the “real” Bolívar’s contributions to Latin American history, including details on his birth and death. As a result of these two sets of information, the player engages in a negotiation between references to the real character and the in-game character’s possible actions, which the player can perform by selecting this particular unit (including its rules and restrictions).

Figure 18. The "History" section in *The War Chiefs* expansion provides both historical and fictional information to the player. In this screenshot, the text explains the in-game character

traits, and then summarizes Simon Bolivar's role in Latin American history. Screenshot of *Age of Empires III: The War Chiefs*. Ensemble Studios. CD. Plymouth: Mac Soft, 2006.

The Heads Up Display: Omniscience in the Theatre of Operations

The Heads-Up-Display in computer strategy games is a fundamental part of the video game genre. Gameplay involves engaging in an interface-intensive war by "pulling the strings" of military units through the HUD interface. The player is involved not only as strategist, but as performer and director of what I call a *theatre of operations*. I borrow this concept from modern warfare theory, as a perspective to understand this virtual space outside the body of the player, and a hovering layer above the game world. In this space, the player can perform hypothetical roles as player, as strategist, as character, and even as god. The theater of operations has been incorporated in many RTS games as a modern connection between the strategic and the tactical level, and this aspect is relevant to the notion of empire building in video games: the theater of operations becomes both the place and the medium in which the Empire is enacted and, if successful, built.

Warfare theory has been developed around many key concepts that contribute to the central role of three operational levels: *strategy*, *tactics* and the *theatre of* operations. The latter is an important warfare concept coined during World War II to name the territorial area where the military operations were to be performed**.** This concept is currently used today in the context of information warfare. Marteen Van Horenbeeck, a Security Consultant and specialist in Information Security defines the theatre of operations along these lines: "US

Army documentation on 'Organization and Administration in World War II' by Blanche M. Armfield (1963) states that: 'The term 'Theatre of operations' was defined in the field manuals as the land and sea areas to be invaded or defended, *including areas necessary for administrative activities incident to the military operations*.' ... and was divided into two chief areas: . . . Land and sea areas to be invaded [and] *Areas necessary for administrative activities related to military operations*" (Van Horenbeeck 245) [Emphasis added]. Van Horenbeeck continues by giving more concrete examples of the concept:

> In Information Warfare, hostilities can take a more wide variety of forms than they did in the past. The core of the hostilities may no longer be to invade 'land and sea areas' [...] During the application of force, whether this consists of conquering market share, for a commercial organization, or in fact conquering or 'liberating' foreign land, in the military term, *information supremacy needs to be achieved*. [...] The Theatre of Operations is the complete spectrum of actors, locations, ideas and communications media where operations may take place in order to lead to ones underlying goal of Information Supremacy. (Van Horenbeeck no page) [Emphasis added]

In video games, strategic and tactical decisions take place in one or various theaters, which are modeled not just as geographical spaces, but also as the center of administrative operations that include the Heads Up Display interface of the game and the geographical virtual area where invasion and administrative

activities occur. As shown in Figure 19, the battlespace constitutes the top portion of the image, which represents the terrain where battle takes place; the controls in the bottom of the image are the Heads Up Display (that works as a "behind the scenes" area where the player controls information, executes strategies, can visualize current inventories and administer the resources).

Figure 19. Screenshot of *Age of Empires III*. Ensemble Studios. CD. Dallas: MacSoft, 2005.

Figure 20. ***Supreme Commander*****. Gas Powered Games. Agoura Hills: THQ, 2007. The contrasting screen shots show the ability to move from ground level to a view from space (satellite view) using only the mouse-wheel. Source:** ***GameSpot*****, 2007, CBS Interactive Inc., 2009.**

The theatre of operations is composed both of the battlespace (where the battle is visualized), and also the Heads Up Display (the space were orders are executed). In other words, I propose that the performance of images at war happens both at the virtual terrain and at the interface's menus—the inventory, the controls and icons that represent opportunities of action for affecting the diegetic world through the HUD interface. Those visible controls are assembled on a higher level over the battlespace to provide the player with a Panopticon informatic-god-like view (See Figure 19and Figure 20). The ability to control vision over the world and also to control the spectrum and range of vision in these games is part of the concept of realism present in these games. Realism is intensively tied to omniscience and control of the world through diegetic aspects of fiction. For these reasons, I consider that RTS and TBS procedural realism might be a descendant of a nineteenth century form of realism, where omniscience and the extra-diegetic apparatus dominated narration. These aspects are also crucial for playing strategy video games in general.

For Alexander Galloway, operations occurring in the HUD are part of the extra-diegetic level of the game (see Chapter 1). Galloway's interpretation of actions that occur on the HUD interface is that, while other fiction media (like cinema) sublimate relations of power and control, "Video games don't attempt to hide informatic control; they flaunt it." Galloway later adds that in Sid Meier's *Civilization* series,

> the gamer is not simply playing this or that historical simulation. The gamer is instead learning, internalizing, and becoming intimate with a massive, multi-part, global algorithm. To play the game means to play the code of the game. To win means to know the system. And thus to interpret a game means to interpret its algorithm (to discover its parallel "allegorithm") (Galloway 90-91).

What Galloway means when he claims that video games flaunt informatic control is that the operator, aka the player, internalizes the logic of the program, and figures out what will work within the rules of the game in order to win. The player learns the game's *hidden logic* (Manovich 222), and becomes a sort of expert in manipulation of menus, tools and buttons to perform strategic actions that will model and manipulate the narrative of the gameworld. The theater of operations (its controls, and the virtual space) is a simulation of a standardized vision of war, where warfare strategy is applied to the conflict situations between every culture in the game.

In Figure 21, the Aztec's military is arranged in a diagram that summarizes the progress of military organization through historical ages: Discovery Age, Colonial Age, Fortress Age, Industrial Age, and Imperial Age. At different ages, more advanced technology becomes available, unlocking better buildings, units and improvements. This is a very good example of how civilizations are inserted in a Western concept of history: rather than following the Aztec circular concept of time, the diagram shows that the unique path for advancing through time is

moving through European concepts of history, and specifically in a positivistic progress fashion such as the advancement from a basic and simple "Discovery Age" toward an "Imperial Age." This diagram is also an example of informatics control; in the game, the player has access to the technology tree to select a "historical" strategy to advance through the Ages in a path that will allow her/him to achieve the construction of a particular military.

Figure 21. "Quick Reference" in *Age of Empires III: The War Chiefs* (leaflet fragment). Microsoft Games Studios; Ensemble Studios, 2006.

This type of planning is even more important for Turn-Based Strategy games, but the technology tree is also present in RTS games in a simpler format.

Even though this is an interpretation of the Aztec's military culture, it is also a representation of our contemporary worldview paradigms. If this diagram is seen procedurally, it is possible to see that it promotes procedural realism's iconic references to the real world. In other words, it promotes and affords the player to execute a modern algorithm for experimenting with historical procedures.

Alexander Galloway has claimed that wargames should be interpreted as references to contemporary culture and to contemporary informatic control, instead of as allegories of historical processes (such approach seems to him as an inadequate ideological critique). He proposes that ideological critique fails to provide an adequate interpretation of these games because "such a critique is undermined by the existence of something altogether different from ideology: informatic code." (102) I agree with Galloway in that these games are representing informatics control, but ignoring the presence of ideological and cultural elements seems to me as a comfortable way of ignoring the embodiment and material relationships of the informatic code he refers, and of treating informatics code as non-ideological, with which I completely disagree (see Chapter 1 and 2). However, I agree with Galloway in that the idea of playing alternative possible worlds are references to contemporary culture.

Technology trees, as procedural representations of world history and concepts of time are ideologically important for players too: James Dunnigan, a wargames expert and author of a popular book entitled *The Complete Wargames Handbook*, defines wargames as follows: "A wargame is an attempt to get a jump on the future by obtaining a better understanding of the past. A wargame is a

combination of "game," history and science. It is a paper time-machine. Basically, it's glorified chess" (Dunnigan sec. 1). The reference to wargames as a way of envisioning the future through the understanding of the past, demonstrates that strategy games in popular culture are perceived not only as a simulation of informatic control (as Galloway argues), but also as bearing an ideology (a specific relationship to history and to the material world). What is interesting to me is that popular culture (for instance Dunnigan's remarks quoted above) does perceive these games as practices for re-writing history: by experimenting with alternative worlds (or potential outcomes), video games enable the player to visually remap alternative conquests and colonial settlements. However, the algorithmic structure of these games do restrict historical experimentation to Western paradigms of history, such as the linear sequence of the technology tree.

As shown in the examples of the concepts of unit, the concept of theatre of operations, and of the tech tree, many computer strategy games, such as *Age of Empires* implement an Eurocentric algorithm of history. While these games make it clear that they are not attempting to be historically accurate neither pedagogical in their function, something that becomes clearly apparent when one is playing these games is that one is enacting essentially the same operations (or performative acts) whether one is playing a European imperial power or a Native American tribe. It is like showing a vast array of possibilities, but underneath, a homogeneous structure determines procedural representation.

Laboratory: The Counter-System

Most gameplay procedures resemble a Western paradigm of historical processes; say a Eurocentric algorithm for the development of civilizations throughout history. This is best illustrated by the selection of civilizations in the *Age of Empires* series: the first *Age of Empires* (*AoE*), *Age of Empires II* (*AoE II*), and *Age of Empires III* (*AoE III*). The first game portrayed ancient civilizations, the second focused on medieval cultures, and the third in the colonization of the Americas (the formation of empires and the formation of independent nations from 1492 to the first half of the nineteenth century). Designers created an interesting selection of civilizations: indigenous civilizations of the Americas are only included in these simulations until the discovery of America (as part of the expansion pack titled *AoE II: The Conquerors*), even though classic Native American civilizations existed approximately from 200 to 900 AD, synchronously with ancient and medieval civilizations. This selection reveals a Western concept of history, in which Native Americans "appear" in history until Europeans arrived to American lands.[65]

Indeed, starting a game in *Age of Empires III* means to engage in grand narrative decision-making; for instance, one has to choose what civilization one wants to embody. In *AoE III*, the player chooses a European colony. The available civilizations are the French, Spanish, English, Ottoman, Dutch, German, Russian and Portuguese. If the player acquired *The War Chiefs* expansion, s/he can choose an Amerindian civilization (Sioux, Aztecs or Iroquois). There are various aspects

[65] Eric Wolf discusses this idea in his 1982 book, *Europe and the People without History*.

the player can review to make her/his decision; the most important are the "Civilization Attributes," which summarize the game's *counter system*. Also, the player can review the *technology tree* (see Chapter 3), which I will explore below. The counter-system is based in each civilization's *combat arms* (the types of troops within a civilization's armed forces). In RTS games, generally combat arms are three different kinds of units: infantry, cavalry, and artillery. Non-military units include settlers, naval units, siege weapons, and buildings. For example, some civilization's armies like the Iroquois are cavalry-oriented, while the Ottoman's strongest combat is based in naval and artillery units.

The counter system's most important function is to guarantee game balance in combat and economic power. This balance is achieved by assigning different combat arms to each culture. For example, in *The War Chief*'s official website, the civilizations are advertised as follow: the Iroquois are "[m]asters at horsemanship", which means their combat arms are heavily based in cavalry. The Sioux are "[a]dept at leveraging European technology" (which means this civilization features powerful artillery and siege arms). Finally, the Aztecs are "[k]nown for assembling powerful armies" based in strong infantry units. Without balance in the military power of all civilizations, or the exploitation of natural resources, the game would inevitably be like a theatre where the same play is performed over and over. The result would be one culture dominating the rest and players choosing the same civilization to play with each other. This shows that balance in diversity is one of the most important procedural values in RTS games.

Of course, if our concept of realism is something close to "realism as a faithful portrayal of social reality," the counter system is definitely not realistic at all: we all know military and economic power balance does not exist in the world we live in. But why then players of modern computer RTS and TBS games reportedly perceive these games as instances of realism? It is important to remember that procedural realism—in RTS games and wargames—privileges a view of realism where an omniscient, panopticon *view and control* of the world's historical processes are the ultimate paths for apprehending reality. In addition, exercising command and control over a civilization's unit is perceived as a playful embodiment of the role of a commander, a ruler, a theater director or even a god personality. If a player has command and control over their units' actions, s/he can shape the evolution of a complete civilization, consequently "dominating" the processes of history and relating these actions to a realistic approach to history.

This particular form of procedural realism is not new at all. As described in Chapter 2, known forms of calculation-based wargaming procedural realism existed since the eighteenth century. I would also add that these forms relate to another Age of Enlightenment invention: the laboratory. In *Collection – Laboratory – Theater*, James W. McAllister explores the concept of laboratory as a "purified artificial" space where "the tension between the local and the universal attempts to advance valid laws for the universe as a whole, but in practice, however is always deeply rooted in specific localities" (Schramm xix). This tension between the local and the universal sheds more light on the coexistence of Eurocentric procedural paradigms and a keen interest on representing selected

historical elements related to particular cultural aspects like in the Aztec units example. As part of the three scenes of knowledge (the Cabinet of Wonders, the laboratory and the theater stage), the laboratory illustrates the operational part of the concept of procedural realism, and as a metaphorical scene of knowledge relates to the counter system in these games.

Coming back to unit control and the counter system as part of the particular concept of realism in RTS games, it might be interesting to ask why is it considered realist to exercise command over units, and to control and execute procedures on historical processes? Why are these grand narratives considered realism?

Why total control equals realism? It seems that having available the complete array of ages and technologies for experimenting with history making conveys the impression of having control over reality as a whole, apprehending reality in the eyes of the player. Because an all-encompassing gaze, a panopticon point of view, a totalitarian perspective of the greater picture provides the illusion of controlling our social and historical circumstances, entertainment and pleasure come from the feel of control we don't have in our own real lives. It is also considered realism because such control is operational, procedural and malleable. Realism in producing verisimilar, plausible outcomes.

Dominion of reality is only true in the player's control over the possible worlds s/he enacts in a game. For players, realism occurs in the RTS laboratory of history, or in the experimentation with historical procedures. Evidently the player's control over the game does not portray all aspects of historical processes

but an oversimplified selection. And the purpose of such selection privileges entertainment over accuracy. The counter-system in RTS games then, is a strategy to achieve procedural balance between types of command and control: according to Rizing_Phoenix, a fan member of *Age of Empires Heaven*, the *AoE III*'s counter system is designed in the following way:

> Heavy Infantry [kills] Heavy Cavalry, Buildings
>
> Light* Infantry [kills] Heavy Infantry, Light Cavalry
>
> Heavy Cavalry [kills] Light* Infantry, Artillery
>
> Light Cavalry [kills] Heavy Cavalry, Artillery
>
> Artillery [kills] Heavy Infantry, Light* Infantry, Buildings
>
> (*Heaven Games*)

We could even make a simpler version of this counter system (with the risk of losing much detail in the game): *infantry kills cavalry, which kills artillery, which in turn, kills infantry* (like in a rock, paper, scissors game). The counter system contributes to the experimental aspect of procedural realism mentioned before. Having this model in mind, it is interesting to observe Figure 22 (below), which is part of a player manual containing the "Military Units by Civilization" chart for *AoE III*:

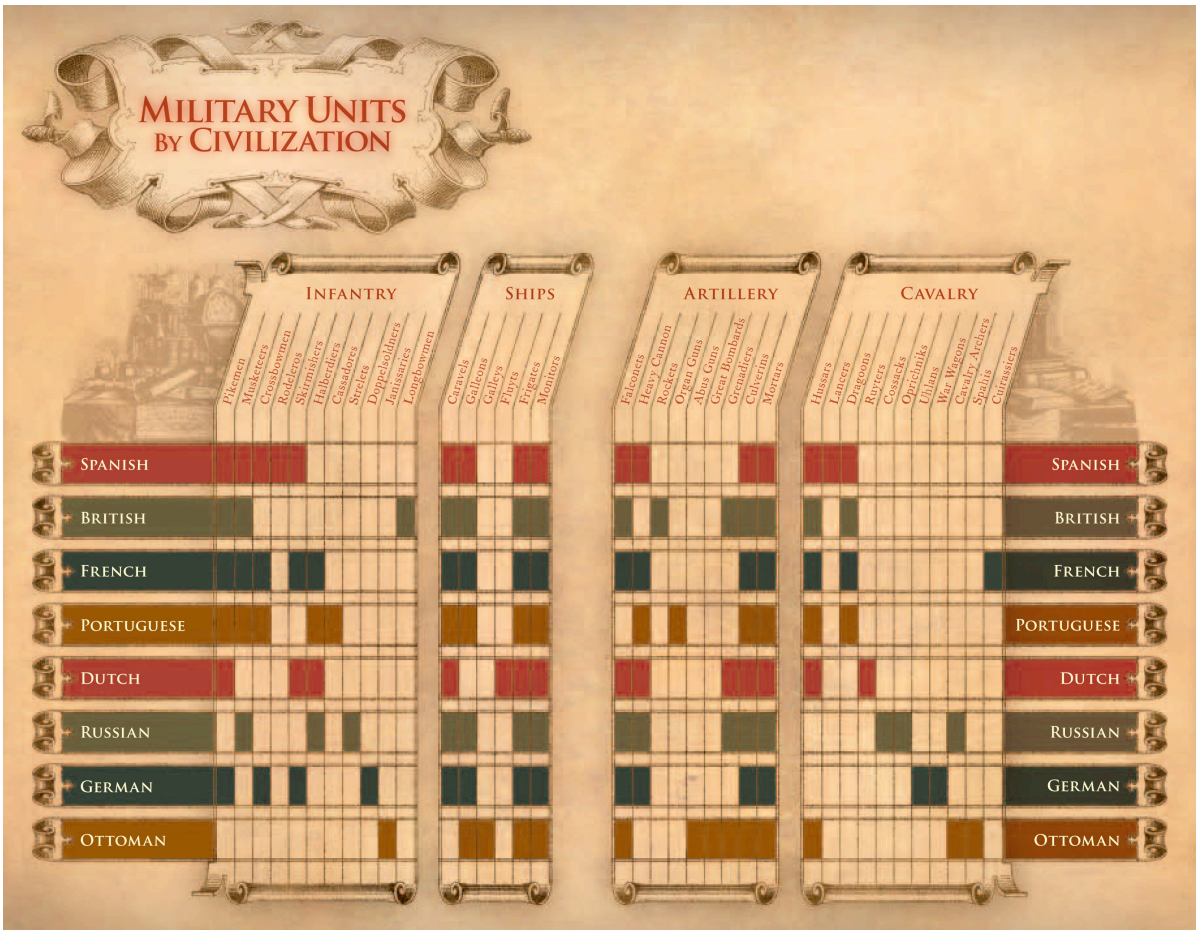

Figure 22. ***Age of Empires III*****'s military units by civilization. The chart is a simplified representation of the game's military counter system. Image from** ***Age of Empires III: Quick Reference Guide*****, Microsoft, 2006.**

In this chart, the British, Dutch, Russians and Ottomans, have a clear advantage of artillery units, while the Portuguese, Spanish and French for example have either more infantry and/or cavalry units. In *The War Chiefs* expansion, the Sioux are featured as "masters at horsemanship" or having strong cavalry, while the Iroquois are"[a]dept at leveraging European technology" (which means this civilization features powerful artillery and siege arms). Finally, the Aztecs are "[k]nown for assembling powerful armies" based in strong infantry units. Any counter system will inevitably establish particular advantages and

disadvantages when in combat against other civilizations. This will make certain nations to engage in different types of strategy versus other civilizations, depending on their strength, type of combat arms, and of course, the player's expertise.

The economic attributes are also part of the counter system. They have an important role in constructing the overall behavior and possible strategies that can be played in a game. In *AoE III*—as in most, if not all RTS games—factions exploit natural resources in the map. The most common resources are food, coin (or minerals) and wood. The player is in charge of administering settlers' actions to develop an economy that can also sustain strong armed forces. Some factions' rule systems makes it cheaper and/or faster to boom a strong economy, while others are more expensive or have more restrictions for economic development. There are also counter systems for economic aspects of civilizations.

As a result of these laboratories for experimenting with civilization's economy and military organizations, three popular types of game strategy emerged in RTS games: booming, rushing and turtling. *Booming* is prioritizing economic development over military strength in the early game, with the objective of creating a strong army toward the end of the game (usually including heavy artillery, naval units and heavy cavalry). *Rushing* is a strategy in which the players focus on attacking early in the game, taking the enemy by surprise; civilizations best adept for this strategy have to allow cheaper and/or faster production of military units in the beginning of the game (often includes large amounts of infantry and/or cavalry units). Finally, *turtling* is defensive strategy; it

focuses on constructing defense buildings and creating a strong military that can successfully stop an attack and crush enemy forces. In Figure 23 there is a summary of important characteristics attributed to in- game's civilizations (sources include the game's official website, data gathered during play and threads from two player forums). It is interesting to note how the British civilization takes the lead in being considered the most flexible faction to adapt to various strategies, and that its most prominent characteristic is that it provides one of the best economies in the game.

The **British** have the best economy of the game, and can build a strong army toward the late game (heavy cavalry and heavy infantry). Their Home City emphasizes improvements to technology and naval warfare. Strategy: "The British are an average civilization all-around. They're good for all strategies: **rushing**, **booming** and **turtling**" (*Game FAQs*).	The **Portuguese** start with two Town Centers, which helps producing settlers quickly, control territory or support their allies. They also have strong navy and strong light infantry and can spy on the enemy. Strategy: Some players identify this civilization as good at building a strong economy, having good defense (great for turtling); also good for rushing.	The **French** can build a strong military quickly, and also have faster cavalry. Moreover, the French are "experts" at allying with the Native Americans. Strategy: Average civilization, good for both rushing and booming	The **Spanish** can build a strong military early in the game, but their economy is somewhat tied to its home city provisions. Spanish Home City improvements benefit soldiers, buildings and naval units. Strategy: Probably the easiest civilization to play. Better at rushing, regular at booming.
Dutch settlers are limited and costly (they cost coin instead of food), but build banks (generating "coin" automatically). The Home City emphasizes upgrades to defense and economy. Strategy: Dutch is a good civilization for booming, and defense (or turtling) (*Game*	The **Ottomans**, Settlers spawn automatically from the Town Center. More unique units than any other civilization. Strategy: Very good at booming and turtling.	The **Russians** start the game with extra resources but few settlers. "Russian infantry, individually weak, are trained in blocks at a faster rate … [and can] overwhelm their enemy with greater numbers" (*AoE III* official website). Strategy: Good at rushing, "with	The **Germans** have a slower economy because settlers are scarcer. The Germans start with the ability to send Mercenaries from their Home City (before other civilizations can). Strategy: good for booming.

FAQs; AoE III Community).		Settlers and Infantry units trained in bulk" ().(economy and mass military)	

Figure 23. *Age of Empires III*'s summary of civilization operational attributes and of player's perceptions on what type of strategies can be executed with each culture. Sources: *Age of Empires III*, Microsoft Corporation, 2005. *GameSpot: Game FAQs*, CBS Interactive, 2009. "Forum: rushing, booming, and turtling," in *AoE III Community*, Ensemble Studios; Microsoft Game Studios, 2009.

The question is how the player will conceive and negotiate each possible culture according to its economic and military counter system traits. A player keen to use artillery will prefer to fight with the Ottoman or the Iroquois (who are represented in the game as having absorbed European technology), while a player interested in cavalry might be interested in playing with the French or the Sioux. Identification with one or other faction will depend to a certain extent in the counter system because of operational reasons. For example, playing with artillery is usually very expensive and time consuming, and the player needs to develop a solid economy before having a strong army. Also, artillery units move very slow and combat operations might be compromised because of this. These examples show how time is a crucial factor both for building a strong economy and executing effective combat operations.

Choosing one or another civilization will determine the type of gameplay a player engages with, and therefore embodying a function in the counter-system. In *The War Chief*'s expansion, there is a simple question and answer system to help the user "find out what nation [s/he] belong[s] to" (called "The Spirit Quest"). The questions illustrate some characteristics of the counter system in this game; for instance, the player should choose the Aztecs if the following questions

are answered positively: “Will you build cities with large structures, temples and walls? / Will you rely strongly on the might of your warrior knights? / Will a huge Home City provide support for your Empire? / Would you rather have your troops be stronger than faster? / Do you value infantry over cavalry or artillery?” [66] The values of centralism and militarism plus game rules surrounding the Aztec civilization are summed up to an infantry-oriented system, in which the role of the Home City plays an important part to support expenses of development. The Aztec civilization does not have cavalry or artillery units, but infantry is stronger enough for attacking in masses. Therefore, Aztecs’ best strategies are playing the processes of “training” and “rushing” with several infantry units, much in the manner of StarCraft’s Zerg dynamics.

[66] Some other examples: according to the question and answer system, the player should choose the Sioux if answers yes to the following questions: “Will you build nimble settlements that do not require many resources? / Do you favor horses over artillery? / Is the speed of your cavalry important?” The questions oriented to choose the Iroquois are: “Is your Empire based in the alliances of many nations? / Does your army contain Spirit Troops? / Will you be building sturdy longhouses in your settlements? / Will you rely in the mighty Tomahawk warrior to build a fierce infantry? / Is your empire a mighty confederacy of your people’s tribes?” (“The Spirit Quest”).

Conclusions. The Regime of Computation and the Procedural Protestant Ethics

To what extent has this analysis on concepts of realism in RTS games helped us to understand how ethnicities are constructed in such interpretation of cultures and historical processes? How approaching these simulations as procedural scenes of knowledge would bring us closer to recognizing important elements in experimental montages of historical processes?

Approaching representation of ethnicities in interactive media such as video games required addressing theoretical approximations to how algorithms are executed—not only by software running in a computer—but also how are executed by users. Therefore, it was crucial for me to begin by addressing the problem of how these concepts are understood by critical theories in the humanities, and from that point, explore how can we understand algorithms executed *by people*.

The conceptual difficulties of approaching the notion of algorithm as a cultural performance brought to the table popular assumptions like algorithms' "lack" of an ideological dimension, this notion is frequently found both in the discourse of computer scientists and humanities scholars. Also, understanding the differences between the material consequences of speech versus code was crucial for me to form a concept of realism as a theoretical framework. In particular, the work of Alexander Galloway was very useful to understand how rules form part both of the internal narrative apparatus (software and machine) and of the player

actions that in turn also affect the narrative of the game through the execution of game rules. Exploring the importance of these aspects allowed me to continue to add a formal dimension to Ian Bogost's rhetorical analysis of videogames, by exploring semiotic implications of procedural rhetoric.

Bringing together the work of Juul Jesper, Alexander Galloway and Ian Bogost, allowed me to identify the importance of non-diegetic apparatuses (game rules and the HUD) in procedural representation. This is an unexplored area in terms of how fiction is enacted and represented through the interaction with elements that do not form part of the diegetic game world. I constructed the term procedural realism as a basic theoretical framework that supports analysis of fiction procedures that represent real-world procedures and that also allowed to explore the role of non-diegetic devices in video games.

This project has established, I hope, a basic semiotical groundwork to approach the particular notion of realism found in computer strategy games. Ian Bogost's contribution to the understanding of procedural rhetoric, gave me the basis to construct a semiotic approach to how realism works in procedural media. Charles Sander Peirce's classification of signs according to their relationship sign references constituted the framework for modeling two basic types of relationships involved in strategy games notion of realism: iconicity and indexicality. Of course, this does not exhaust in any way semiotic relationships between a representation and the represented, but I expect to have contributed to the relations that pertain to my interest in non-diegetic devices.

Having explored the algorithmic aspects of procedural representation, I ought it pertinent to explore whether these types of representations were unique aspects of computer-based media or, more likely, part of a larger tradition dating back to the history of strategy games in particular. I believe one contribution of this project was to explore non-diegetic aspects in the historical development of games. Game rules and the HUD display were the general focus of Chapter 3, where I explore the notions of procedural realism and non diegetic devices in the history of tabletop strategy games. I found that the roles of the rulebook and the umpire supported the notion of procedural realism; the representation of iconic procedures and representation of outcomes is related to the evolution of the rulebook and the umpire respectively.

One unexplored, but interesting research possibility arose from this framework: games that rely intensively on the interaction between the player and non-diegetic devices (such as the HUD), might bear a genealogic relationship with the concept of European realism in nineteenth century realist fiction. For instance, the concept of realism in RTS and TBS games relies in the control of the diegetic world from the perspective of an omniscient, non-diegetic narration. A fact that supports this idea is illustrated in Chapter 3, where I explore the origin of these computer games in eighteenth and nineteenth century simulations of warfare. Moreover, the all-encompassing, non-diegetic, panopticon grand narrative perspective of these games, suggest a similar relationship with the realist novel narrator.

In order to understand how ethnicities are represented in these games, it is necessary to understand which processes are used to enact them. For instance, analyzing Native American civilizations in the visual and textual dimensions wouldn't be complete without addressing which iconic procedures are used to portray their historical processes, such as colonization or the mechanics of their economic system; for example, the Aztec units are designed to portray this culture as one that relies in class socioeconomic divisions. In addition, the HUD interface (as a narrative mediation device) provides a "place" of inscription where game rules are displayed, and where the player inscribes her/his execution of processes. The HUD interface is also a place where outcomes are inscribed in the system as indexical references.

I hope to have contributed in advancing some ideas on how procedural realism as a general representational strategy approaches real world references in gamic action. RTS and TBS games' history is still unwritten, but Chapter 3 might serve as a move toward understanding the often-unexplored non-diegetic devices in the history of RTS and TBS games. The birth of the HUD interface and the importance of unit control, counter system and technology trees reveal that the particular concept of realism found in RTS and TBS games is a complex implementation of a laboratory of history. This laboratory of history has indeed ideological implications, and among them, the suggestion that reality works through algorithms and computation, therefore, there is a conviction that realism can be achieved by controlling the "rules" that define historical development. In computer strategy games, this control is exerted from a non-diegetic position.

Embodiment of Outcomes in the Laboratory

Katherine Hayles in *My Mother Was a Computer* describes scientific realism as follows:

> … [F]or the realist, information about physical reality is structured so that it flows from the material (say, a field of morning glories of varied colors) through the operational (experiments in breeding that operate upon the plants and plants genomes to isolate colors from one another) to the symbolic (graphs and charts showing how the colors migrate back to an equilibrium distribution after being separated) (*My Mother Was a Computer* 205).

Katherine Hayles spots three stages in the production of scientific reality: *observation* of the material, *operations* to simulate the material and the representation of both these stages in the *symbolic*. Procedural realism has a similar structure in that there exists an operational (or procedural) stage of in-game processes that imitate real world procedures. The difference with scientific realism is that procedural realism can be a rhetorical and fictional production of knowledge, as opposed to the intention of accuracy that surrounds scientific methodological rigor. Procedural realism allows for the inclusion of non-pragmatic objectives such as entertainment. Furthermore, the "symbolic" representation referred by Hayles is similar to the indexical aspect I formulated in my construction of the concept of procedural realism, but in the case of electronic media there is a material bond between operational and the symbolic, which is therefore an index.

The laboratory as a scene of knowledge offers a playground for basic knowledge structures such as systematization of procedures, experimentation with available elements, observation of real-world procedures, and presentation of an inscription as procedures' information embodiment. The stage of inscription (or for my interest, of procedural realism's indexicality), which Hayles illustrates with the example of laboratory graphs[67] that have both a material and an iconic bond with physical properties (see footnote 67), "bear an analog resemblance to the vibrations" (206) and "remove the noise or . . . compensate for it as much as possible in the experimental design and subsequent analysis so that the form of the underlying regularities becomes sharp and well-defined" (*My Mother Was a Computer* 205). Similarly, in RTS games, the "noise" of social structures and war-related side effects that are not captured by these simulations of war is a "cleaner" representation of war outcomes, such as statistics displayed in the HUD interface and other extra-diegetic devices, from a safe panopticon perspective of a

[67] Hayles explains: "Inscription, then, is crucially important to the transformation of embodied reality into abstract forms. Bruno Latour and Steve Woolgar, imagining themselves to be naïve anthropologists visiting a biological laboratory, emphasized that what would first strike such observers is the 'strange mania for inscription' that obsesses the scientific workers, from laboratory technicians scribbling in laboratory notebooks to senior scientists writing journal articles. Defining an inscription device as 'any item of apparatus or particular configuration of such items which can transform a material substance into a figure or diagram,' Latour and Woolgar note that 'inscriptions are regarded as having a direct relationship to the original substance' (51). For our purposes, it is worth noting that many, perhaps most, scientific instruments produce inscriptions through morphological proportionality to physical properties. Sound waves hit a membrane, and the vibrations capture an analog resemblance, which is conveyed through a linking mechanism to append tracing a line on graph paper, and the line in turn bears an analog resemblance to the vibrations" (*My Mother Was a Computer* 206).

player that, much in the manner of an omniscient narrator or an omniscient deity experiments with references to the real in a laboratory of war.

Katherine Hayles' thesis of the regime of computation is basically that it functions as a cosmology that renders the world in modern scientific worldviews. In her words, the regime of computation provides

> . . . a narrative that accounts for the evolution of the universe, life, mind, and mind reflecting on mind by connecting these emergences with computational processes that operate both in human–created simulations and in the universe understood as software running on the "Universal Computer" we call reality. . . . Code is understood as the discourse system that mirrors what happens in nature and that generates nature itself. (27)

Connecting Hayles' conceptualization of the regime of computation as a worldview with Bogost's procedural representation, I argue that mimicking a selection of real-world procedures (by playing these interface-intensive games) constitutes both what Galloway identifies as representations of contemporary information control, and also constitutes the embodiment of an ideological paradigm that claims to "mirror" a selection of historical processes. As mentioned before, I would, however, say that such claim of realism is embodied in the software more than in reality. There is a on the one side, a representation of contemporary information control and, on the other, a representation of ideological approaches to cultural diversity. This seems to be an implementation

of today's information control to explain how cultural differences are constructed, and this is part of the ideological paradigm approached.

Ages of Empires is an example of how code and popular culture can render a whole cosmology. A Eurocentric worldview is portrayed in the division of labor, Western concepts of history (technology tree) and the ideological implications of unit control, which also coexist with some simplified references to the cultures depicted in the game. The local and the universal are in conflict in these procedural representations of history, and this tension bears ideological assumptions written in experimental algorithms of history. In the development of computer strategy games, *unit control* evolved to portray a placeholder for historical agency and individual cultural characterization, such as the Aztec units in *War Chiefs*, by portraying the looks, arms and ranks of Aztec emblematic warriors, but whose behaviour preserves the European concept of unit by not addressing the Aztec citizens' military and economic functions in the *calpulli*. Also, the implementation of *counter-systems* as procedural portrayals of cultural diversity evolved as a system to achieve game equilibrium and afford "diverse" game experiences to the player in the disguise of different cultures' possibilities of actions, such as the Iroquois' possibility to establish alliances with many nations.

Finally, the technology tree embodies a map of possible historical algorithms. Civilizations have a set of possible paths to advance in history, and players should plan strategically by choosing to invest in developments that improve their military supremacy, defense capabilities and/or economic power. In

general, building units play the role of a hub from which other units or improvements can sum up to a civilization's development and expansion. The technology tree usually bears a linear concept of history, where the player aims to advancing to a new age based in a positivistic European history: in *Age of Empires III*, both Iroquois and Germans start from the Discovery Age and "improve" toward the Imperial Age. A player can advance to a new (and by implication a more "civilized") "Age" if they acquire enough wealth, troupes, and structures.

Coming back to previous questions such as why is it that the representation of Amerindian cultures in a game like *Age of Empires III: The War Chiefs* enables players to use the "Nature Friendship" ability in the HUD interface, while this option is not allowed for the rest of the European in-game civilizations? Or, why is it that only the European civilizations have a button to choose a "Revolution" feature to revolt against their home city and become a new nation? Why do Amerindians have to dance in a fire pit to spawn settlers, as if their reproduction was subject to ritual actions? Are there some procedural cultural archetypes being implemented to certain ethnicities?

Even though there are attempts at differentiating between cultures, one can note that there are culture 'clusters' or groups that fall under the logics of certain civilizing and war dynamics; we could even say that the Spaniards are also standardized under the English Colonization by not addressing their concept of *Reconquista* and Holy War, nor the particular role that religion played during their own processes of colonization and conquest. All natives are standardized too

under the logic of holy dance ritual powers, and for example, the Aztec's *Guerras Floridas* are not represented either. (*Guerras Floridas* were a type of Aztec warfare where the aim was to obtain captives for ritual sacrifice.) It is important to clarify that I am not advocating a historically accurate representation of colonial war, but instead acknowledging that there are both informatic and ideological implications for cultural analysis of video games. A successful informatic critique should maintain a strong relationship with ideological critique.

In this game, one of the ways that Native American tribes differ from their European counterparts is in the production of soldiers or warriors. For example, if one plays the Aztecs, warriors can be produced by building a house structure, and then by invoking worship to the iconic Aztec Goddess *Coatlicue,* she of the serpent skirt.[68] By selecting these two operations (house and worship), the Aztec Goddess Coatlicue "spawns *macehualtins",* i.e. produces soldiers for the player. *Macehualtins* were commoners and the lowest rank of the Aztec army; their rank could be increased by obtaining captives in war (see Hassig for a detailed discussion on Aztec warfare and warrior rank). The incorporation of Coatlicue, an iconic Mexican figure into the narrative of this video game is particularly fascinating. As recorded by the Sixteenth-Century Franciscan Friar Bernardino de Sahagún in the *Florentine Codex* (the largest encyclopedic compendium on Aztec culture and religion), the goddess Coatlicue was miraculously impregnated by a

[68] See Jean Franco's article "The Return of Coatlicue: Mexican Nationalism and the Aztec Past" in the *Journal of Latin American Cultural Studies* Vol. 13, No. 2 August 2004, pp. 205-219. In this article Franco provides a good overview of the literary appropriations of this Aztec goddess.

ball of feathers when sweeping her house, and then gave birth to Huitzilopochtli, the foundational and Aztec war-faring God. Huitzilopochtli appeared in adult form and dressed in full war regalia including his fire-serpent weapon, in order to defeat his unruly four hundred brothers in battle (Centzonhuitznahaus) and mutilate the body of his plotting sister (Coyolxauhqui). The association of birth and war, house and worship is a very interesting take on a ritualistic militarization of the in-game Aztec civilization. Another way that Native American groups are differentiated from European groups in the game is that the Native American tribes possess something called a fire pit, a building unit where settlers engage in a ritualistic dance. This type of performance can result in different effects beneficial to the player's faction. Different characters perform a variety of dances (fertility dance, gift dance, war chief dance, alarm dance, war dance, healing dance etc.) with various effects such as producing soldiers, gaining experience points, etc. Generally, the effects of ritual dance are speeding up processes such as birth of settlers or increasing hitpoints.

European groups do not possess a fire pit. Instead, the effects are gained by performing other actions such as hunting for food, mining, building forts or other structures. While including a fire pit might be read as one way of trying to differentiate between Native Americans and Europeans (i.e. presenting the Native American cultures as Shamanistic cultures), one might ask why religion is not also factored into the representation of European acts. For example, there is no planting of crosses, reading of a *requerimiento,* attending mass or other similar performances. Such representations could lead to reading European cultures as

more technologically advanced (culture) or even "civilized" vs. Native Americans as "superstitious" (nature). This representation is further reinforced as only Native Americans have the ability to befriend animal allies (bears or jaguars) that can assist them in war.

One possible reading could be the representation of U.S. political, cultural, and technological imperialism over Mexico and other border dynamics. Other possible readings aside is a graphic narrative of what Serge Gruzinski might term an example of *Images at War* (2001) where "Such a clash [of images] so closely evokes our contemporary world in its postmodern version that it forces us to reflect on the fate of conquered cultures, on cross-fertilization of all kinds, on the colonization of the *imaginaire*" (5). Gruzinski would likely categorize video games as "neo-baroque" productions where the spectator (or in the case of video games, the player) has the freedom to direct his own post-colonial or experimental theater of operations (concept explained below). Real time video games (representing conquest and colonization) such as *Age of Empires III: The War Chiefs* enable a user (player) to aim for one of a finite set of possible conquest and colonization outcomes by utilizing a standard repertoire of factions, weapons, and strategies.

In some ways computer strategy wargames represent a standardized (and Eurocentric) vision of military conflicts—where different cultural conceptions of war are collapsed. For the most part, these games do not portray the different cultural conceptions of war between the different historical players or historical outcomes. While the player in a RTS game can in a Borgian manner play either

the traditional historical victor tribe (for example, a Spanish conquistador) s/he can also play a historical vanquished tribe (for example, the Aztecs), thus disrupting traditional historical narratives and perspectives, and can therefore create new fictionalized worlds or visions. That said, one could play the Devil's advocate and ask if it is even possible to represent a historical or "authentic" vision of Native American conceptions of war. At best, video games could represent types, stereotypes, or a mélange of palimpsests of Native Americans, as some Hollywood films have often done. This same question has plagued the study of Amerindian pasts and Colonial productions, where scholars offer reconstructions and interpretations of the past based on the existing archives. Thus, the representation of fictionalized, hypothetical, and simplified encounters of conquest and colonization with only a brief nod to accuracy in video games is understandable, and perhaps, even desirable. Especially so when the use of these video games by players demands simplification of actions in favor of the purpose of entertainment.

On the other hand, the fact that playing historically or culturally accurate representations are not the objective of these games doesn't mean that these representations are ideology-free or that they do not promote certain values. Alexander Galloway in *Gaming: Essays on Algorithmic Culture* (2006) claims that wargames like *Civilization* should be interpreted as references to contemporary culture and to contemporary informatic control, instead of as allegories of historical processes. He proposes that ideological critiques fail to provide an adequate interpretation of these games because "such a critique is

undermined by the existence of something altogether different from ideology: informatic code" (102). To explain this argument, Galloway has eschewed some 'phases' the player goes through after playing Sid Meier's *Civilization* video game:

> After the initial experience of playing *Civilization* there are perhaps three successive phases that one passes through on the road to critiquing this particularly loaded cultural artifact. *The first phase* is often an immense chasm of pessimism arising from the fear that Civilization in particular and video games in general are somehow immune to meaningful interpretation that they are somehow outside criticism. Yes, video games are all about algorithms, but what exactly does that matter when it comes to cultural critique? Perhaps video games have no politics? This was, most likely the same sensation faced by others attempting to critique hitherto mystified artifacts of popular culture... Often, it is those places in culture that appear politically innocent that are at the end of the day the most politically charged. *Step two*, then, consists of the slow process of ideological critique using the telltaled clues contained in the game to connect it with larger social processes. Critiquing the ideological content of video games is ... the "cultural rhetoric" of games. For *Civilization*, the political histories of state and national powers coupled with the rise of the information society seem particularly apropos. One might then construct a vast ideological critique of the game, focusing on its

> explicit logocentrism, its nationalism and imperialism, its expansionist logic, as well as its implicit racism and classism (Galloway, *Gaming* 99) [Emphasis added].

As a third "step", Galloway states that it is necessary to think about the core political principles of informatic control (understood as in contemporary information society control) in order to analyze video games. This means that it is necessary not only to explore the ideological references to cultural and political control but also to understand the basic mechanisms of computer informatic control in our society. Galloway identifies two basic principles in computer informatic control: flexibility and standardization. "Flexibility is one of the core political principles of informatic control, described both by Deleuze in his theorization of 'control society' and by computer scientists like Crocker" (Galloway, *Gaming* 100). Flexibility means that instead of imposing a channel of communication, networks are created to distribute communication through definite and controlled channels. Galloway extends this idea to illustrate the shift from Foucault's discipline society to Deleuze's information society, in which flexibility is actually a strategy for the exercise of control:

> While it might appear liberating or utopian, don't be fooled, flexibility is one of the founding principles of global informatic control. It is to the control society what discipline was to a previous one . . . . What flexibility allows is *universal standardization* (another crucial principle of informatic control). If diverse technical systems are flexible enough to accommodate

> massive contingency, then the result is a more robust system that can subsume all comers under the larger mantle of continuity and universalism (Galloway, *Gaming* 100-102) [Emphasis added].

But how do all these informatic concepts of flexibility and standardization connect to this project? One of my objectives is to propose that while I agree in that informatic critique is a necessary element for the study of video games, the ideological implications cannot be ignored in the analysis of a cultural artifact. That would be equivalent to decontextualize gaming as a cultural performance and invention. In other words, that would mean to assume that the video game does not attain a relationship to the material world in which it was created and most importantly, in which it is performed. As noted in Chapter I, it is interesting to cite here that Heidegger has seen technology "as a stance towards the world--what others might call an ideology—insofar as it constitutes an instrumental 'mode of revealing'" (McQuire 257-258). Indeed, Wendy Hui Kyong Chung goes so far as to say that software is ideology, instancing Althusser's definition of ideology as "the representation of the subject's imaginary relationship to his or her real conditions of existence" (Cited in *How We Became Posthuman* 60-61).

To deny ideological critique to the analysis of video games would also mean that the video game makes no reference at all to historical and cultural signs. This point can be illustrated by one of Galloway's own explanations of the standardization principle of informatic control:

> The massive "making equivalent" in *Civilization*—the making equivalent of different government types (the most delicious detail

> in early versions of Meier's game is the pull down menu option for starting a revolution), of different victory options, of formulaically equating in number of happy citizens with the availability of luxuries, and so on—is, in this sense, and allegorical reprocessing of the universal standardizations that go into the creation of informatic networks today. In Meier, game studies looks more like game theory. In contrast to my previous ideological concerns, the point now is not whether the *Civilization* algorithm embodies a specific ideology of "soft" racism, . . . Other simulations let the gamer play the logic of a plane… the logic of a car, . . . or what have you. But with *Civilization*, Meier has simulated the total logic of informatics itself. (Galloway, *Gaming* 101)

As Galloway himself notes, there is a strong influence of standardizing principles in the game *Civilization*. This is also the case in the *Age of Empires* game where the concept of a westernized vision of war dominates the game dynamics, and imposes a single alternative for conflict resolution purposes between cultures. This certainly has ideological implications. Even though there are attempts at representing different concepts of war between the Native Americans (Aztec, Sioux, and Iroquois) or Europeans (Spaniards, English, French, Portuguese, Dutch etc.) there is still a necessary dialectic of modern warfare that is being assembled over the portrayed cultures.

Strategy games have been—at least since the eighteenth century—a laboratory for the regime of computation, where an operational concept of realism

developed under tensions between mathematical representations of the world and, later, by computer-driven code simulation. The operational level of these representations comprises iconic procedures that are indexed in the symbolic representation of outcomes, much in the manner of a postmodern / industrial Wunderkammer where a procedural representation of contemporary control societies coexist with the protestant ethics of capitalism as a group of promoted values. Much work can be done in the area of procedural representation of ethnicities, especially to answer why total control equals realism?

As mentioned before, my first guess would be that having available the complete array of ages and technologies for experimenting with history making conveys the impression of having control over reality as a whole, apprehending reality in the eyes of the player. Because an all-encompassing gaze, a panopticon point of view, a totalitarian perspective of the greater picture provides the illusion of controlling our social and historical circumstances, entertainment and pleasure come from the feel of control we do not have in our own real lives. It is also considered realism because such control is operational, procedural and malleable. Realism is producing verisimilar, plausible outcomes in a Western like concept of history.

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