Difference between Qualitative and Quantitative Analysis

Another way to think of military simulations (or war gaming) is as a methodology or process, leading to a more disciplined analysis. I like to think of it as a quantitative process or methodology as opposed to a qualitative, or equally dangerous, a partially qualitative methodology. I use the term dangerous because when the latter is coupled with a political agenda or bias, it is usually useless and misleading as a study of the historical event. Of course there are many valuable qualitative documents with objective views, but one has to find (and validate) them.

In the qualitative process, an author is able to substitute numbers with adjectives, ignore whole areas of unsupporting data, and draw 'conclusions' that are firmly stated with no real proof or even analysis behind them. The adjectives and phrases used may include: "many tanks destroyed", "heavy casualties", "stiff resistance", "decisive victory", and "overwhelming odds", to quote some of my favourites. Unfortunately "many tanks" can be 3 to 300, and the others could mean almost anything. The author is allowed to get away with sloppy research and even sloppier thinking. The result is often ambiguous at best and outright propaganda at worst.

The partially qualitative process or document is even more potentially dangerous. In this case the qualitative analysis is usually presented with carefully selected quantitative data in the form of statistics, to support it. The analysis is presented as a quantitative analysis based on a historical research, but in fact this is an illusion. This is the classic example of "there are lies, damn lies and statistics", and is why most people are wary of statistics. The most common technique in relation to WWII statistics is to use them out of context, because it is usually difficult and self defeating to manipulate the figures directly (except for most Soviet era accounts, but then the Soviets had their own set of post-war rules). In other words, it is <u>what is left out</u> of the quantitative data that is important.

For example, one side's loss figures for a particular battle or campaign are not very informative (and often misleading) unless contextual statistics are included such as: overall strengths for both sides, enemy losses, and the time period being considered. A partially qualitative statement about a military campaign may include "force x suffered huge casualties in this period, over 100 000 in one year alone". Thus 100 000 casualties sounds unbearable in this context (i.e. a possible defeat for force x). However if force x had an average strength of 1 000 000 personnel over the year, only 10 000 of force x's casualties actually died, force y (the opposing force) had an average strength of 2 000 000 personnel over the year, and force y suffered 500 000 casualties, then the context and reader's perception of the campaign are very different. In proper context we find that force x's casualties represented only around 10% of the forces present over a whole year, only 1% of personnel present suffered fatal injuries, and 5 times as many casualties were inflicted on an enemy who had an average 2 to 1 numerical superiority (i.e. a possible victory for force x, and almost certainly a much higher Relative Overall Combat Proficiency (ROCP)).[1]

Leaving out pertinent statistics also allows the author the 'defence' that he or she was unaware of the 'new' data. My favourite description relating to such documents, books and films is "they are full of what's not in them". An author can present a detailed analysis of one aspect of the campaign with selected supporting data, and simultaneously treat another equally or even more important aspect of the campaign with a purely qualitative analysis. Apart from the occasional digression to discuss some 'selected hard facts', the partially qualitative process allows the same level of descriptive language and fanciful thinking. The vast majority of books written about WWI and WWII are fundamentally a qualitative analysis or partially qualitative analysis of the events in question. The skill of the reader is to sift any 'gold' out of the analysis, if there is any, usually by validating the data with as many other sources as possible.

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[1] Refer to Part III – for details on Relative Overall Combat Proficiency (ROCP).

It is far more uncommon to find a true quantitative analysis with a political agenda or bias because the author needs a lot more skill to present the data in the form which will support their argument, without simultaneously giving the reader the 'ammunition' to present an alternative argument. This is in essence the start of a true quantitative analysis and the war gaming process. Obviously our ideal is the quantitative analysis which makes a genuine effort to use accurate historical data to draw realistic and reasonable conclusions.

The first and most important step in any historical simulation is therefore the research, analysis and organization of the data involved. The architect of the simulation must attempt to at least start a genuine quantitative analysis. The data will then serve as the foundation of the simulation model. The quantitative analysis of this information is no small feat and for Operation Barbarossa, the largest military campaign in history, there will always be gaps and the analysis will never end.

The following are the main reasons why using a historical simulation methodology leads to a more disciplined analytical process, and ultimately closer to a true quantitative analysis of any battle or campaign:

1. **The military simulation designer is forced to analyse aspects of the battle or campaign they may not wish to analyse for a variety of reasons.** These reasons may include: it is boring, not normally the main focus of their historical interest, too emotionally painful or doesn't fit their preconceived ideas. The historical simulation methodology requires as many aspects of the campaign to be simulated as practical because in many cases apparently obscure factors had a much greater impact on historical events, and command decisions, then readily apparent in a qualitative analysis.

   The rather dull, but vital, subject of battlefield logistics is very good example of a subject area most often inadequately addressed in the majority of current WWII history books. Almost invariably, battlefield logistics is cursorily treated and supposedly covered with phrases such as "force x was mostly dependent on horse drawn transport" or "force x had insufficient motor vehicles and relied on commandeered civilian vehicles". Such phrases are completely subjective and no effort is made to analyse in depth the true relative logistical situation for each of the belligerents. A historical simulation methodology requires an analysis of all aspects of battlefield logistics if at all practical, including: numbers and types of transport vehicles available (including horse, motor vehicle, air and rail), terrain, weather, the quality and quantity of transport infrastructure present (roads, rail, ports and airfields), total supply lift, effective supply radius and the type and number of combat units being supplied (i.e. supply demand, which varies tremendously for different types of combat unit).

2. **The military simulation designer is forced to attempt to quantify everything, whether it be a physical parameter like geography and weather, or a less tangible parameter like leadership or combat skill.** This is possibly the most powerful aspect of the historical simulation methodology. The simulation architect is simply not allowed to ignore, guess, or use careless thinking on any aspect of the simulation. This is because the simulation represents the real world and real issues, and will ultimately be tested against real world results.

   For example, it's no good estimating combat proficiency or skill based on the 'knowledge' that your country produced brave soldiers. Bravery and motivation did not automatically translate into higher Relative Overall Combat Proficiency (ROCP). The questions raised include: How effective were the command, control and communication systems? How well did different land and air combat units cooperate together at the tactical and operational level? How thorough was the training, especially for officers and NCOs? What was the prevailing culture and what were the reasons for going to war (motivation)? What was the kill-loss ratio achieved in combat? These questions then raise other questions which the simulation designer may not have even initially thought of. In the end the designer has to put a value on all these

parameters, and justify them. Of course it is impossible to answer every question with a suitable answer, but if all assumptions are stated, the designer exposes the weakness and strength of their arguments for others to use, agree with or change.

3. **The military simulation designer is forced to repeat the process (above) for all sides.** In other words, an analysis is never formulated in a 'vacuum', and is always considered relative to the other side and the time period in question.

   This is one of my pet hates in the qualitative analysis. Authors will often repeatedly elaborate on an aspect of one side which resulted in a weaker performance, when the only thing that really matters is: what was the magnitude of the aspect relative to the other side at the time? One of the most glaring examples of this, in many accounts of Operation Barbarossa, is the debate on logistics. There are endless diatribes about the poor logistical support in the German Army compared to the Western Allied Armies, their dependence on horse transport, and the apparent effect on the campaign in the East. If any quantitative analysis is involved, it usually focuses entirely on the number of horses and trucks involved in the invading Wehrmacht forces. Yet the only number that really matters is the Wehrmacht's Supply Distribution Efficiency (SDE) relative to the Soviet SDE in 1941, and not relative to the fully motorised US and British Armies that landed in France in 1944, or the armies of today. Most current works on Operation Barbarossa (especially those highlighting the invading force's logistical weaknesses) completely ignore the Red Army's Supply Distribution Efficiency in 1941.

4. **The military simulation designer has a means of calibrating and testing the analysis.**

   As stated above, the simulation accuracy can be tested against real world historical results. Ideally the simulation represents a snapshot of a historical place and time, with the physical and cultural world simulated. If all key decisions are the same, then a valid simulation's outcome will probably follow the historical result. The stress here is 'probably' because no two complex events will be exactly the same and there were many examples of incredible combat results which were not predictable. However the larger the simulation, the longer the timeline and the more times the simulation is run, then the closer the results will get to the actual historical outcome. If the simulation has significant unrealistic parameters then the consistent deviation from historical results is usually soon observed. No one can say any book or film can be 'calibrated' for realism.

5. **The military simulation designer, or end user, can easily improve the simulation**.

   If the end user disagrees with any aspects of the designer's (or author's) quantitative analysis, or additional or new historical data becomes available, he or she can improve and build on the simulation. The methodology adopted above makes this relatively easy because the simulation designer has had to quantify each parameter, and had to justify the assumptions and conclusions made about each parameter. In effect, the simulation designer has already initiated debate by exposing many of the weaknesses in the simulation to possible alternative arguments.