The benefits and limits of computerization in conflict simulation

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Abstract

Computing is not the only way to model and simulate humanities problems. In the specific field of conflict simulation, there is a long and continuing tradition of using manual modelling techniques such as maps and counters to create playable games which mirror some of the dynamics of real armed conflicts. Computer games are not automatically superior to such manual models, since mass market commercial software focuses far more on entertainment than on realistic simulation, and since the enormous capabilities of computers tend to encourage detailed incorporation of quantifiable technicalities at the expense of the vital but much less tractable human element. The biggest limitation of computer models is their limited transparency and design accessibility for non-programmers such as humanities students and scholars. Manual modelling offers a valuable 'bridge' between computing and traditional humanities scholarship, allowing easier generation and use of specifically tailored models, and building synergistic relationships which foster more widespread and effective adoption of digital techniques.

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A key concern of digital humanities scholars is to define and articulate what methodological advantages computing may bring to the understanding of problems in the humanities as opposed to the natural sciences. My KCL colleague Willard McCarty has written eloquently on this issue, and he has made the very important point that techniques such as 'modelling' and 'simulation' are not limited to the specific field of computing, but have a much broader history and application within intellectual endeavour as a whole (McCarty, 2002, 2004). My colleagues Matthew Kirschenbaum, Patrick Juola, and I built on this important truth that modelling and computing are not necessarily synonymous when we presented a panel at DH 2010 on 'Wargames in a Digital Age', drawing on our specific expertise in the field of conflict simulation. In this short article, I endeavour to show with reference to this particular case study that computing has limits as well as benefits as a modelling medium, and that a better understanding of these advantages and disadvantages may help digital humanities scholars to develop even more effective methodological synergies in the future.

Ever since the development of *Kriegsspiel* nearly two centuries ago, military professionals and enthusiasts have used simulation and gaming techniques to model real military conflicts (Allen, 1987; Perla, 1990; Dunnigan, 1992). This phenomenon builds on the theoretical similarity between war and games, in that both are dialectical strategic contests between opposing wills, each struggling to prevail (Huizinga, 1970, ch. 5; Cornell and Allen, 2002). Hence, Clausewitz said that 'In the whole range of human activities, war most closely resembles a game of cards' (von Clausewitz, 1976, p. 86). There are now many thousands of published wargames, covering almost every historical conflict.[1]

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The growing potential of computers has naturally transformed the field of conflict simulation. Military training now employs networked computer arrays running real-time first person models of entire conflict environments, and tens of millions of enthusiasts use similar first person simulations of air combat, ground fighting and the like (Halter, 2006; Smith, 2009). The similarity between the genres has become so great that virtually the same games are often employed by military professionals and civilian enthusiasts, as with the commercial game *Armed Assault* (Bohemia Interactive, 2007), whose military variant *VBS2* is widely used as a training aid and has even been released back to the public by the UK Ministry of Defence as a recruitment device![2] However, what is interesting is the persistence of traditional manual simulation techniques alongside this computerized mainstream. Just as military forces continue to use real field exercises, so many enthusiasts continue to employ pre-computer age techniques such as physical maps and counters in their modelling of conflict. Indeed, such 'manual' wargames are now being published at a faster rate than ever before (albeit in smaller print runs), and there are still far more manual than computer wargames in existence (Palmer, 1977).[3]

I have been playing and designing conflict simulations for over three decades, and I use both manual and computerized versions routinely as instructional aids and research tools in the War Studies Department at KCL, including through an MA course in which students design their own manual simulations of conflicts of their choice (Sabin, 2007; Mills and Sabin, 2008).[4] This gives me a powerful insight into the benefits and limits of computerization in conflict simulation, especially from a scholarly perspective. My forthcoming book *Simulating War* focuses heavily on manual simulation techniques despite the ongoing computer revolution (Sabin, 2011), and an examination of the reasons for this yields some important lessons for digital humanities scholars seeking to build closer links with non-scientists for mutual academic benefit.

It is easy to see why video games like Activision's *Call of Duty* series sell tens of millions of copies, while manual wargames now sell only a few thousand (Ahmed, 2010).[5] Manual wargames have always been complex, lengthy, and cerebral affairs, whereas video gamers hardly even need to read any rules before jumping into the vivid 3D world to control their own personal 'avatar', just as if they are stepping into a war movie. The downside of this mass market appeal is that computer and console wargames are big budget commercial products in which simulation usually comes a very poor second to entertainment value (exactly as in the film industry). The great majority of 'first person shooters' and 'real time strategy' games sacrifice realism to enjoyment in a way which makes them useless as serious models of warfare. Only a small minority of commercial computer wargames are true simulations, and since such games will only run on the latest hardware and soon become unplayable as operating systems evolve, the number of useable and worthwhile computer wargames is dwarfed by the ever-growing corpus of manual games which has accumulated over the past five decades.

The relative advantages of manual and computer simulation vary greatly depending on the type of conflict being modelled and the perspective which users are intended to adopt. Broadly speaking, the more fast-moving and physically calculable the conflict environment, and the more that users are intended to experience the perspective of a single real individual, the more that computers have to offer. Hence, although it is possible to simulate aerial dogfights using maps, counters, and dozens of pages of highly complex and time-consuming rules (Webster, 1995), the fast-paced 3D manoeuvres are obviously much better captured by real-time computer simulations from the perspective of the individual cockpits, and this is exactly what I use in my own teaching about air combat. Even when simulations are intended to model entire battles, computers can employ AI routines to mimic the limited perspectives of an individual commander, by masking the full picture and imposing realistic command delays in a way which manual simulations find harder because their users must run the whole system rather than just playing individual roles within it.[6]

The trouble with computers is that their unparalleled number-crunching abilities tend to encourage the belief that accurate simulation is primarily a matter of adding more and more parameters and increasingly detailed data (Grigsby *et al.*, 2003; Lead Pursuit, 2005). Manual simulation designers, in contrast, must perforce focus on identifying and modelling only the really significant dynamics in that particular conflict, since their games would otherwise be completely unplayable. In a humanities field such as war studies, these key dynamics are often human rather than technical, and so are precisely the aspects which modellers find it hardest to quantify (Sabin, 2007). Manual wargame designers are used to having to settle for an output-based, top-down design approach which gives only an impressionistic flavour of the overall observed reality, whereas computers seem to offer the enticing possibility of more input-based, bottom-up techniques in which the individual components of a situation can be modelled in such detail that outcomes emerge objectively from first principles rather than through mere subjective depiction of real experience. Not only does this Holy Grail of 'scientific' objectivity tend to encourage unwieldy levels of detail and complexity, as in the ongoing agent-based modelling of Byzantine logistics which can only be run using distributed simulation across a network of computers (Haldon *et al.*, 2010), but it also tends to focus the modelling on quantifiable technicalities at the expense of the often more significant human element.

Modern first person computer simulations of infantry combat or aerial dogfights illustrate the potential problems very well. Despite highly precise and detailed modelling of equipment characteristics, weapons effects, and terrain, such computer simulations consistently tend to produce grossly ahistorical mutual casualty rates, because the individual combatants (whether controlled by AI or by real humans at networked terminals) behave far more boldly than they would if the bullets were real. Well over half the computer 'sorties' which my students play to get a feel for how air combat dynamics changed over time end with them being shot down in flames. Manual simulations find it much easier to model the suppressive effect of fire, by simply prohibiting users from moving or firing with troops who are pinned down in this way (Barker, 1988; Sabin 2011, ch. 11). Since it is very common indeed for conflicts to be affected at least as much by such psychological dynamics as by more calculable physical parameters, manual simulations can often identify and capture the 'big picture' at least as effectively as do more detailed and visually striking computer models (Sabin, 2007). Willard McCarty put it very well when he wrote that, 'a model is by nature a simplified and therefore fictional or idealized representation, often taking quite a rough-and-ready form: hence the term ''tinker toy'' model from physics, accurately suggesting play, relative crudity, and heuristic purpose' (McCarty, 2004, p. 255).

A further key consideration is that 'accessibility' in the simulation field is a complex and double-edged concept. Computer simulations tend to be more accessible to users, but harder to programme and design, so they are best suited to expert-led situations in which a few highly capable individuals devote considerable effort to creating a model which can be learnt and used 'as is' by masses of less-qualified people. Manual simulations, in contrast, tend to be less accessible to users because they need to master lengthy rules to be able to operate the model at all, but in the process the users are required to engage much more directly with the designer's ideas and assumptions, and it is a short step from being able to play a manual simulation to being able to tweak the rules or even to design entirely new systems to give a better reflection of one's own understanding of the underlying military reality (Dunnigan, 1992; Sabin, 2011). Hence, manual simulations are much more accessible from a design perspective, since one does not need to be a computer programmer to create new systems, and since using other people's systems conveys a much better understanding of design techniques. The manual simulation system in my last book prompted flourishing online discussions which now amount to well over twice as many words as there are in the book itself (Sabin, 2007).[7]

Many recent computer simulations have sought to soften their expert-led character by incorporating provision for simple modification and scenario

generation by users themselves (Koger, 2006). However, this flexibility rarely extends to changing the fundamental systems, and it is actually manual simulation design which has become radically more accessible and democratized in the computer age, thanks to the ease with which individuals can now design full colour maps and counters and sell or give away digital copies of their rules and graphics online without any physical production or distribution costs.[8] Since I believe that designing simulations for oneself is a far better way of gaining insight into the dynamics of a real conflict than is simply playing someone else's computer game on that subject, I see the much greater design accessibility of manual simulations as a major reason for their continued production and relevance, with computer graphics and online distribution playing a key role, but without the rules themselves having to be coded into computer software.

For educational purposes, it is vital to have design flexibility and not to be limited to commercial products, because published manual and computer wargames alike are generally far too complex and lengthy to be used by students in a class context (Garris *et al.*, 2002; Crookall and Thorngate, 2009). Niall Ferguson has advocated the use of commercial computer games for history teaching,[9] but I have found specifically tailored manual designs to be equally effective, and grouping students around tables with large-scale physical maps and counters works at least as well as using data projectors or multiple monitors (Hays, 2005). I now run nine different manual wargames per year across my various classes, on topics ranging from the Second Punic War to the Eastern Front in World War Two, and all using simple games which I have designed myself for this purpose (Salen and Zimmerman, 2004; Sabin, 2011). As I write these words, I am preparing later today to run three simultaneous refights of the battle of the Korsun Pocket in 1944 with my thirty BA students. Neither I nor my MA students would be remotely capable of generating such designs in a fully computerized format, so the manual approach offers key benefits by making simulation design directly accessible to those in the humanities and social sciences (Moizer *et al.*, 2009).

The central message of this article is that 'simulation' and even 'digitization' are not necessarily synonymous with 'computerization', as so many today seem to believe. Military professionals and enthusiasts have been producing 'digitized' mathematical models of conflict since long before the computer age, and such manual simulations continue to survive alongside their computerized counterparts. The biggest challenge they face is that computer simulations now have much greater mass market appeal and a much more professional image within defence and academia. However, without the broad design accessibility and top-down focus of manual simulation design, computerized conflict simulation risks becoming an unduly arcane and detail-obsessed science. I have even been commissioned to run a full day of manual wargames for senior British officers this May, so as to develop their ability to design and run such simple tailored simulations for themselves for training and planning purposes. Manual and computer simulations of conflict will hence remain complementary endeavours for many years to come.

So what does all this mean for scholars of digital humanities? I think the key implication is the need for balance. Computers are just one tool (albeit a tremendously powerful one) with which the overall methodologies of modelling and simulation may be pursued. Their number-crunching and visualization capabilities are unparalleled, but software design often appears intimidating and inaccessible to non-programmers, who may therefore eschew ideas of modelling altogether and take refuge in the traditional qualitative and verbally based methodologies of humanities teaching and research. Manual modelling offers a potentially valuable bridge, which can allow humanities academics to develop their own modelling concepts while also weaning programmers and non-programmers alike away from the double-edged temptation to seek progress through ever more complex and comprehensive data inputs. It provides a *lingua franca* which all parties (with a little effort) should be able to comprehend fully, rather than just take on trust. By helping to foster truly collaborative rather than merely mutually

dependent intellectual relationships, manual modelling may pave the way for more widespread and routine integration of computing capabilities into humanities teaching and research, thereby yielding the best of both worlds.

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Notes

1 See the listings under 'wargames by period/subject' at http://www.grognard.com (accessed 28 February 2011).

2 http://community.bistudio.com/wiki/Virtual_Battlespace:_JCOVE_Light (accessed 30 March 2011).

3 The flood of new manual designs is evident from http://www.consimworld.com (accessed 28 February 2011) and from the new magazine *Battles*, available from http://www.battlesmagazine.com (accessed 30 March 11). Computer wargames are covered at http://www.wargamer.com (accessed 28 February 2011).

4 Digital copies of over forty of the past student projects are available for free download from http://www.kcl.ac.uk/sspp/departments/warstudies/people/professors/sabin/consim.aspx (accessed 30 March 2011).

5 http://www.callofduty.com (accessed 28 February 2011).

6 World War Two computer wargames using these capabilities to good effect are available from http://www.panthergames.com (accessed 28 February 2011).
7 http://groups.yahoo.com/group/lostbattles/ (accessed 30 March 2011).
8 'Print and play' digital copies of manual games may be bought from http://wargamedownloads.com (accessed 30 March 2011).
9 See the 'Making History in the News' section at http://making-history.com (accessed 30 March 2011) for details of Ferguson's close involvement with this strategy game.