

From:

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Real Wars on Virtual Battlefields

**The Convergence of Programmable Media
at the Military-Civilian Margin**

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The book analyzes the multifarious exchange of algorithmic technologies and concepts between the military and the media industry from the early 1990s until now. Unlike most related scholarly work which focuses on digital games, it drafts a model of programmable media which is grounded in a close-reading of the key technologies, most notably the paradigm of object-oriented programming, and reconsiders technical disciplines from a humanities perspective. This model is then applied to analyze the effects of algorithmic logic on the military-civilian continuum, including economic practices, patterns of media usage and military decision-making.

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1 INTRODUCTION

“Es soll sich kein Staat im Kriege mit einem andern solche Feindseligkeiten erlauben, welche das wechselseitige Zutrauen im künftigen Frieden unmöglich machen müssen: als da sind, Anstellung der Meuchelmörder (percussores), Giftmischer (venefici), Brechung der Kapitulation, Anstiftung des Verraths (perduellio) in dem bekriegten Staat etc.“ (I. Kant, sixth preliminary article, *Zum Ewigen Frieden*, Ersttext 1795)

1.1 Remilitarization – Coming to Terms with the Notion of War in Contemporary Western Societies

Immanuel Kant's thoughts on the potentiality and conditions of “eternal peace” appear remarkably topical, even when read against only the publicly known conditions of contemporary (Western) warfare. The “poisoners” that Kant vehemently opposed as a tactic of warfare are still a powerful topos in the discourse on the proper conduct of war, made manifest in the fear of chemical and even biological weapons. Yet, digital computer and videogames like *Command & Conquer: Generals* (EA Pacific: Electronic Arts, 2003), released only weeks before the US invasion of Iraq, already begin to include these controversial elements of warfare into their programmed rule ecologies, fundamentally re-shaping their interpretation by making them systemically manageable, localizable and communicable, regardless of the popular rhetoric of ‘singularity’. This is only one example of the technological convergence between (commercial) programmable media and military technologies and its profound socio-cultural implications that constitute the central theme of this book. Not only is the “mutual confidence” [wechselseitige[s] Zutrauen] between politico-military entities characteristic of previous notions of warfare, but programmable media, both as tools and weapons, are an emerging key technology in managing the distrust that has taken its place within the logic of ‘information warfare’.

Noam Chomsky's claim of a *New Military Humanism* from his eponymous 1999 book has been discarded as populist (cf. e.g. Bauerlein, 2005), but it illustrates how (non-fictional) media coverage of military intervention in the Kosovo conflict effectively revitalized war topoi from the Second World War by coining a new 'humanitarian' rhetoric. Similar to several other studies written since the spill-over of programmable media applications into mainstream usage, like e.g. Samuel Weber's *Targets of Opportunity: On the Militarization of Thinking* (2005), Chomsky's argument more or less explicitly cautions against the potential for 're-militarization' in contemporary Western societies. The most obvious methodological problem with this lies in the fact that the notion of (re-)militarization suggests continuity with earlier forms of increased military embeddedness in society, which is not sustainable and ignores the impact of programmable media technologies in this regard, something which will be scrutinized in this book. A brief look at a few diverging opinions, such as Faisal Devji's dictum of the "global war on terror as de-militarization" (Devji, 2006: 30), indicates the complications implied in the term if applied to the current situation. Devji understands the "transformation of war into policing" and the 'criminalization' of Al Qaeda as a form of de-militarization, since military rhetoric in its traditional sense is gradually supplanted by other concepts like criminal law, which stem from the perceivably 'civilian' sphere. While the notion of militarization, understood as a historically localizable idea, would provide a distorted image, programmable media, or rather practices and structures derived from program code properties, do arguably form a technical as well as epistemological infrastructure for blending military and civilian applications, while also constituting an arena to recursively 'process' (to use programming terminology) and re-negotiate these concepts in various, contingent configurations. However, while both the militarization hypothesis and the ongoing debate about digital games abetting violence on various levels might provide feasible and oft-chosen vantage points on the topic at hand, neither will play a major role in this book.

Negotiating the perceived "gap" between civilian and military "society" in the United States has long been a motor of technological but also societal innovation which has often trickled down into other national militaries, e.g. very visibly with the end of the Second World War, after which the US could not demobilize as rapidly as in prior conflicts. (Cf. "Holsti Ole R. A Widening Gap between the U.S. Military and Civilian Society?: Some Evidence, 1976-96" *International Security*, 23:3, Winter 1998-1999: 5) The Center of Military History (CMH) even dedicated a lengthy study to the integration of the Armed Forces into US society from 1940 to 1965, concentrating

mainly on issues like segregation equality policies that were defining for contemporary US society as a whole. While such a study is not likely to be undertaken for the current situation, surprisingly similar topics are being constantly re-negotiated, e.g. on the official on-line forums of influential digital war games. A more comprehensive look at this corpus in Chapter 4b will demonstrate how this discourse is framed in various ways by the contingencies of programmable technologies. Related concepts like the notion of the 'inter-war', which has been revitalized in the wake of September 11, 2001, will also be touched upon in later chapters.

While this book will consider mostly patterns of media usage and deployment inaugurated by the US Department of Defense (DOD), other military forces shall be selectively set against this backdrop. For instance, the German military [Bundeswehr], after commissioning an advertising game (*Helikopter Mission*, 1995) which tapped into then familiar-digital game syntagmas in the mid-1990s, came to reject the use of programmable media for instructional or recruiting purposes (cf. e.g. Deutscher Bundestag, 2002), but still, in specific areas like aerial rescue operations (SAR), utilizes digital games, which, being browser-based and created using the *Adobe Flash* authoring suite, resort to a very different technological setup and, as will be elaborated below, epistemology. (Cf. e.g. <http://www.rettungsfliieger.bundeswehr.de/sar/game/start.htm>) The re-thinking of military-themed digital games in Germany is part of a larger process of 'catching up' on embedding programmable technologies into the infrastructure of the Bundeswehr (cf. e.g. NI-33), which hints at the general tendency that, consequently, digital games will have to be localized within a broader context of programmable applications.

The interrelation of war and (mass) media is a fairly well-studied field in media studies and, to a lesser degree, in historical and political analyses. For instance, Müller and Spangenberg mention several influential approaches in their 1991 article in a key anthology which represents to some extent the contemporary on-topic discourse in germanophone academia. (Cf. Müller/Spangenberg, 1991) The title of the anthology already exhibits the momentum of neologisms and the metaphorical or rather generally linguistic cultivation of media technologies within the corpus of scholarly literature; this applies particularly to the German discourse, although recent prominent anglophone contributions similarly utilize rhetorical figures like the "citizen-soldier". (Cf. Stahl, 2006). A common theme in those interpretations is the assumed instrumentalization of media channels, as evidenced e.g. already in Herman/Chomsky's intuitively termed 'manufacturing consent' hypothesis. (Del Fabbro, 2002: 3) The hypothesis focuses on the inequality of power, assessing media

effects from that perspective. While Herman/Chomsky do not systematically unfold the technological contingencies of the media genres they analyze, their conceptual model of five layered “filters” being inserted into the flow of information intrinsically resonates well with principles of programmable media where ‘filtering’ is a key procedure. While this context was probably not implied in the original formulation of the hypothesis, the paradigmatic effects of programmable media frequently produce similarly quasi-technical readings and rhetoric, which will be more closely investigated below, thereby demonstrating the need for further differentiation of terms like ‘instrumentalization’.

The widespread military adoption of programmable media, most prominently digital games, has been accompanied by other, only superficially unrelated technological developments. One striking affirmation of the topos of ‘war as a videogame’ is the recently increasing reliance on remote-controlled drones (UAVs), not only for surveillance but also for combat operations, (cf. e.g. Barami, 2004: 5) motivated by the almost paradoxical obligation of the US Army to fight wars without being ‘allowed’ to lose soldiers. Bahar Barami describes that regular-sized UAVs had already been in use for some time when the 2003 invasion of Iraq fostered research into miniaturization and provoked a shift to portable, more cost-effective devices. (5) Apart from the logic of UAVs as virtually unlimitedly reproducible, semi-autonomous and programmable agents, which exhibits several overlaps with programming concepts like Object-Oriented Programming (OOP) that will be further investigated in the second chapter, practical implications need to be taken into account, like the new archetype of soldiers controlling a UAV remotely from their hometown, participating in an on-going conflict while staying entirely embedded in their ‘civilian’ life world [Lebenswelt], e.g. having a family and other consistent relationships. The term [Lebenswelt] is hereby used in congruence with the common definition attributed to Alfred Schütz and Thomas Luckmann. (Cf. Fritz, Jürgen “Lebenswelt und Wirklichkeit” Jürgen Fritz/ Wolfgang Fehr (Eds.) *Handbuch Medien: Computerspiele* Bonn: BPB, 1997: 6/7)

These forms of psychological displacement are already, albeit not as drastically, implied in the daily usage of military-themed digital games, and practices like these will be a recurring topic in this book. As Barami continues, “robotics entered a new market phase with the events of 9/11 and the U.S. military operations in Afghanistan and Iraq”. (5) What began as a civilian process, with the time-critical assembly of ‘search and rescue’ robots looking for survivors in the ruins of Ground Zero, soon expanded to include combat operations overseas, using e.g. a modified version of a product offered by the consumer-oriented company iRobot. (Cf. e.g. [14](http://</p>
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findarticles.com/p/articles/mi_qa3723/is_200608/ai_n17171882) The 're-programming' of 'civilian' or commercial applications has by now trickled down into military usage of programmable media, especially, but not exclusively, with regard to digital games, and will be another important trajectory especially in the fourth chapter.

One possible hypothesis could hold that programmable media, by virtue of their socio-technological contingencies, will replace or at least override the previous 'economic' paradigm of warfare with new rationales based on programmable technologies. I will illustrate this point briefly using an example Noam Chomsky repeatedly quoted in his lectures, indicating how the momentum of economic reasoning in military contexts transcended political camps; one of the more recent occasions was a lecture at MIT on the Middle East crisis held in 2000, which supports the claim that this type of rhetoric is still applicable. (Cf.http://web.media.mit.edu/~nitin/mideast/Chomsky_lecture.html) Hence, the US intervention against the Sandinistas in Nicaragua, which Chomsky himself considers an act of 'state terrorism' covered by geopolitical power struggles, was officially and, to a degree, also publicly considered a "sensible policy" even by left-wing liberals like Michael Kinsley, since it allegedly complied with "cost-benefit analysis". (20) The discursive power of rhetorical figures and semantics derived from the field of economics has been the product of a particular political, historical and also technological context, promoted not least by the 'dual use' of mathematical game theory both in economic and military contexts. Below, the effects of programmable technologies like digital games and simulations taking this place will be analyzed from various angles, leading e.g. to the perhaps surprising finding that economic rationales have indeed not been abolished, but are, on the contrary, being re-read and re-combined within the framework of programmable systems as the new benchmarks of consensual military organization.

The convergence of aesthetic, rhetorical and logical properties between digital games and military training simulations shall be illustrated using a brief case study in the form of the promotional videos of VirTra Systems, a company producing high-quality simulation environments for military purposes. (Cf. e.g. http://www.virttra.com/real/IVR4G_product_video_DSL.ram) The unique selling points listed in the video, e.g. "realistic video and sound", "Real Time Scenario Creation" (01'40"), as well as various 'gameplay modes' such as "Convoy and IED training" (01'42"), are already exactly in line with those of many commercial digital war games. The claim that VirTra simulators use "Hollywood"-level actors (05'37") illustrates how, just as with digital games, the film industry still serves as a frame of reference for military training simulations; back cover claims like "the most cinematic and intense combat moments" (Call

of Duty 3) support this hypothesis. Even the military/civilian gap is effortlessly bridged by implementing both usage contexts as simulation “settings” advertised in the video (1’12”) and, thus, homogenizing them within the programmed rule ecology of the system. A closer look at the semantics reveals how the technical framework of the application pre-structures interpretation, as with the separately available “low-light” scenarios, (1’47”) dissecting lighting as a customizable parameter instead of an ‘organic’ element of the simulation environment. Furthermore, the described logic of military tool development coincides with ongoing trends in digital game development, most notably with its modularity paradigm aiming at maximum integration of components. One example is the advertised VirTra “drop-in recoil kits”, (2’25”), designed as an add-on device to enhance the haptic realism of training weapons; this already suggests a characteristically modular approach to notions like authenticity which are similarly influential in user discourse revolving around military-themed digital games and will be revisited in the third chapter. The training concept is described as a “loop of interaction” (2’55”), specifically through the implementation of a ‘threat fire belt’ delivering electric shocks to simulate being hit in the simulation; the ‘feedback loop’ model is again very similar to (earlier) models of Human-Computer Interaction, specifically in the case of digital games. (Cf. e.g. Friedman, 1995 or Newman, 2002)

Finally, the promotional video is heavily rooted in the logic of universal computability. As evidence of the accuracy of its ballistic models, VirTra advertises the fact that Federal Ammunition resorts to their models to “create their ballistic tables” (the current ballistics catalogue can be accessed at: <http://www.federalcartridge.com/ballistics/default.aspx>). Reciprocally, game companies refer to those tables to translate them into the physics model used in their games. The tabular representation thereby inherently dictates an interpretive ‘grid’, offering a consistent taxonomy that inherently lends itself to algorithmic expression within a programmable media framework, and even closely resembles the formal structure used in many digital games, thus becoming increasingly iconic. It is evident that a ‘translation’ of data between both functional contexts, rather than the hermeneutically organized presentation of information, is one case of a technologically induced practice stemming from the complex interplay between ‘real’ and ‘virtual’ weapons industries. Many of the aspects introduced in this brief example, like modularity, systems architectures with global variables like lighting and the scope of computability, will later be covered in dedicated paragraphs.

1.2 Programmable Applications within Media Deployment Policies

While digital war games have recently received a lot of scholarly attention from various perspectives, the goal of this book will be to analyze how programmable media in general affect military self-description and its overall disposition towards media technologies; this undertaking necessitates both historical and, to a certain degree, cultural contextualization of the few prominent digital game projects with military participation, like *America's Army* or *Kuma/War*, which are usually taken as representative examples. Since the coverage of media infrastructures bridging the gap between military and civilian technology partners has increased greatly in the past few years, with e.g. the U.S. Army creating a dedicated digital games office (the TRADOC Project Office for Gaming; cf. NI-29), tracing the repercussions of program code in key areas related to the military-civilian divide like e.g. economic structures will be a central aspect of this argument.

While the proposed notion of 'programmable media' will be unfolded in detail in the following chapter, it should be clarified early on that its main frame of reference is the concept of objected-oriented programming (OOP), a programming paradigm or style which has become immensely popular and characterizes both topical programming languages (such as C++) and scripting languages (such as Perl or PHP), thereby accounting for the technological makeup for most applications subsumed as 'programmable media' in this book. Heeding Kittler's criticism of the troubled relation of the humanities with technologies, (e.g. Kittler, 2006) the first step will thus be to derive sustainable models of analyzing media texts by interpreting and adapting structural properties of the technologies used to create them, such as object classes and instances, inheritance, encapsulation and polymorphism in the case of OOP. As a second step, these concepts can then be used as a conceptual nexus for historically comparative inquiries, for example into the early history of war games and their materiality, similar, for example, to the information science concept of the "discourse network" Kittler attempted to illustrate the shifting logic of differentiating between 'data' and 'noise' under various historical conditions. (Kittler, 1985) However, while Kittler's close-reading of programming technologies focuses on the 1980s, this book will draw on more recent developments in the field which characterize the current media landscape, and which occasionally require the rethinking of scholarly positions on programming.

In his essay on "technological determinism in military history", George Raudzens illustrates how earlier military technological

breakthroughs were accompanied by the belief that they would not only strengthen a just cause, but help prevent war itself (as e.g. with the Gatling gun in the American Civil War etc.). (Raudzens, 1990: 403) Raudzens's thesis that weapons need to be considered as pieces within a larger "system of armaments and institutions" (405) rather than as "isolated devices" can be usefully adapted to the consideration of programmable media, including games and training simulations, as weapon technologies. An important effect that is implied in Raudzens's historical synopsis is the association of specific weapons technologies with particular forms of social and governmental organization and the function of these technologies in modifying or even destroying these forms. This aspect is embedded e.g. in terms like "chariot aristocracies", referring to a dominance of chariot-producing cultures in the Middle East that was abolished with the availability of cheap iron for weapons and armor. (Raudzens, 1990: 405). These thoughts will be guidelines for assessing patterns of military media deployment and at the same time they will indicate how these strategies of using programmable media frame military thinking, similarly producing systems of governance visible in military operations, e.g. in Iraq and Afghanistan, something which makes the earlier notion of 'instrumentalizing' media intrinsically problematic.

1.2.1 MILITARY THEMES AS A CONSTANT IN PROGRAMMABLE MEDIA PRODUCTION

In the fourth chapter of his *De Re Atari* from 1982, Chris Crawford and his co-authors outline the hardware capabilities of early Atari 400TM and 800TM home computers, describing e.g. also character animation devices which were later termed 'sprites' but at the time were referred to as "player-missile graphics". (Crawford et al., 1982) 'Player' and 'missile' were highly specialized functions for pre-defined character animation, the latter being especially "useful as bullets" as the user manual unequivocally suggests. Since horizontal motion was easier to implement than vertical motion and since the Atari computer provided "hardware collision detection", most quickly computable between 'player' and 'missiles', military-themed patterns of thinking were arguably built into contemporary digital game hardware to some extent and encouraged specific types of gameplay.

Another potential reason for the ubiquity of military themes in digital games is the fact that simulating destructibility has to date been the most feasible canon of psycho-visual techniques to produce 'interactive' environments, a key selling-point of digital games

in general. The third chapter of this book will present a case study on how aspects like destructibility or natural phenomena have quasi-‘organically’ evolved throughout digital game history by virtue of specific program code features and how they modified the corresponding popular interpretations of ‘authenticity’, culminating in the equation of ‘destructibility’ and ‘interactivity’ as communicated in game magazines, advertisements as well as postmortems and other technical documents. This technological momentum of military-themed games can plausibly be factored into the conceptual shift within the digital games canon from abstraction towards ‘mimetic realism’. While, formerly, war games sought to capture as well as define the ‘essence’ of military operations by coining as concise a symbolic order for it as possible, more recent war games partially seek to reverse this process by trying to achieve a more direct, mimetic correspondence of player action and played action (as e.g. in Quick-Time Events pioneered by games like *Dragon’s Lair* and the *Shenmue* series) and pre-structure the game as a programmable system into several discrete elements, like artificial intelligence, terrain deformation or character animation. All these building blocks are represented by dedicated components within a game engine, and the complexity within these elements is gradually increased by constantly adding new functions to a base of reusable working code; at the same time, this techno-epistemological setup is stabilized by implementing more and more algorithmic links between these elements, like AI routines dynamically reacting to terrain deformation or to environmental audio sources. Thus, the contingencies involved in writing program code apparently fundamentally alter the spectrum of conceivable and manifested media formats. This syntagmatic shift in digital war games is accompanied by recent non-war game franchises often inscribing the game as an intermediary narrative layer within the game, as e.g. in the Japanese *Yu-Gi-Oh!* or *Card Hero* series. While this represents a move away from the chess paradigm of symbolically representing a war with a minimum number of interrelated ‘algorithms’, the new style of writing digital games has already retroactively affected board games and other earlier media genres where game pieces have become more and more detailed and lifelike and even programmable elements like ‘artificial intelligence’ are inserted into the logic of physical game tokens in pioneering games like *King Arthur*. (Rainer Knizia: Ravensburger, 2003) (cf. De Boer, 2004)

The insight that game designer and theorist Chris Crawford allows into the development of early (war) game design and which will repeatedly be used as primary sources throughout this book reveals that military themes were among the most commonly projected applications for emerging computer technologies at universities, both

on mainframe and home computers; (Crawford, 2003 (2): 187/88) Crawford's own initiation with digital games design occurred through a joint project to port the board game *Blitzkrieg* to a computer and use it as an AI programming challenge. Thus, the early affinity with representing military conflict might in part result from early designers' personal interests. William Higinbotham, the constructor of *Tennis for Two* (1958), also developed weapons technologies for B-28 bombers and worked at the Manhattan project at the Los Alamos National Laboratory on the US nuclear weapons program (cf. e.g. Pias, 2002: 9). Trip Hawkins, later to found the biggest publisher of digital games to date, Electronic Arts, initiated an accredited degree in "Strategy and Applied Game Theory" at Harvard and subsequently devised an acclaimed simulation of nuclear war that was even considered at the annual conference of the International Peace Research Institute in Stockholm. (Cf. *Retro Gamer* 24, 2006: 62) In this context, computer and video games (digital games) often appear as a byproduct of research guided by the logic of military technological development. While the interpersonal networks and the resulting flow of knowledge and ideas provide an important and often overlooked subtext, the focus of my argument will be on the technologies and emergent practices and patterns they produce. Regardless of Crawford's personal interest in war gaming, the programming languages used for his early games like *Tanktics* (1976) were originally created for scientific calculations (Crawford, 2003 (2): 194), which represents an important contingent constraint on the spectrum of digital game creation; ludic models of warfare using these types of functions and calculations necessarily required and produced a 'scientific' understanding of war that correlated with earlier notions of 'scientifcating' war, starting with the First World War. As will be elaborated later on, similar technological contingencies, such as shifting programming paradigms and middleware (cf. e.g. Cass, Stephen "Mind Games" *Spectrum IEEE* 39:12, 2002: 40-44), continue and slightly modify this framing impact on programmable media design.

1.2.2 THE CONTINGENCIES OF PROGRAMMABLE MEDIA TECHNOLOGIES

In her description of the use of commercial digital games by the Singapore Armed Forces, Gwenda Fong makes the case that, while digital games and military simulations supposedly differ in their approach to realism, their convergence is motivated by a "common set of enabling technologies". (Fong, 2004: 269) However, all the specific technologies mentioned, like "artificial intelligence", "user interfaces" and "networking", equally apply to many other forms of pro-

grammable applications. An important aspect of this book will thus be to identify and contextualize cases of technological convergence and assess their socio-cultural impact; according to Fong, the availability of PC-based real-time 3D rendering techniques in commercial games provided one such breakthrough for the military applicability of digital games.

Not only with the advent of the computer have notions of warfare been directly related to their respective technologies of representation. Similar to how tabletop war games in the 18th century both mimicked and shaped the military media utilities of the time (like e.g. maps, tokens as proxies for military units etc.), contemporary digital games set in 20th century conflicts draw on other amalgamations of military and ludic technologies, allowing e.g. the control of joystick-controlled surveillance drones in specific sections of some games. (Cf. e.g. Pias, 2001/02: 39-50) Although in academic literature digital games are often described (mostly for political reasons) as an entirely novel media form, the comparison with older war game systems and military practices is a useful exercise in discerning recurring criteria, like the belief in computability, which are exemplarily elaborated on in the third chapter. For instance, Chris Crawford mentions *War in the East* (~1974), designed by war game mastermind James F. Dunnigan for Simulations Publications Inc. (SPI), as the “first ‘monster’ game” for its sheer size, requiring four map sheets and roughly 2000 counters. (Crawford, 2003: 13) This criterion of relative scale and detail, metonymically referencing the perceived complexity of the Eastern Front in WWII in an imposing way by strategically violating representational conventions of board games, is but one parameter which can be just as usefully applied to digital games. Accounts of digital war games often gloss over rather than foreground technological continuities compared with older, e.g. board-based forms of war games, which are usually not understood as ‘technical’ media at all any longer because their technological makeup (position markers made from cardboard etc.) is by now widely and comprehensively understood, as well as, more importantly, publicly reproducible and, thus, naturalized. Some issues pertaining to board-based war games such as the compatibility of board pieces or the reusability of rule systems are plausible points of contact with programmable media that will be worked out as systematic topics later on. Furthermore, the hexgrid as a common smallest unit of spatial organization can, in many ways, be understood as equivalent to a data type in programmable media and, in many cases, makes for a more useful common denominator than a single binary digit (or ‘bit’), which has often been consensually suggested as ‘unit of operation’ by media and cultural scholars. The most common data type in OOP is the ‘class’, a specified format of

storing data pertaining to an object which, thus, inherently defines the limits of meaningful, i.e. algorithmically usable, information on that particular type of object; the sample 'button' class in the example e.g. is resizable and potentially movable since its scale variables (xsize, ysize) as well as position variables (xposition, yposition) are given.

Button
- xsize - ysize - label_text - interested_listeners - xposition - yposition
+ draw() + press() + register_callback() + unregister_callback()

Illustration 1: UML Example

In digital strategy games, hex-grids were often adopted and subsequently 'mathematicized' to make the topography manageable for the AI. However, other data structures quickly emerged with new computational opportunities; for instance, rectangular grids had been popular in the early years when multiplication and division were not yet supported by the hardware, but with the rise of real-time strategy games in the mid-1990s and the presumably 'unrestrained' unit movement, the screen resolution effectively became the dominant (and increasingly evident, i.e. unreflected) grid and data type. In other genres such as 3D shooters, data types determining how game engines handle spatial organization historically led to similarly characteristic restrictions. The *Doom* engine, which did not compute true 3D coordinates, could not differentiate between rooms above each other and, gameplay-wise, used a 2D plane internally. Both hex-grids and data structures in war games predetermine the understanding of war since they are adopted as unquestioned interpretational filters of information (for the purpose of complexity reduction) by the player. The re-combination of data types into data structures in program code is but one example which can and will be analogously applied to the segmentation of the game rules in the following chapters.

In military practice, actual large-scale war games are gradually being supplanted by programmable simulations, but still play an important, however continually renegotiated role. (Cf. e.g. NI-39) Those 'games', or rather collective training scenarios, are rather understood today as a dramatic 'play' [Schauspiel], a signal of strength both towards the indigenous populace and towards potential enemies. Rather than serving tactical purposes like before, as a simulation or feasible training constellation, the massive real-world war games yield one contingent and emergent instantiation which translates into a complex 'message' that, similar to a piece of program code, is fed into both one's own and enemy information ecologies according to the information warfare paradigm. The rooted nature of this paradigm in the logic of programmable media or digital games and its retroactive impact will be further investigated in the fourth chapter. At the same time, military conflicts or conflict types in military-developed games like *America's Army* are similarly iteratively re-played by numerous semi-coordinated players as a kind of ritualized, dramatic performance, which is partially pre-defined by the game's programmed framework and serves a symbolic rather than practical function. Play sessions being recorded, discussed in forums and re-played effectively de-singularize the events they depict (the numerous renderings of the D-Day scenario in games like *Medal of Honor: Allied Assault*, *Call of Duty* or *D-Day* are a prototypical example) and recursively update the common interpretive frame concerning real-world military conflict, as will be exemplified later, e.g. with regard to forum analysis. These examples should serve to demonstrate the interrelatedness of more and less topical media genres and the necessity of taking a step back in order to aim at a broader perspective.

1.3 The State of Research and the Politics of Documentation

In recent years, the amount of news articles, company presentations, studies and other material on instances of technological convergence between the military and civilian sector available both online and in subscription-based on-topic publications has become almost impossible to cover, regardless of the fact that many of these texts never catch much public attention. Some examples of more or less mainstream sources include *StrategyPage.com* (<http://www.strategypage.com/dls/articles/20030122.asp>), *CNN* (<http://archives.cnn.com/2001/TECH/ptech/11/22/war.games/index.html>), *WIRED News* (<http://www.wired.com/news/technology/0,1282,65403,00.html>) and dedicated publications such as *Military Training*

Technology. (<http://www.military-training-technology.com/article.cfm?DocID=665>)

Unfortunately, the current discourse on war games often still reverts to the question of whether programmable media, particularly digital games, foster violent behavior, desensitize the viewer towards images of violence and/or promote weapons handling skills among a mass audience. However, research conducted by the military on use of digital games for training purposes demonstrates that the intended goals and, by inference, the implied ethical problem “is not [...] [teaching] to handle or fire a weapon, but in learning to lead squads, units, or larger forces”. (Bonk/Dennen, 2005: 12) Thus, military rationales conceptually converge with patterns found in the civilian sphere, most notably the business world, as will be elaborated in the final chapter; in this sense, ‘leading squads’ is not an objectionable but instead a desirable quality in contemporary society. Moreover, preemptive moralization has been an obstacle in the scholarly analysis of military-related media genres, since it usually narrows down the discourse (cf. e.g. “war film is something different from even an approximately faithful rendering of the reality of war”; Büttner, 2004: 81) by dwelling on the impossibility of ‘representing’ war.

A possible reason for the apparent public neglect of war games and programmable media technologies might be that the developments described do not fit the current frame of reference of the average news reader, e.g. demanding technical background knowledge and contextual information. In Germany, much of the critical on-topic research is indebted to the logic of Friedrich Kittler’s writings on war and the media. Many of these authors, Wolfgang Coy, Georg Christoph Tholen, Manuel Köppen and Hartmut Winkler, to name but a few, are also geographically located in the proximity of Kittler, having worked or still work in or close to Berlin. This ‘monolithization’ produces valuable insights and has prepared a specific ‘playful’ perspective on the repurposing of media in war times, but it has also necessarily placed other aspects on the periphery. Contributors from the field of ‘computer game studies’, like Hartmut Gieselmann and David Nieborg, often write from a journalistic or production standpoint and focus on comprehensive factual descriptions; some of those texts, however, do not question their own methodology, e.g. concepts like the pursuit of realism (cf. e.g. Graaf van der, Shenja & Nieborg, David B. “Together We Brand: America’s Army.” *LevelUp: DigitalGames Research Conference*. Ed. Marinka Copier & Joost Raessens Utrecht: Universiteit Utrecht, 2003: 324-38 http://www.gamespace.nl/content/NieborgVanderGraaf_TogetherWeBrand_2003.pdf: 7/8) In her writings, Swedish media scholar Eva Kingsepp concentrated on representational

conventions in WWII games set against examples from war films. (e.g. Kingsepp, Eva "Immersive Historicity in WWII Digital Games" *HumanIT* 8:2, 2006 <http://www.hb.se/bhs/ith/2-8/ek.pdf>) Kingsepp relies on the close-reading of selected games and established ideas, like Bolter & Grusin's notion of 'remediation' and Bau-drillard's 'simulacra' and 'hyperreality', to substantiate her claim that WWII games feed into the desire for 'reenacting' history through immersion. This scholarly tradition often presents its object of study as a radically new phenomenon and as representative of the "military-entertainment complex", a term prominently featured e.g. in (Lenoir, 2000), who traces it back to Bruce Sterling in *Wired*, 1993. (Cf. 292) Methodologically original work like (Pias, 2001) and (Pias, 2001/02) often pursues a linguistic approach, e.g. working productively and playfully with the descriptive language, and is based on a thorough understanding of the history of technology, yet usually contemplates only historicized scenarios like the Second World War or the Korean War. In comparison, this book will attempt to incorporate both recent technological and politico-military developments with special emphasis on the military activities in the Persian Gulf since the early 1990s and to bring together the numerous heterogeneous facets characterizing military media deployment from a 'programmable media' angle.

Despite the wealth of information, the argument at hand can certainly not claim to give a comprehensive overview, especially since many potentially valuable sources are possibly classified. Even the reports and articles from military publications used in this book might have been revised for a non-military target audience in some cases, especially since many recent game applications (co)developed by military institutions are instrumental in the agenda of the Global War on Terrorism. Yet, military sources like the Marine Corps Modeling and Simulation Management Office (MCMSMO) and publications like *Military Training Technology* (<http://www.military-training-technology.com/>) offer a wide range of coverage for an arguably diffuse 'target' audience. (Cf. e.g. <http://www.tecom.usmc.mil/techdiv/downloads.htm>) While this might simply be standard policy for general research institutions like the Institute for Creative Technologies (ICT), the programmable media paradigm that will be elaborated below and the resulting 'information warfare' suggest an implied decentralized, strategic 'deployment' of these 'sanitized' texts for a number of reasons, some of which I hope to delineate later in this book.

A very basic motivation might be to stage the idea of military games as 'natural' in popular discourse by aligning it with conventional forms of news coverage. Another reason might be to legitimate the massive financial support for institutions with ties to the mili-

tary, like the ICT, by emphasizing outreach and public awareness. In the following chapters, I will outline other, more subtle and, therefore, influential effects of this alleged policy of transparency, such as inserting partially overlapping units of information into the user information ecologies, thereby quasi-‘programming’ society conceived of in terms of program code. In the fourth chapter, I will attempt to contextualize this as a system of interlocking decentralized strategies, understanding these texts as ‘inter-active media’, i.e. as media artifacts designated for inter-active usage, remediation and re-distribution within active user communities; the different use of the term compared to the commonplace notion of interactivity in digital game studies shall be indicated by the hyphen throughout this book. This strategic spread of information coincides with the logic of programmable media in numerous ways; most basically, the documents in question are regularly taken up and multiplied by journalists. (Cf. e.g. Amy Harmon’s inquiry into military use of games for the *New York Times*; NI-30) Thus, the texts can be said to be ‘compatible’ with the information infrastructure of contemporary news media and, therefore, are exponentially distributed either in their original form, as text segments, or even decontextualized quotes. This form of assumed information policy is closely related to the economic concept of viral marketing, i.e. choosing the formal elements of media artifacts in order to, in program code terms, maximize the compatibility of the data type with the defined methods in the given system or program and, thereby, the interaction within a news infrastructure; as will be shown later on, the plausibility of using biological imagery like the virus to conceive of and describe information brokering can again be traced back to the conceptual nexus of program code that is at the center of this book. The recently increasing tendency towards handbooks and anthologies on war gaming and simulations (cf. e.g. <http://www.hyw.com/Books/WargamesHandbook/Contents.htm>) similarly serves to channel disparate interpretations by providing a framework for ‘compatible’ discourse. It is certainly possible to apply this model also to earlier examples of media deployment, like the propaganda ‘machinery’ of the National-Socialist regime, and historical analogies are frequently interspersed throughout the book.

Scholarly research on the topic often pursues an episodic approach; for instance, Roger Stahl introduced the topic with an account of how the US military designed the control interface for an unmanned reconnaissance device (“Dragon Runner”) after the PlayStation2 controller, assuming that many soldiers would at least be vaguely familiar with it. Stahl uses this episode to prepare his thesis of the “blurred distinction between the soldier and the citizen” (Stahl, 2006: 113); yet, the episodic approach here circumvents

important related aspects, such as the question as to why and how the PlayStation2 controller, just like most digital game interface devices, produced at least roughly congruent mappings from game to game. While all buttons are freely assignable as far as the game software allows, 'standardization' usually emerges as a byproduct of software design and particularly paradigmatic button mappings recursively 'program' their users, creating reusable 'scripts', so that users are able to interact with most game software intuitively, which, as a constant practice, reinforces both the sense of becoming and the desire to become a quasi-extension of the algorithmically-defined game rule ecology. Standardization through the reusability of program code will be explored as a general cultural momentum in the third chapter, especially because it shapes the collective production imaginary of how to structure interaction in a digital game. Thus, a closer look at which developments elude public attention is instrumental in making the constraints of one's own disposition and expectations towards this complex field visible; for example, one usually ignored case in point is the technology transfer from military applications to location-based public entertainment systems, such as theme parks. (Cf. e.g. Katz, 1994) Taking this transfer of mostly network-related algorithms and hardware (110) into account provides a number of vertices to explain the usually disregarded formal convergence of digital games and theme park attractions, like *Fightertown*TM (cf. e.g. <http://www.ibiblio.org/GameBytes/issue18/misc/ftown.html>), as media genres. The fact that the Distributed Interactive Simulation (DIS) technology used for that purpose can link commercial-quality PCs and "high fidelity flight simulators" in one network (112) further encourages the interchangeability of code and concepts on differently scaled platforms and, as will be fleshed out in the third chapter, creates a common epistemological context.

With regard to this heterogeneous research situation, it appears productive to consider on-topic, especially academic, literature on digital war games as primary sources and para-textual layers of information to obtain a more comprehensive overview of contemporary conceptions of war in a particular cultural context. German scholars, for instance, already started writing about digital games, mostly as a youth culture phenomenon, in the late 1980s with a special focus on war games, although the term was inconsistently defined at that time. (e.g. Fritz, 1988) This body of rather pedagogical work exhibits a usually implied but still influential notion of the user being 'programmed', (cf. e.g. the title of a volume written for the Federal Center for Political Education (bpb), *Programmed for Playing War* [Programmiert zum Kriegspielen]) which anticipates 'cybernetic' models of player-computer interaction developed much later, since program code and basic code literacy were much more visible at the

time; however, the programming references usually stayed on a rhetorical level. Thus, the history of scholarly discourse can be an important subtext since, as in the case of Germany, the continuities are still visible e.g. in the authors and the still noticeable dominance of pedagogical topics.

Hartmut Gieselmann produced a book-length account of digital war games in 2002 (Gieselmann, 2002) that sums up several arguments from the German research context. Gieselmann bases his distinction between game, reality and simulation on the psychoanalytical ideas of Freud and D. W. Winnicott, which focus on playing as a child's activity; (11-14) in this sense, games act as an intermediary stage (termed a "third reality") for children to negotiate between pleasure principle and reality principle and to explore the latter. Gieselmann attempts to link the "creative" aspect of play derived from Winnicott to digital games, using e.g. the "omnipotence" of the child to imbue trivial things with "magical" significance, to explain the popularity of MODding, i.e. modifying a commercial digital game with tools often provided with the game software. (Cf. e.g. <http://www.moddb.com/mods>) The model of programmable media sketched in the following chapter and the subsequent applications to other spheres of media usage and parasocial practices will present a different approach to MODding as 'mental simulation', exploring the spectrum of technological feasibility given by the game as program. Distinguishing between simulation and game, Gieselmann draws on Baudrillard, who describes simulation as a "third order simulacrum" which does not mediate between reality principle and pleasure principle but substitutes itself for reality (unlike "imitation" and "production"); instead of pursuing these established differentiations further, I will rather undertake a close reading of the specific technologies used to investigate the constant renegotiation of 'simulation', 'game' and other related discourse terms.

Gieselmann references another early German scholar of digital games, Ralf Streibl, whose 1996 project on war in digital games cautioned against an impending militarization of society and pointed out the potential of digital war games to be instrumentalized by the military. Gieselmann's account of war game developments and theorization characteristically leaves central issues like "realism" unquestioned, arguing e.g. that the game *Conflict: Desert Storm II: Back to Baghdad* (Pivotal games: SCi Games, 2003) reinforced established concepts of the enemy [Feindbilder] "due to its high level of realism", which allegedly establishes "a close connection with the real military". (Gieselmann, 2002: 17) After critically reviewing the notion of 'realism' and related concepts against the backdrop of a consistent model of 'programmable media' which will be established in the following chapter, it appears that, instead, military concep-

tions of the enemy, most notably the rather amorphous ‘Global Terrorism’, are fundamentally shaped by the enabling technologies used to model them in both digital games and simulations. This implied understanding of the enemy in program code terms simultaneously leads to corresponding self-descriptions and assertions which, through the venue of commercial digital games, ‘trickle down’ into public conceptions.

The use of technical terminology and rhetoric is often observable in academic texts without adapting the context of the terms; for instance, Lev Manovich in his “Cinema as a Cultural Interface” uses terms like “[inheritance]” and “interface” in their program code sense, but rather casually (cf. Manovich, 1997: 5). The momentum of program code rhetoric and imagery within scholarly discourse will be investigated more closely in the following chapter. Thus, for reasons to be elaborated further below, the corpus of scholarly literature used for this thesis comes less from the still dynamic field of digital game studies, but rather from histories of technology, sketched by authors like Lewis Mumford, Arnold Pacey, Marshall McLuhan and Claus Pias. Even more importantly, the focus will be on close-reading technological documents and scholarly papers from areas like computer science and engineering as primary sources and vertices of recurring dispositions towards technologies that could be characterized as ‘programmable’ in a historical perspective.

1.4 Programmable Media as Socio-Cultural Filters

Resorting to games as models of specific areas of society and culture is not a recent phenomenon, but one which has recently picked up momentum and shifted towards digital games as ‘role models’. One such example is Phyllis L. Speser’s interpretation of technology transfer, also an important aspect of my argument, as a game. Speser structures her book roughly according to the key elements of a game, conceptualizing technology transfer according to symbolic ‘game pieces’ and ‘game boards’. (Phyllis L. Speser, *The Art and Science of Technology Transfer* Hoboken, NJ: John Wiley & Sons Inc., 2006: VII) This technique of conceptualizing technology transfer as a game is applicable especially in the area of programmable media, and the re-use and differentiation of algorithms and components, as well as the creation of tailored business models from this technological setup, will play a key role later in this book. The fact that Speser’s book is written from a policy perspective (cf. e.g. xvii) suggests that the model of the ‘game’ is intuitively plausible in these

contexts and thus translates into actual corporate as well as political decisions.

The increasing relevance of digital games as a form of cultural expression and performance [Performanz] can be seen in a number of episodes, like the withdrawal in 2006 of Badr Hakeem, a Saudi-Arabian professional gamer, from an E-Sports championship after he found that he was due to compete against an Israeli player. (Cf. NI-31) In an interview, Hakeem argued that the alleged ongoing aggression of Israel against the Palestinian people prevented him from playing against his Israeli opponent. Thus, the act of publicly playing against each other appears to be perceived as a heavily politically loaded one, which is complicated by the fact that both were to compete in the digital soccer simulation *Pro Evolution Soccer*, since soccer, due to its high visibility in mainstream media, has itself a tradition of being a proxy 'battlefield' for geopolitical constellations. While the disposition towards games is highly culturally specific, as e.g. Huizinga exemplified in his *Homo Ludens*, the explosiveness of the case above stems from the peculiar politico-economic constellation of digital game tournaments, something which is also, at least partially, attributable to the properties of program code, as will be argued in the final chapter.

The fictional content of the games thereby does not represent an obstacle and quasi-'programmable' media genres, most notably ludic forms like digital games, have even been implicitly instrumental in making the boundaries between fact and fiction in actual governmental and military practices more and more permeable. For instance, the US Ministry for Homeland Security started an initiative in mid-2007 encouraging science-fiction authors to contribute ideas for future threat scenarios that might actually shape the development of proactive defense measures. (Cf. NI-32) While the media artifacts in question, i.e. the contributions, are written texts, the public contest, or 'challenge' (as e.g. in the DARPA 'Grand Challenge'; cf. <http://www.darpa.mil/grandchallenge/>), as a type of defense and media policy can actually, as will be laid out in this book, be regarded as informed by the paradigm of programmable media. Instead of previous centralized, top-down research directions, perfectly encapsulated e.g. by the SDI initiative proposed in 1983 and mainly pushed forward by US President Ronald Reagan as its key advocate, these new types of policies actively incorporate a large amount of more or less relevant bottom-up input with an intended, inherent fuzziness. A temporary analogon could be the move of chess AI algorithms from pre-computing as many steps as possible starting from the current constellation to using large movement databases as 'ideal types' which are obtained from observed real sessions and tagged as to be algorithmically usable; while this shift

was initiated by the availability of more computer memory, the contest is made feasible by the availability of larger semi-connected user communities as 'hardware' to run on. At the same time, this process clearly reflects common programmable media practices, e.g. looking up a topic online by using a search engine algorithm and selecting from a display of probabilistically derived potentialities (Google Suggest; <http://www.google.com/webhp?complete=1&hl=en>), to the point of being at least implicitly re-modeled by those technologies, just as efficient Google users develop a mental model of the expectable results. Extrapolating from this analogy, the political process in this case appears to be conceptualized as an algorithmically expressible system or a computer program, which currently represents the tacit benchmark for effective processes; this assumption will be explored in detail in Chapter 4a with reference e.g. to military decision-making processes and training constellations.

Historically, war and games have always been discussed in similar terms, more or less intricately linked in both popular and academic discourse, with their status within society being constantly re-negotiated. For instance, Henry Jenkins points to the martial terminology used for sports event coverage and the original semantization of chess as a generic battle between two diametrically opposed forces. (Cf. Jenkins, 2003) Johan Huizinga, an early theorist of the interrelations between ludic activity and cultural achievements, argued that play and games were originally tools to contain the use of violence, substituting war for a virtualization of 'agon' (to use Caillois' terminology). (Spreen, 2001: 36) The "enclosure of violence" within "sacred rule", however, can also be understood as legitimizing or naturalizing war (by 'defining' it in the first place). In his comprehensive account of the cultural functions of play, Johan Huizinga gives an insightful anthropological overview of war and ludic activity. (Huizinga, 2003: 89-) In fact, although Huizinga's personal pre-WWII experience of war is almost inconceivable from a contemporary perspective, his account of how war cannot be understood as an "agonistic [and thereby legitimate] function of society" (90) in many ways fits the description of military simulation games. In other words, playing war games as a collective everyday practice precisely eliminates the 'play' aspect and dissolves this connection. I will not pursue this anthropological argument with respect to games in the traditional sense much further, although my model of programmable media convergence also explicitly takes into account the level of everyday practices and experience.

Marshall McLuhan described both weapons and games as 'media', i.e. "extensions of man", yet in separate chapters of his *Understanding Media*. Accordingly, the respective chapter on games, may-

be coincidentally, contains surprisingly numerous examples of war games (e.g. McLuhan, 2003: 234/235). Following McLuhan, the increasing tendency towards specialization in the sphere of work is supposedly being countered by games allegedly propagating generalist actions. While this still applies in many areas of games, the case of programmable media introduces additional complications; as I will argue later, many digital games, by virtue of their technological makeup, profoundly and sometimes even deliberately conflate the spheres of work and recreation, whilst McLuhan still employs these spheres as a binary opposition for building his argument. Intuitively referring mostly to sports-type games, he points out that the main aspects that disqualify war from being a “true game” is that the rules are not known to and accepted by all participants, and that the ‘audience’ involvement is too high, wryly hinting at collateral damage, something which has become all the more topical since the 1960s. (McLuhan, 2002: 240) Again, McLuhan’s comments are useful methodologically for their formal rigidity, e.g. by taking into account the necessity and potential functions of the audience. However, McLuhan understands games as a culturally necessary form of inhibition against “automatism”. (241) It remains to be shown that digital games, by virtue of the programmability, often precisely reverse this notion.

Later on, he describes how social changes lead to the interpretation of the ‘obsolete’ or historicized social norms and ‘rules’ as a game, (239) especially in the case of radical and short-term transformations where the overcome norms are displayed as man-made and unrelated to the new circumstances of social reality (following Huizinga’s criterion of games being detached from ‘reality’ in terms of rules and implications). McLuhan’s hypotheses are useful methodological snapshots because they suggest treating ‘games’ not necessarily as material objects but as structures that can equally be applied to construing social transformations. This technique will prove especially useful below while assessing the impact of programmable media on contemporary warfare and its politico-institutional context.

The direct political implications of digital games, subscribing implicitly to Raudzens’ notion of technologies as influencing political structures, have already tentatively been explored in academic literature; one influential recent approach is Stahl’s proposition of a third sphere of identity, the “virtual citizen-soldier” as a product of the blurring between military and civilian spheres. (Stahl, 2006: 113) Accordingly, Stahl reads the differences between the TV coverage of the 1991 and 2003 Gulf Wars as an indicator of a new ‘embedded’ citizen/viewer. (115) Thus, starting with premises similar to this book, Stahl rather employs a politically-oriented approach. For

instance, he follows Arquilla and Ronfeldt in calling the net war paradigm “more ‘total’ than total war”, (114) thus concentrating on the macro level and utilizing concepts from political and military theory; furthermore, identity politics, like e.g. the double status of the “net war citizen” as both “object” and “subject” of war, are a key aspect of his argument. (114/15) Stahl utilizes Paul Virilio’s ‘acceleration’ hypothesis to sketch the ‘citizen-soldier’ figure who is characterized by the need for constant action rather than reflection, (126) a condition he finds similar to the situation of a game player. This “temporal collapse” allegedly even permeates political semantics as in the Bush administration’s mantra that the United States is “running out of time” in the Global War on Terrorism. (120) Finally, Stahl differentiates between interactivity and participation “in the democratic sense” (115) and considers the restructuring of “the civic field” (118), hinting at the potential political implications of net war strategies. The ‘soldier-citizen’ model is a valuable tool for potentially mapping these forms onto the currently existing political system based on terms like democracy and citizenship. However, rather than seeking to reconcile these political concepts with the net war ramifications, I will attempt to analyze the enabling programmable technologies as structural role models for socio-economic, as well as military, organization.

1.4.1 WAR AND LUDICITY IN OTHER MEDIA GENRES

Politico-military awareness of the cultural significance of ludic activities and symbols often exceeded concurrent public sensibilities. A 1967 military document, the PsyOps Policy No. 36 on the “use of superstitions in psychological operations”, details the massive collaboration of toy producers who supplied suits of Ace of Spades cards for US operations in Vietnam. (Cf. <http://www.psywarrior.com/superstition.html>) According to Viet Cong symbolism, the Ace of Spades is considered the “death card”; therefore, it was deployed to instill terror and encourage desertion. Since most Vietnamese playing cards are imported from China and their markings differ from those on Western cards, this fatal association arguably already stems from negative experiences with French colonial forces since the mid-19th century, which brought Western cards with them.

With reference to the recent use of playing card decks in Iraq, Joyce Goggin contextualizes the use of the *Most Wanted* playing cards as a medium, both in terms of their material properties (“small and portable”), and their usually positive connotation as a ‘toy’. (Goggin, 2005: 1) Combined with these properties, their inherent horizontal and vertical differentiation (i.e. colors and values)

makes card decks ideal tools for 'implicit' learning, e.g. of mathematical tables or vocabulary lists. Extrapolating from Goggin, playing cards can be argued to anticipate a few structural properties of programmable media effectively, such as the segmentation of thematic complexes into 'units' and the symbolic encoding, although the information is 'hard-coded' into the card and the rules for their combination must be externally agreed upon. More importantly, playing cards can be understood as a form of 'inter-active media', a concept all-too-eagerly applied exclusively to digital games at the moment. In this sense of the term, it is not the cards as objects which provide feedback or 'inter-action' but their portability (and, thus, exchangeability with others), and their repurposing potential (by altering the external rules) enables usage practices markedly different from reading a book or watching a movie (although, as will be exemplified later, books can also be considered 'inter-active' media under specific circumstances). The use of playing cards in Iraq in 2003 reflects this idea: the cards were used both by soldiers for playing poker and also for decentralized, semi-directed educational purposes, e.g. for memorizing names and faces of Iraqi politicians, both by the soldiers themselves and the Iraqi population. The cards were later sold at online auctions as collectible items, which further increases their 'inter-active' potential, capitalizing on another intrinsic property as a 'medium', i.e. their limited availability.

While the game of chess will not be vital to the argumentation in this book, the relationship between war and games proper has already been negotiated by means of, among other specific media technologies, the chess computer. (Cf. e.g. Spreen, 2001: 37) Already in 1950, Norbert Wiener and Claude Shannon interpreted the chess computer not simply as a showcase for AI research, but also as a "machine for taking away the restraints of violence" [Entgrenzungsmaschine der Gewalt]; while the game of chess, from a cultural history perspective, is credited with the canalization of violent outbreaks, chess computers were at that time considered as a "field of possibilities" for optimizing military strategies, influenced by the growing popularity of von Neumann's and Morgenstern's game-theoretical thoughts. Contemporary programmable media like digital games have taken over many of those functions without provoking the same critical stance. Scholarly extrapolations, e.g. from a poststructuralist standpoint, as in the case of Spreen, are often rather speculative and figurative, e.g. predicting the interconnection of machines into a "global, automatic network" and cautioning against the "genealogical interface of hypermodern computer and media technology and weapons technology and the atomic bomb". (37) Departing from a close-reading of technologies, this book is designed to formulate a complementary position which, in programmable

media terms, is more 'compatible' with other research strands and is, thus, better suited as a quasi-algorithm used to process and structure the constant 'input stream' of related news items.

The use of a quasi-ludic rule system within the military, independent of actual war games, can be extended to sports. For instance, the German variation of dodge ball [Völkerball] builds on the hierarchical differentiation between the 'king' [König] and a number of in-field players. After all in-field players are hit by the opposing team, the 'king' enters the field and becomes 'vulnerable'; the respective player must be hit three times to win the game. While this setup already implies a martial narrative, the practical implications of the rules on the players are especially noteworthy and, occasionally, coercive, e.g. since players must decide on a 'king' who is usually the most agile player beforehand. Furthermore, the act of throwing a ball to hit other players is uncommon in ball games and, especially when team members have been 'killed' or 'imprisoned' (depending on semanticization), the pressure of being repeatedly targeted has strong psychological implications on the players, something which has even been attenuated, for instance, by including a ban on head shots in the official rules. Baseball similarly encapsulates a particular, historically localizable notion of military conflict (in this case the American Civil War), and the connection was even institutionalized by having troops play the game as part of their regular exercise regime. (Wenner, 1989: 52) This conflation of spheres like military training, sports and also its media coverage was propelled by the fact that by the mid-19th century the commercialization and institutionalization of sports began, which, among other things, effectuated the increasing standardization of rule systems.

Similarly, Marshall McLuhan analyzes how particular sports (or games), like baseball, embody a particular socio-cultural order, an order which, however, is simultaneously co-shaped by the contemporary media technologies. Baseball, in his reading, is rooted in the "one-thing-at-a-time" mentality (McLuhan, 2002: 239) and work delegation principles of the "mechanical age", which is popularly associated with the assembly line as a socio-technological frame. He furthermore speculates that (then) new technologies of representation like "the TV image", synonymous with electrification, "alienate [media users]" from 'outdated' sports like baseball since they establish new organizational paradigms which are reflected in different sports. Put more abstractly, the contingencies of representational technologies, imposed by a specific media technology like television (or the computer), arguably influence both cultural dispositions towards certain sports and the formal aspects of sports as media genres. In brief, the fact that baseball is even less 'compatible' with

the socio-technological premise of programmable media technologies than with television could explain why it is comparatively seldom represented as a digital game. On the contrary, sports reflecting program code principles, such as de-centralized planning and interlocking local 'scripts', like *American Football* would be further propagated by the increasing spread of programmable media technologies; while this hypothetical interrelation cannot be empirically validated, the assumption itself is intuitively plausible, as will come out more clearly in the following chapters. The same pattern holds true for the medium-specific limits of representation imposed on warfare themes. MOUT-type operations and decentralized semi-autonomous units, which are currently discussed extensively among military strategists, coincide with program code paradigms like Object-Oriented Programming (OOP) much more than the quasi-linear progression of massive tank divisions that characterize earlier military practices (and older programming syntagmas) and, for this as well as other reasons to be sketched below, are disproportionately more common in recent military-themed digital games.

Finally, war toys are a ludic media genre that has embodied as well as shaped specific 'war mentalities' throughout its long history; in fact, the current historicization and scholarly neglect of toys in favor of digital games produces critical blind spots, while, before the pervasiveness of programmable applications, digital games were often perceived as a continuation of the debate revolving around war toys. (Streibl (2), 1997: 2) In February 2007, Märklin, a big player in the toys market founded in 1859, officially switched back to military semantics, adding a new product line called *Metal Military Mission by Märklin (4MFOR)*. (<http://www.4mfor.de/>) Märklin has been one of the biggest producers of model railways and adopted digital control mechanisms for miniature trains already in the 1980s. Integrating the company name into the franchise is a particularly strong commitment; moreover, the label '4MFOR' strongly references military abbreviations (e.g. KFOR) and CI design. Interestingly, the move towards military models followed a takeover by British investor Kingsbridge. (Cf. e.g. <http://www.net-tribune.de/article/020207-141.php>)

The Märklin model catalogue, juxtaposing extremely precise information on the original vehicles (e.g. dimensions given in millimeters) with model properties, can be read as a continuation of programmable media characteristics extending into toys production; apart from what Lev Manovich termed 'database logic', encyclopedic and systemic thinking are clearly visible since all the physical models are built on the basis of digital 3D wire-frame models, such as the one used in the above advertisement. These traits are even more clear-cut in other popular types of toys like trading-card games.

There are at least two similar 'official' games endorsed by the US military, *Mission Command* (cf. e.g. <http://www.boardgamegeek.com/game/12425>) and *Daring Eagle* (cf. e.g. <http://www.boardgamegeek.com/game/12424>), a combined board and card game, both produced by the Army National Guard.

The case of long-standing brands or game syntagmas like the Märklin models or also the 2008 re-issue of the iconic board-based war-game *Risk* can be read as a useful indicator of changes in the concurrent popularly communicated notions of warfare. *Risk* (Parker Bros., 1957) was originally released in 1957 and, to some degree, encapsulated the Cold War idea of 'global domination', despite being released in France and featuring a game board and board pieces referencing the Napoleonic era; the later revision was titled *Risk: Black Ops* (Hasbro, 2008) and most notably introduced a new resource system based on capitals and cities as well as more differentiated objectives other than global domination. The emphasis on cities within the rule system clearly reflects the recently increased attention towards urban conflict theaters and the training focus on MOUT operations that will be discussed later in connection with concurrent digital games. Even more importantly, the more localized and even shifting objectives take into account the fundamentally different premise of contemporary warfare, in which clear-cut victories or even the promise of 'global domination' have no place. The modifications to the rule system are interpreted as designed to accommodate new playing styles which are characterized by "shorter time commitment" (c.f. e.g. <http://www.blog.newsweek.com/blogs/levelup/archive/2008/02/04/is-risk-black-ops-from-hasbro-the-next-big-hit-for-ea-casual.aspx>) rather than to reflect changes in the perception and interpretation of warfare.

As this paragraph attempts to show, considering digital games at the expense of other media genres is a pitfall that needs to be avoided; on the contrary, a comparative look at the enabling technologies and their impact on practices and interpretation of the military/media industry can be instrumental in situating digital war games within a broader socio-historical context.

1.4.2 MILITARY THEMES AS STRUCTURAL CHALLENGES OF REPRESENTATION

From a comparative angle, even decidedly pre-digital media coverage of wars exhibits a tendency to transgress inherent representational limitations of media genres. Already Johann C.L. Hellwig (1743-1831), weighing his understanding of war against the visualization techniques offered by chess as a contemporary game and medium, found that the "need for [c]ommunication" ['Bedürfnisse'

nach 'Communication'] among game units (meaning e.g. the feeding of horses instead of communication in the currently familiar sense) overstrained the rule ecology provided by chess. From a current perspective, these categories of war induced by Hellwig from observation appear perfectly congruent with the aforementioned logic of OOP, a key technology in most programmable media production including digital games. This notion of war-related themes 'challenging' representational means and conventions overlaps e.g. with Manuel Köppen's broad investigation of the shifting position of the 'observer' in war scenarios since the 19th century. (Cf. e.g. Köppen, 2005: preface) In this perspective, though, war is found to challenge sensorial perception and is, accordingly, related by Köppen to other arenas of modernity like traffic and the general habitat of the modern metropolis.

A more complex example of this phenomenon is Ernst Friedrich's *War against War* [Krieg dem Kriege], a book published in 1924, which consists mostly of extremely graphic photographs of the trenches and victims of the First World War, condemning warfare in the name of capitalism and exploring the functions and new possibilities of documentary photography at the time. While *War against War* certainly defies most literary syntagmas, it even starts out with a quasi-'inter-active' device (in the sense laid out above): a list of people or nations that would possibly like to ban the book. Friedrich achieves both the integration of the potential use and abuse of his text into the, however pictorial, narrative and the introduction of his book as a 'tool' [Werkzeug], an 'inter-active' medium, rather than as a literary work [Werk]. (Friedrich, 1991: 6) The direct address to the reader and the constant multilingualism (with all texts and annotations given in English, German, French and Dutch) support this claim. Furthermore, *War against War* strongly exhibits the belief that the newly discovered medium of war photography, more precisely the feasible production of photographs on the battlefield, could have a sufficient public appeal which might be deterring enough to prevent future wars altogether. The idea of an older medium, in this case the written word, being '[insufficient]' (22) for the "[painting]" of modern warfare and its atrocities, was, at least for some time, a new thought, inspired by the shock those never-before-seen images instilled in contemporary society. The photographs are often characteristically set against recurring metaphors of the time, such as the "field of honor", thus attempting to dismantle them through the raw force of a new medium.

Ernst Friedrich's use of photographs as pacifist 'propaganda' can be considered as an opposing strategy to the instrumentalization of photography that Susan Sontag analyzes in her *Regarding the Pain of Others*; both types of strategies, however, consider 'li-

near' or 'static' media photography as 'material' for repurposing and recontextualization, which could be summarized as 'implied inter-activity', i.e. formal parameters of both the photographs and their media contexts which encourage remediation and circulation. Thus, implied inter-activity would denote the potential of formally 'hermetic' media, such as texts and images, to produce non-standard usage patterns that could be labeled 'inter-active'; in programmable media terms, it would refer to the propensity of data types to respond to a given set of interlocking algorithms within a program. This differs notably from the understanding of texts as 'interactive' by allowing for multiple, recursive re-readings and rather refers to formal elements that pre-structure collective forms of media usage and the parasocial organization of media users, just as *War against War* spawned a 'movement' of activists advocating the use of the then-new medium for pacifist purposes.

While this alternative notion of 'implied inter-activity' will be further explored below using fan site toolkits for digital games as an example, its most fundamental structural prerequisite is the easy (technical) modifiability and segmentability of the media text as source, which is distinctive from digital media (this would be partially congruent with Lev Manovich's notion of 'modularity'; Manovich, 2001: 51) and programmable systems. For instance, online video networks like *youtube* and *metacafe* host numerous military tribute videos, ranging from sentimental to belligerent in affect, which reassemble recorded TV footage by using programmable editing tools like *Adobe Premiere*.

The independent production of military tribute videos is surprising given the chorus of critical voices against allegedly increasing military autonomy in Western societies and the assumed critical stance of independent media production in particular. Earlier accounts sometimes reduced independent media production exclusively to alternative news programs with a strong investigative mission, such as *Undercurrents* (cf. Taylor, Lisa, Willis, Andrew (Eds.) *Media Studies: Texts, Institutions, and Audiences* Boston: Blackwell, 1999: 141), which masks out potential external influences that could account for occurrences like the tribute videos, while some recent textbooks like *Democracy and New Media*, co-edited by Jenkins, Thorburn and Seawell in 2003, already provide a critical counter balance to the democratic promise of the independent media.

While most of these accounts disregard formal elements and technological contingencies of programmable tools and media artifacts, the criterion of technically feasible modifiability and segmentability could yield a complementary perspective. Most videos, accordingly, are collages of still images, generic text objects and roughly cut news footage usually underscored with a continuous

piece of music. The second chapter will establish and support the hypothesis that this form of media production can be understood as inherently ludic, with the source material as playing field and the media tools as board pieces or tokens. Although there is usually no definite goal, the paradigmatic quality of 'official' military video syntagmas produces a mixture of free-form play (or *Paidia* according to Roger Caillois) and mimicry of these syntagmas (*Ludus*). For instance, one video labeled *Bomb Saddam* and described as a "tribute" to the soldiers serving in Iraq offers a collage of extremely short shots from war documentaries and news broadcasts arranged using the formal repertoire of music videos, e.g. exhibiting a very precise synchronicity between video and sound track, but also closely resembles official recruiting material of the US Army and other military institutions. (Cf. <http://www.youtube.com/watch?v=wNWtFNS6K08>)

To conclude, the main goal of this book will be to provide a framework for tying together the various forms in which programmable media, most notably digital games, appear in contemporary Western societies and, as an outlook, to provide a common ground for discerning culturally specific ruptures.

1.4.3 FROM LUDICITY TOWARDS DIGITAL GAMES

While the shift towards algorithmic expressibility which characterizes digital games and simulations has already been present in previous forms of games, the 'mathematicization' of games has not been constantly linear across historical periods and cultures, as e.g. an article by Christoph J. Scriba on the British mathematician John Wallis (1616-1703) exemplifies. One of the two technical applications by Wallis, Scriba, chooses to illustrate his hypothesis of the increasing mathematization of technology since the 17th century as a game or, more precisely, a "ring puzzle". (95) The basic idea behind the mathematical modeling of the game was optimization; the other application accordingly models the statics of a roof as an optimization problem. The game's principles were formalized through a customized mathematical notation (105/107); this 'algorithmization' turned the solution of the puzzle game into a 'routine' task (110) and, thus, mostly eliminated the notion of play by subdividing the larger goal into subtasks and, more importantly, presented a (theoretically) scalable model (103) that could accommodate any change in complexity. Thus, the tools for conceptualizing games like the symbolic mathematical notation by Wallis fundamentally alter the perception of the game as well as its cultural ascriptions and functions; by providing a scalable 'algorithm', Wallis eliminated the cri-

terion of difficulty or challenge that characterizes games in a cultural historical perspective. As will be elaborated below, playing strategies used in digital games like 'powergaming' clearly revitalize and exploit this understanding of games and, thus, blur the boundary between the logic of play and work-related rationales.

Mathematical game theory as laid out by Morgenstern and Von Neumann was not so much read critically as a foundational text projecting a particular social 'ideal type' but rather as a quarry of inspiration in very diverse areas, such as, most recently, e.g. the design of socially conscious AI behavior for more efficient educational software tools. (Cf. e.g. Glass, A., Grosz, B. "Socially Conscious Decision-Making" *Proceedings of the Fourth International Conference on Autonomous Agents* 2000 <http://citeseer.ist.psu.edu/529200.html>) For that reason, it is useful to take a step back and identify some convergent aspects between game theory applications; for instance, the case of e-learning tools exhibits a highly formalized model of learning, stemming at least in part from technological contingencies, which, as will be elaborated below, constitutes one often overlooked point of contact between military and civilian technologies.

A key vantage point within mathematical game theory is the model of interdependent 'rational choice' (cf. e.g. <http://plato.stanford.edu/entries/game-ethics/>), which can be understood as a behavioral archetype that envisions society from the desire for economically predictable actions and, by analogy, e.g. also informs the notion of the learner in e-learning applications. As Pias indicates, the "classification" of problems already depends on the tools employed in its solution, leading to the increasing assessment of military problems according to "calculation time, number of steps of an algorithm, and memory size needed". (Pias, 2002: 2) Thus, considering digital games and military simulations as a continuation of game theory assumptions, the notion of behavioral standardization, 'laboratory conditions' that are never met outside of mathematical models, is implied in both military training and the recursive projection of effective player strategies while playing a digital game.

Moreover, Von Neumann and Morgenstern explain the usually counterintuitive concept of multiple attributions [Zurechnungen] as the solution for a game-theoretical problem in economics by comparing it with the consensual idea of a "behavioral standard" in actual social organization, i.e. by tapping into the level of observable, personal experience. (Von Neumann/ Morgenstern, 1973: 40) This analogy is carried even further, e.g. by inversely mapping the observed stability conditions for a given behavioral standard in a society onto the mathematical definition. (41) Von Neumann and Morgenstern continue to back the viability of their analogy (42) and,

consequently, deemphasize its bidirectional character; that is, not only is it exclusively an 'ideal type' of society that fits the mathematical model, but the consecutive widespread adoption of the theory since its proposition in 1943 has recursively shaped the projected societies.

Concerning the 'purity' of their method, the authors interestingly admit that a "verbal explanation" of the rule systems they describe, while not universally applicable, is often possible, although keeping "mathematical rigidity" throughout appears more consistent. (279) This peculiar and unsteady relationship between observation (e.g. of social processes) and mathematical modeling, i.e. formalization, or between analogy and mode of description, constitutes the most relevant aspect of mathematical game theory for this argument, since it re-occurs on various levels of programmable media genres like military simulations, e.g. in the approximative development of physics models and the analogous common notion of 'realism' which is constantly and fluidly renegotiated, both in playing and designing digital games, as well as in refashioning them for training or 'other' purposes.

While mathematical game theory is often treated as a historicized phenomenon and is closely linked to individual figures like Von Neumann/Morgenstern but also Herman Kahn and others, it is worthwhile to juxtapose it with more recent technological developments and to read it as a conceptual spectrum which is still influential today within an entirely different context. Most prominently, Claus Pias has been analyzing mathematical game theory along these lines, highlighting for instance the often neglected affective connotations of its practical application, like the "humiliating potential" of the early computers, such as the ENIAC used in the resolution of the Korea War (Pias, 2002: 1) Pias gives an illustrative example of his 'linguistic' approach in the same passage as his later elaborated thesis (inspired by Günther Anders) that computer games "declare their players simply as [unzurechnungsfähig]", an attribute that would roughly translate into "certifiably insane" in English, but which, in German, has a second, literal meaning which is 'not being computable'. In many ways, this book subscribes to Pias' larger project of an "epistemology of the digital computer", (1) although my argument focuses less on linguistic and affective inferences but on technologies and practices.

Not only digital games but also specific game-related technologies are being used as tools for interpreting and recursively affirming contemporary society and culture. In October 2006, a team of computer scientists at Northwestern University, Illinois announced the development of a software tool (*News at Seven*), funded by the National Science Foundation (No. 0535231), that automatically gen-

erates a news format from online news sources using the *Source Engine* from the popular game *Half-Life 2*. (Cf. <http://destroyer.cs.northwestern.edu/about.php>) One reason for choosing the *Source Engine* might have been its focus on believable character representation, using e.g. facial animation and animation blending; consequently, some of the modifications of the original engine were routines for randomized and fixed-interval peripheral motions blended with the current bone animation state.

An important aspect of *News at Seven* is the implied belief that news programs' syntagmas can and should be sufficiently formulaic to be automatable, a belief which is apparently consensual enough to ensure public funding. Even 'relevant' information from the blogosphere and additional images are automatically collected and displayed by the *News at Seven* software. Thus, visual elements of representation familiar from digital games enter the daily practice of daily news watching, which is fairly constitutive, at least in Western democratic 'information societies'. Complementarily, game footage from games like *Brothers in Arms: Road to Hill 30* is increasingly being used in documentary TV formats. (Cf. e.g. <http://www.gamespot.com/xbox/action/brothersinarms/news.html?sid=6140685>)

By automating the selection and presentation of information, the cultural status of news formats is, however unnoticeably, critically challenged, since this status was, at least partially, based on the fact that the news formats presented a personalized, criticizable and accountable instance, instead of a set of configurable system parameters and filters. Another, earlier example which demonstrates the constant exchange of technologies and concepts between war games and digital games in general is the origin of digital role-playing games (DRPGs) from military games and simulations, a development which was anticipated already in the tabletop war games and role-playing games of the 1970s. One of the most prominent cases was the shift of influential developer STRATEGIC SIMULATIONS INC. (SSI) from producing military simulations to creating formative DRPGs based on the popular *Tactical Studies Rules* (TSR) franchise *Dungeons & Dragons*. (DD-SSI-1) Arguably, the major innovation in the still amorphous DRPG genre introduced by SSI was the implementation of AI opponents built on "list[s] of priorities" (83), i.e. weighing a simple set of possible actions against a very basic analysis of the given situation; this AI concept, which, in heavily modified form, is still in use today, even allowed for emergently "concert[ed]" AI behavior when applied to multiple agents in the same scene. At the same time, it permanently shifted the formal conventions of the genre towards tactical battles, most notably since the program code was inspired by and even partially reused from earlier military simulations the company had

worked on. DRPGs like *Wizard's Crown* introduced disproportionately detailed combat rules, including e.g. injuries and bleeding, which had been adapted from the company's six-year experience with military strategy games. The same case exemplifies the reciprocity of technology exchange with the company's immensely popular *Panzer General* (SSI: SSI, 1994), re-importing DRPG conventions (and, thereby, algorithms) like a persistent experience system for all units which provided for gaining prowess depending on a unit's performance in battle; (86) this system has subsequently become institutionalized in both genres.

To conclude, one further key objective of this book will be to identify changes in the actual implementation of military operations and self-organization based on programmable media technologies. Historically decisive examples of the relationship between media representations and military strategies are e.g. the versatile role of optical telegraphy during the Napoleonic Wars and the use of chronophotography or aerial (reconnaissance) photography during World War I (Köppen, 2005: 1). This is especially relevant since, due to the aforementioned 'inherent ludicity' hypothesis, which will be elaborated in the following chapter, programmable media occasionally reference and re-interpret these representational conventions. For instance, the loading indicator screen in *Full Spectrum Warrior* de-contextualizes the logic of satellite photography by using the continuous zoom into a satellite image of the respective environment as a loading indicator, i.e. playfully tying the depth variable of the satellite zoom state to the progress variable of the loading routine provided by the game engine. Thus, through quasi-ludic extrapolation, elements and visual syntagmas, like satellite views, are detached from their original functional frame by being algorithmically expressed and transcoded into a different program context.

1.5 Digital Games as a Subset of Programmable Media

Most research on digital games has highlighted the ludic aspects and treated its objects primarily as games; focusing instead on the common denominator of program code as proposed in this book allows for meaningful cross-references to military-related findings in other media genres, like the increasing reliance on quantifiable (and quasi-algorithmicizable) information in current TV news coverage.

Many, especially brief news reports close by detailing how many people were affected (e.g. killed, wounded or rendered homeless) in the respective event. While statistics also used to be given in earlier news accounts (cf. e.g. German TV coverage of the Turkish invasion

of Cyprus in 1974: <http://youtube.com/watch?v=hgmJKhXJ0bM>), the markedly shorter coverage of each event in current news formats puts far more emphasis on the numerical data, even for comparatively 'peripheral' or local events like traffic accidents. By using them as indicators of quantifiable information or 'variable names' in programming terms, labels such as 'killed' or 'wounded' are increasingly naturalized and even implicitly arranged into a hierarchy, with e.g. people killed bearing more strongly than wounded or even homeless, with the final implied 'severity' constant being theoretically computable by adding and averaging those variables. Accordingly, news items like car bombings or natural disasters are conceptually 'homogenized' by being made expressible using the same 'data type', i.e. a set of parameters that sufficiently describe every conceivable type of event and recursively modify the boundaries of conceivability. These categories are, in turn, fixated in actual programmable media structures like the *MIPT Terrorism Knowledge Database*, categorizing terrorism-related incidents by tactic, target type and even binary flags like 'suicide' and 'US Attack'; according to this logic, the destruction of the World Trade Center is filed as "Al-Qaeda Attacked Business Target" (Sept. 11, 2001, United States)". (Cf. <http://www.tkb.org/Incident.jsp?incID=7757>)

While this overemphasis on numerical data can be read as either a symptom or a cause of the increasing pervasiveness of programmable media, it documents a turn towards algorithmically processable information on behalf of a critical public which will be further investigated in the third chapter. In part, this strategy is 'imposed' by the unmanageable flood of information and the decreasing tendency to generate (or, from the recipient's side, accept) narrative coherence. Quasi-programmable applications like the *MIPT database*, but also much more commonly used cultural techniques like electronic program guides (EPG), increasingly permeate everyday life and arguably require the shifting of focus away from digital games towards a broader notion of inherent ludicity in programmable media objects. For instance, car navigation systems tentatively transform driving a car into a 'game' by cross-linking physical input and on-screen symbolic manipulation, i.e. the congruence of projected route and actual route as represented by lines and icons. Consequently, navigation systems already spawned apparently counterintuitive but nonetheless perfectly consequential applications, like e.g. a patent for a navigation system offering digital games that use geodata (cf e.g. <http://www.freepatentsonline.com/6401033.html>), which explicate the intrinsic ludic potential. From the beginning, i.e. before they became naturalized and reduced to their practical purpose in public discourse, 3D navigation systems were much more

immediately linked to digital games. (Cf. e.g. <http://www.wired.com/cars/energy/news/2004/06/63842>)

One of the most convincing recent takes on formal game analysis, which implicitly understands games as programmable applications in an attempt to reconcile literary studies and computer science methodology, proposes 'unit operations', i.e. "modes of meaning-making that privilege discrete, disconnected actions over deterministic, progressive systems" (cf. Bogost, Ian *Unit Operations: An Approach to Videogame Criticism* Cambridge, MA: MIT Press, 2006: 3), as the principal analytical currency. With concepts like 'fungibility', describing the conditions of successful interplay between 'units' of programming, criticism and analysis, Bogost unfolds a neo-structuralist approach to game analysis exhibiting a number of methodological overlaps with the approach chosen for this book; however, while the author focuses on digital games and game criticism, the argument at hand requires a more macro perspective and, thus, will only reference Bogost, as well as related authors, to demarcate the model of programmable media analysis at hand.

In a recent 'meta review' of scholarly analysis focusing on the entertainment and military sector, Peter Bürger argues with Ekkehardt Jürgens, at least from a German perspective, that the critical review of "media products" and "media structures", i.e. the aesthetic assessment of individual media texts or genres on the one hand and economic, political and technological transformations on the other, is still separated. (Bürger, 2007: 4) Thus, instead of defining programmable media as a tangible subset of media phenomena and discussing them on the object level, I will attempt to use programmability and the 'inherent ludicity' hypothesis as a theoretical framework to identify continuities and ruptures between technologies and social constructs that can be read as quasi-programmable. The benefits of this approach can be illustrated e.g. by taking a closer look at peer-to-peer (P2P) tools as programmable media producing similar effects (e.g. in the handling of military-related material) to digital games.

A sample query in the popular tool *Emule*, which allows users to open folders on their computer for others to download from, demonstrates the abundant availability of military-related documents, most prominently combat and leadership training manuals as well as historical overviews. The often rigid nomenclature rules, including e.g. numbering titles in a series, hint at collecting practices as one result of the technical infrastructure provided by *Emule*. Apart from the aforementioned 'encyclopedic' genre of textbooks, other media genres, like e.g. dioramas and military models, as well as instruction manuals for constructing dioramas, are offered and di-

verse historical periods covered (from Roman antiquity to the Second World War). The frequent sharing of instructions on how to build military dioramas suggests an increasing network integration of hitherto isolated practices like building and painting military models comparable to developments in user-generated programmable media content, like the collective authoring of digital game modifications (MODs) that will be covered in more detail later on.

Since the users' file lists and profile data are made available to other users, P2P usage must be considered as at least potentially a social activity where e.g. a user's file repository constitutes a powerful element of identity politics and social distinction; other *Emule* functions, such as the chat options, 'preferred source' lists etc., support this claim. In this constellation, collecting military-related material can be interpreted as pre-structured by quasi-ludic principles embedded in the software tools as programmable media.

One quasi-ludic element is the momentum of encyclopedic completeness implied in the regular and differentiated file nomenclature and consecutive numbering reminiscent of popular video game structures, most prominently the *Pokemon* franchise and derivative games. The example of *Emule* and P2P tools, while pointing at an often overlooked arena of brokering military-related information, can be plausibly approached by using the 'implied interactivity' hypothesis, even though, for want of empirical data and a long-term perspective, its historiographical implications can only be touched upon as part of the overall topic. One such implication is a divisible and positivist notion of history as a not necessarily linear, but discretely segmentable, compound of phases produced by the contingencies of serialized file labeling and the need for discrete categories, whether they are precise periods of time, nationality or weapon types (cf. e.g. file names like "Roman Military Clothing 100BC-200AD").

Broadly read against the 'collective intelligence' mode of media usage proposed by Pierre Levy, (cf. Levy, 2001) both P2P tools and independent media production lead to a quasi-ludic 'reverse engineering' and collective 'mental simulation' of distributed knowledge about military simulations, both concepts which will be revisited and expanded later on, which can e.g. tentatively be seen in discussions on the public accessibility of genuine military game software and modifications. For instance, numerous documents were shared using *Emule* (at least at the time of writing this book) that address the assumed availability of the *Virtual Battle System 1* (VBS1) modification for the commercial game *Operation Flashpoint*, commissioned and used by the US Army.

Datenname	Größe	V...	T	Vollst...	Typ
How To Create Your Own Vbs1 (Virtual Battespace 1, Or Virtual Battlefield System 1 Eos).txt	1.70 KB	10	100%		Dokument
Vbs1 All - Addon.rar	506.05 MB	4	75%		Archive
VBS1_Infantry_Combat_Scenario_pack_v1.0(missions).zip	142.60 KB	3	100%		Archive
PC Game VBS1 - Virtual Battle Space (By Jhony).rar	1.02 GB	3	0%		Archive
CD-KEY VBS1.txt	3.73 KB	3	100%		Dokument
vbs1-dtn.cue	74 Bytes	3	100%		CD-Images
vbs1-dtn.ShareVirus.nfo	4.92 KB	3	100%		Dokument
CD-KEY VBS1.txt	55 Bytes	2	100%		Dokument
VBS1 All Addons [all .pbo files extracted from the .msi files].zip	507.06 MB	2	50%		Archive
cd key VBS1 virtual battle space.txt	28 Bytes	2	100%		Dokument
Vbs1 Defence Scenario Pack v1.0 (Missions).zip	260.19 KB	2	100%		Archive
VBS1_core_uncracked_US8key_needed HOW TO RUN.txt	468 Bytes	2	100%		Dokument
VBS1_Large_Assault_single_player_scenario_pack_v1.0(missions).zip	245.83 KB	2	100%		Archive
VBS1_hostage_rescue_scenario_pack_v1.0(missions).rar	46.00 KB	2	100%		Archive
vbs1-dtn.afv	766 Bytes	1	100%		
Vbs1 with crack and pass.txt	359 Bytes	1	100%		Dokument
VBS1_core_uncracked_US8key_needed HOW TO RUN 2.txt	474 Bytes	1	100%		Dokument
VBS1_Infantry_Combat_Scenario_update1_pack_v1.0.zip	58.18 KB	1	100%		Archive
VBS1 Working Version Tutorial (Without CryptoBox).txt	3.26 KB	1	100%		Dokument
How to get VBS1 working READ...doc	1.39 KB	1	100%		Dokument
Vbs1 All-Addon How To.txt	152 Bytes	1	100%		Dokument
vbs1-dtn.ShareVirus.cue	85 Bytes	1	100%		CD-Images
VBS1 Info READ & SHARE.txt	838 Bytes	1	100%		Dokument
VBS1 - core_crack_pack_by --S@y722--.rar	1.47 MB	1	100%		Archive
Ofc To Vbs1.rar	30.04 MB	1	0%		Archive

Illustration 2: Sample Query for VBS1 on Emule

One user clearly lists the respective technical differences between the off-the-shelf game and the military version, including the after-action review (AAR) function, an observer module for the instructor (similar to the freely maneuverable camera that many multi-user games played in E-Sports tournaments have consecutively taken up for broadcasting their game sessions more efficiently) and a slightly more detailed soldier model, which has, in the following, been independently re-created and published as “Infantry Model v2.0”. Thus, there is apparently an interest in making the ‘technological advancements’ and resources of the military MOD available as public domain modules. Furthermore, making the VBS1 available to the public can arguably be interpreted as a hacker’s ‘rite of passage’, indicated e.g. by the overall rhetoric and the multiplicity of proposed ways of getting the hacked game to work, something which would support the assumption of quasi-ludic principles as a pattern of Human-Computer Interaction (HCI). Yet another document shared through *Emule* alludes to a specific case of abusing the interest in VBS1 by substituting the desired file with a ‘camouflaged’ Hollywood movie rip, thereby prototypically replicating one of the foundational strategies of the information warfare paradigm, namely ‘disruption & destruction’ by inserting ‘faulty’ data into another information ecology to produce system-immanent dysfunction, something which will be elaborated upon in the fourth chapter. The file list generated by ssearching for VBS1-related files creates a contingent ‘historical’ snapshot or canon of how users exchange strategies to hack the software, share allegedly hacked files and source code or discuss whether the modifications made to the original game justify the efforts in the first place. In this instance, *Emule* is used as a communicative platform that is ‘programmable’, most basically by

enabling the recursive use of different search terms, and, as a 'historical' document, exhibits many features of the 'database logic' sketched by Lev Manovich in rarely encountered purity. At the same time, it technically enables and, thereby, encourages the 'interactive' distribution and repurposing of 'hermetic' digital data, like military textbooks, causing a shift from the formerly singular instances like *War against War* to common practices of collective media usage.

1.6 Towards an Integrative Model of Programmable Media Analysis

The key to understanding programmable media convergence at the military/civilian margin will be an integrative and flexible model of programmable technologies based on the examination of key technologies in an attempt to transfer the basic structures and patterns and apply them to other areas like social organization and technology transfer. Many texts written from a technology studies standpoint align themselves with one of the diametrically opposed 'determinist' vs. 'contextualist' camps. Technological determinism, often negatively connoted as naïve and positivist due to its origin and heyday in the late 19th century, identifies technological advances as the driving force behind historical processes. Inversely, contextualism and the 'social construction of technology' (SCOT) hypothesis, popularized e.g. by Lewis Mumford and, more recently, authors like Bruno Latour and Wiebke Bijker, focus on the socio-historical circumstances that shape technological development (a concise summary can be found in: Erik Baark, *Lightning Wires. The Telegraph and China's Technological Modernization, 1860-1890* Westport, CT: Greenwood Press, 1997: 7-9) For instance, Mumford argues that the development of bow and arrows by the Paleolithic man was first obscured by an over-reliance on stone tools and their implicit cultural functions, which drew attention away from technological advances in the use of wood and cords. (Mumford, 1977: 138) He points out that this weapon was the "first real machine" and exhibited in its makers a "remarkable capacity for abstract thinking"; actually, not only does the design of a bow and arrow require abstract thought but, as McLuhan highlights and as will be elaborated in the fourth chapter, it also fosters the development of these mental capacities. This extension of the initial assumption, which Mumford himself does not explicitly make, could be supported by another observation concerning the bow he describes: the use of a hunting bow as part of an archaic stringed instrument used to produce music. (139) In his account, technological and artistic "advances" occurred in paral-

lel without any implied hierarchical order. The ambivalence of being both a weapon and a tool of cultural production, characteristic of the bow, can still be found, to an even more extreme extent, in current programmable media systems, an instance of convergence which is often overlooked due to the incompatibility of artistic and military discourses. Later, Mumford hints at other instances of inspiration in "art and sexuality" (148) derived from weapon development. Although it might appear as an 'easy way out', I would argue against the mutual exclusivity of technological determinism vs. contextualism. Baark points out that contextualist approaches tend to dwell on the "micro-level of society", i.e. on the set of values and cultural imaginary that constrain the development of technologies at laboratory-level at a very early stage. Thus, by differentiating the level of analysis and occasionally overlaying multiple examples and readings, both approaches can and will be utilized in this book as 'mainsprings' or 'algorithms' that continually readjust the emergent perspective on programmable media and, ideally, keep it dynamic.

Methodologically, an attempt to delineate an integrative model of programmable media analysis should take into account earlier media theories which directly work with the respective technological setup, such as Michel Chion drawing on the formal contingencies of filmmaking and the motif of the constantly unwinding projector in his writings on sound and music in film. Due to the structure of scholarly discourse, Chion's simple but fundamental observations, such as the fact that the advent of sound films inherently necessitated the stabilization of projection speed (cf. Chion, 1994: 16/17), are often overlooked due to their technical and de-mystifying argumentation, but they nevertheless profoundly shaped the formal conventions of the medium and are immediately transferable to programmable applications, as will be exemplified below in e.g. considering the shift towards game engine design and reusable components. Similarly, Genette in his *Paratexts: Thresholds of Interpretation* departs from a close reading of production technologies and technological constraints on the formal spectrum of print media, pointing to aspects like typesetting, cover design and even the material properties of paper in books. Even though Genette focuses primarily on deliberate design choices such as e.g. the layout of a poem on a page, this approach is more useful for an integrative model of programmable media than many texts discussing digital games specifically. Consequently, the operative vocabulary Genette introduced, like the distinction between peritext and epitext based on the 'distance' to the main text, is much more 'compatible' and 'transcodable' (to revitalize programming terminology), i.e. designed as a 'tool', when applied to more recent technologies than many scholarly texts focusing on more recent media phenomena. There-

fore, rather than covering as many available studies on digital games as possible, the argument presented in this book will draw mainly from a critical re-reading of established theorists like Marshall McLuhan and Benedict Anderson by substituting the respective paradigmatic media genres (like e.g. the map and the museum in Benedict Anderson's writing) with programmable technologies, but especially from the close-reading of technical documents, military publications and also scholarly contributions as primary sources.

The main field of reference will be the level of program code, which, in the context of game studies, has been discussed with slightly increasing enthusiasm in recent years. In media studies, program code has an even longer history as an explanatory variable and object of study. This book, however, will occupy a middle ground between code in its concrete, hermeneutically unintelligible form (e.g. Montfort, 2006) and code as a highly abstract concept (cf. e.g. Hagen, W. "Der Stil der Sourcen. Anmerkungen zur Theorie und Geschichte der Programmiersprachen" M. Warnke, W. Coy und G. C. Tholen (Eds.) *HyperKult* Basel: Stroemfeld/nexus 1997: 33-68 or Winkler, H. "Das Modell. Diskurse, Aufschreibesysteme, Technik, Monumente - Entwurf für eine Theorie kultureller Kontinuierung" Pompe, H.; Scholz, L. (Eds.) *Archivprozesse. Die Kommunikation der Aufbewahrung* Köln 2002: 312) by focusing both on principles imposed by computability and on manifestations of code in actual production processes, i.e. modular design, game engines and elements of programming styles.

Applying the model of programmable media to military strategy and self-assertion in the Middle-East since the early 1990s, I will attempt to explore the opportunities of understanding programmable systems as role models for policy-making and identification. The image of digital game or simulation users as becoming 'part' of the technical system has been a consensual aspect in most accounts of digital games to date, but was seldom systematically elaborated upon. For instance, Claus Pias inverts the common subject/object relation of man and technology, claiming that the hardware and software "design the player after their counterpart [Ebenbild]", (cf. Pias, *ComputerSpielWelten*: 5/6) an idea which is encompassed in terms like 'usability', which already imply the player as "a second program" whose "output" is "requested" by the game. Pias already maps digital game genres onto the originally technical procedures they semanticize, e.g. generating time-critical selection chains (action games), retracing links in a database (adventure games) or optimizing a configuration of given values (strategy games). To interpret instances of programmable media convergence along the military/civilian boundary, I will extrapolate from this notion and con-

sider concrete effects, like the spread of 'program code literacy' in the following chapters.

1.7 Technical Preliminaries

Since the book at hand is intended to cover a wide range of sources, many of them only available online, such as military online periodicals, technical documents on programmable media development and forum excerpts, all relevant texts have been converted into PDF format using the freely available tool *FreePDF XP* and archived for future reference. Due to the constraints of working with texts that do not have a consistent pagination due to their web-based origin, the respective pages from the PDF version have been indicated; they should be reproducible using the same tool, or at least give a sufficiently precise orientation.

The bibliography lists only works that have been repeatedly used or are otherwise especially relevant to the topic at hand; similarly, the lists of other source types like designer diaries, news items and military publications include only the most relevant texts for reasons of clarity. All other sources are given with complete bibliographical details within the main text when necessary. Finally, all translations of quotes are provided by the author and occasionally, to preserve and point out selectively the specificities of German as opposed to Anglophone discourse, both versions are given.