

In August 2017 the TIK Channel on YouTube posted a video presentation with the title 'The Numbers Say it All: The Myth of German Superiority on the WW2 Eastern Front'. A few people have asked me what I thought of the video because I have done some work on calculating the Soviet and Axis ROCPs (Relative Overall Combat Proficiency) on the Eastern Front during WWII. The research and work for this is continuing, and it is intended that the results of this will eventually be published in Volume V of 'Operation Barbarossa: the Complete Organisational and Statistical Analysis'.

The premise of the video is essentially that the common perception of the German/Soviet loss ratios has been exaggerated, as well as the overall Soviet numerical superiority during the war. In essence, this means the Wehrmacht was not actually that superior in terms of overall combat performance, and the numerical odds against them were 'never really that bad'. The evidence presented in the video relies on two tables from two books, namely 'The Price of Victory' and 'When Titans Clashed', and to a lesser degree, on selected data from a third book, namely 'Enduring The Whirlwind'.

Overall, the video made some good points. However, on its own it definitely gives the average person (who may have a cursory, or no significant, knowledge of the War on the Eastern Front) the completely wrong impression. This conclusion was only reinforced after studying the three books in their entirety (as I have copies of all the references used in this video). The following essay encompasses my thoughts on why I don't agree with the video's statistics, or the premise they are meant to support. I believe the main premise of the video is wrong at the most fundamental levels, and that the common (historical) perception of the Eastern Front during WWII is probably, after all, closer to being 'right' than 'wrong'.

The essay first examines the sources, and then the actual statistics shown are reviewed. The last section, and perhaps the most interesting, is why the presenter shows a complete lack of understanding of what it actually means to be outnumbered (by even 2 to 1) in a modern war and where both sides have very similar levels of technology.

Why the presentation 'The Numbers Say it All: The Myth of German Superiority on the WW2 Eastern Front' is misleading, examples of the selected and hence misleading statistics, and why some of the rational used is ill-founded.

This video presentation is based almost entirely on selected tables and data from three sources (books). Therefore we need to know a bit more about these sources and how reliable they are. The following is a brief description of these 'sources', including some of their key (and very important) limitations.

The Price of Victory, The Red Army's Casualties in the Great Patriotic War, by Lev Lopukhovsky and Boris Kavalarchik, 2017. (Table 15 on page 133 used). This recent book's primary focus is to correct the 'mistakes' (deliberate or/and otherwise) in the well-known Krivosheev work on Soviet WWII casualties (see below on this work). It also seeks to 'correct' the totally ridiculous irrecoverable Soviet/Axis Loss ratios presented in the Krivosheev work. As far the Soviet irrecoverable losses (killed, missing and POWs) are concerned, it is an excellent book and extremely well researched with many sources used.

However, that is where it stops. This whole work only focuses on irrecoverable losses (killed, missing, POWs); it totally ignores all wounded and other casualty types. There is absolutely no mention, anywhere, of the millions of Soviet wounded, etc, during WWII. How can a book with this

title not mention the approximately 18,319,700 wounded and sick on the East front in WWII?! (data from Krivosheev). A huge number were permanently disabled with lost limbs and other massive injuries. Although called 'recoverable losses', a great many (well over a third) were not 'recoverable' in any military sense. This completely suits the Soviet side/agenda in this debate (as we will see below).

Even worse, the Germans side's data relies entirely on one source; namely Overmans statistical survey (see below) on Wehrmacht casualties, and absolutely no effort is used to ratify the figures used in this very controversial and problematical work. Likewise, their treatment of the Axis allied casualties is totally cursory and at a high level, with very few references shown. Ironically, Lopukhovskiy and Kavalerchik are guilty of the very crime they accuse Krivosheev of: namely treating a single source as sacrosanct, and without any proper debate or cross checking of the casualty figures quoted (in this case on the German/Axis side).

When Titans Clashed, How the Red Army Stopped Hitler, by David Glantz, 2010. (Table N, pages 383 to 389 used). This well-known work is a very good overall history of the East Front, but told very much from the Soviet perspective (as are many of Glantz's books, but this one in particular). I would even go as far as to say, this work, which I have thoroughly studied, is mostly biased in the Soviet's favour (unlike many of Glantz's later and better works). It is now quite old, first published in 1995, with this new edition in 2010. The new edition has some updated data (mainly adding Operation Mars), but still relies almost exclusively on Krivosheev's work to supply key information like the 'Front Strengths' as used in Table N, as well as casualties. It still fails to consider major battles/campaigns such as Operation Bustard Hunt (*Trappenjagd*) (over 200,000 Soviet casualties) and the Battle for Belorussia from Oct. 43 to April 1944 (around 700,000 Soviet casualties).

Nevertheless, if there was one general-history book to read on WWII's East front from the Soviet perspective, than I would recommend this one. Glantz uses Krivosheev data for Soviet figures and German archival data for German figures (from the German Federal Archives (Bundesarchiv (BA))). Glantz does not use the data from Overmans study (see below) on German casualties (very few historians do, as there are major problems with this work). Also, Glantz does not use Overmans data in his many more detailed works on the Soviet campaigns on WWII.

Enduring The Whirlwind, The German Army and the Russo-German War 1941-1943, by Gregory Liedtke, 2016. This new book's focus is generally on the German Army's condition (replacements, etc.) in the period in question. It focusses well on the specific question, but it is really a specialised work with a lot specialised strength and smaller unit replacement data presented. The data that is presented is well reached and referenced, and accurate as far as I can see.

However, I personally found the book difficult to 'digest' in that it difficult to see where the author is going. His basic premise is fine, and I generally agreed with this (namely the German Army was not inevitably worn down, or fatally weakened by its casualties in 1941-43). However, he is not convincing enough because he does not present overall data (across the whole theatre) on German casualties and replacements, so it is impossible for the reader to gauge the German Army's overall condition across the front at any point in time. The text also often descends into a sort of general history of the war; it even uses some maps taken directly from some of Glantz's works. There is little to no discussion of German supply logistics at critical points in time, a critical element missing from the book (and which would have made it really useful). Like Glantz, Liedtke uses Krivosheev data for Soviet figures and German archival data for German figures (many obtained via the published 'German and the Second World War Series', by the German Research Institute for Military history in

Potsdam). Importantly, Liedtke does not use the data from Overmans study on German casualties (also like Glantz, and also like the German Research Institute for Military History in Potsdam).

There are two more key ‘players’ here, which the reader needs to be aware of (for background) and to get a full picture.

The Krivosheev Study. This groundbreaking study came from the first proper ‘official study’ of Soviet WWII casualties, sanctioned by the Russian government in the early 1990s. It was completed by a team of authors from the Russian General Staff and led by Colonel General Grigori Krivosheev. It went into great detail on casualties of all types (killed, wounded, missing, POW, sick, etc), casualties by operation, and front strengths at the beginning of particular operations. It was translated into English and published as ‘Soviet casualties and Combat losses in the Twentieth Century’, and published as a book in 1997 (Greenhill Books). Minor revisions have been published (in Russian) in 2001 and 2010. The Krivosheev study is referenced extensively by all the above books, and is where all the above Soviet strength and casualty data comes from.

For many years it was apparent that much of the data was flawed, especially the chronic underestimation of the 1941 casualties. However, historians were grateful that any such massive work existed, and were prepared to turn a blind eye to the ‘mistakes’ in such a massive undertaking. Unfortunately, after the 2010 edition failed to correct these obvious mistakes (and even compounded the already terrible ‘chapter’ on German lose figures), it was now obvious the Krivosheev work was generally minimizing their own losses and maximizing the enemy’s.

This is where Lopukhovsky and Kavalerchik stepped in with their ‘The Price of Victory’ book. They bravely, systematically and professionally ‘corrected’ the ‘mistakes’, increased the Soviet irrecoverable losses by 3,102,500 personnel (for the whole war) to 14,534,600, and totally destroyed the ridiculous Krivosheev chapter on German irrecoverable losses (even though no Western historian ever used this chapter anyway). Unfortunately, Lopukhovsky and Kavalerchik failed to discuss any other casualty types (i.e. the 18,319,700 wounded, etc), and used only one very dubious source for the German irrecoverable losses (Overmans study). If they had applied the same thoroughness to Soviet recoverable losses, and applied the same professionalism to the German (and German allied) irrecoverable losses (as they did to the Soviet ones), then the ‘The Price of Victory’ would have become a classic and extremely useful study.

The Overmans Study. In 2000, the German historian, Rudiger Overmans, published ‘Deutsche militärische Verluste im Zweiten Weltkrieg’ (German Military Casualties in the Second World War). This was independent of the very extensive OKW archival reports on casualties, currently residing in the German Federal Archives or Bundesarchiv (BArch).

There is also strong evidence that the entire Overmans study was commissioned for political reasons (it was completed in the mid-1990s) in order to demonstrate that Germany was, again, not hesitant about its role in WWII, and was not in any way attempting to minimise its losses and involvement. No doubt this was very admirable; but the study was not designed (or focused on) reviewing military casualties by operation or by type (for military history purposes), but much more on demographic distribution and overall theatre losses.

Unfortunately, there are many problems with using Overmans study to compare military casualties, which would in itself warrant a whole essay (so I cannot go into them all here). The first key point is that it is a statistical sample study and not a meticulous archival study. A sample (less than 10,000) was taken of the German military personnel records, and their fate and where this occurred were recorded. What was not recorded was cause of death (eg, died in combat or from pneumonia in a rear area) or if the death was associated with a particular Army, operation, or within a reasonably narrow time frame. It should be noted that there are over 18,000,000 individual records involved (the approximate number of total personnel mobilised for all paramilitary type organizations in the entire Reich in the entire war). Therefore the sample is statistically very small (around 0.05%) which is a huge problem in itself. Overmans maintains that there was a '99% confidence level' that the results were accurate based on the sample size, which is statistically (i.e. mathematically) completely baseless.

The second key point is that these irrecoverable losses include deaths from all organizations; including those not directly under Wehrmacht command and operating in deep rear areas. These include organizations like the police, OT, RAD, Volkssturm (militia), security/intelligence forces (even those operating against partisans, resistance fighters or enemy intelligence elements), etc. It also includes all Waffen SS casualties, which are usually listed separately in the OKW BA archival reports. Therefore the Overmans study is the maximum possible number killed, MIA or POW, and regardless of where they came from. It turns out that in many cases, this results in a gross exaggeration of 'front' losses. Critically, Overmans does not show estimated irrecoverable losses on each front over a particular time, as does Krivosheev. At best, it is really is a blunt instrument for showing the probable maximum overall losses in the war. Having said all this, the Overmans study is very good at establishing losses by demography and over long time periods (possibly for a strategic study of the whole war and its outcome). However, it should never be used for computing military casualties at the front due to combat operations, which is exactly what Lopukhovskiy and Kavalerchik have done in 'The Price of Victory'.

With the above in mind, let us now examine a few of the problems with the main statistical spreadsheets shown to support the presentation.

1. The irrecoverable losses comparison table used at the start of the presentation (taken from page 133 of the book: 'The Price of Victory').

PROBLEM 1 (and a massive problem / omission). The chart only focuses on irrecoverable losses as this totally suits the Soviet/Russian side's apparent agenda. Surely, if you want to compare the true relative combat performance (tactical or operational) then all types of casualties must be included, especially those wounded in combat. This is because: wounded are the direct result of enemy action (ordnance), the result of the enemy attempting to inflict the maximum possible casualties (their so called 'casualty inflicting efficiency'), and often 3-5 times higher than their irrecoverable losses (especially, and often, in an attacking force). Likewise, even those sick enough to be 'unfit for service' can be classified as operational casualties largely due to enemy action. How can wounded possibly be ignored in any discourse on this subject? The answer is that they can't.

To really hammer home this point, consider the following data from one of the most respected and reputable WWII historians in the world, namely Niklas Zetterling. Mr Zetterling is foremost in his meticulous research in the German archives (and widely acknowledged as such). He has a far more

formidable reputation than Overmans, and, in terms of archival research in the German archives, is comparable to Glantz's research into the Russian archives. In this case casualties include, killed, wounded, missing, POW, sick and unfit for service.

Year	German Losses	Soviet Losses	Ratio Sov: Ger Losses	Ratio Presented in video
1941	831,050	6,127,447*	7.37	12.2
1942	1,080,950	7,369,278	6.82	5.0
1943	1,601,445	7,857,503	4.91	3.3
1944	1,947,106	6,878,641	3.53	1.0

* Corrected by adding the additional 1,653,627 irrecoverable losses proven to have occurred in the Price of Victory study (i.e. the corrected Krivosheev figure). This data is as published in Normandy 1944, Niklas Zetterling 2000, with full footnote references (on page 91). The Soviet figures are from Krivosheev (with 1941's obvious errors corrected with the Price of Victory data), and the German figures are compiled from the Bundesarchiv records (eg, BA-MA RW 6/v. 552, BA-MA RW6/v. 553, BA/MA RH 2/1343, etc. and several other specified OKH and OKW reports). These German sources have far more credibility than Overmans study, and are essentially confirmed by many other very reputable authors and institutions; including Liedtke (who uses similar archival sources for his book) and the German Research Institute for Military History at Potsdam (in their definitive published Germany and the Second World War series).

Like all statistics, these need some qualification (unlike some, I qualify the statistics used if required, because they are statistics after all!).

Firstly, the German figures are for Army (Heer) only and exclude Luftwaffe, Kriegsmarine and Waffen SS casualties. For example, as quoted in the presentation, Liedtke (page 169) quotes 1,094,251 casualties in 1941, which is 263,201 above the above figure. This includes additional casualties in other branches of service, including the Waffen SS which sustained around 43,000 casualties (ref Vol IIB of my own work, page 348). Liedtke's figures comprise 167,354 killed, 34,514 missing/POW (i.e. 201,868 irrecoverable losses), 600,584 wounded and 291,799 sick (i.e. 892,383 recoverable losses, of which around two thirds returned to military service). Overall, the reader should therefore add around 980,000 German casualties over the course of the period above to correct for this.

Secondly, the Soviet figures are not corrected for NKVD casualties (as these were not administratively under the Red Army; similar to the Waffen SS and OKH) in the NKVD combat units. Soviet figures are also not corrected for the additional losses shown in the recent Price of Victory study (as per the table in the presentation, page 133). The reader should therefore add around 1,846,000 Soviet casualties over the course of the period above to correct for this (ca. 300,000 NKVD and, 683,884 in 1942, 612,571 in 1943, 249,709 in 1944).

Even if we add all these corrections to both sides, the numbers involved still do not significantly change the ratios shown in the above table, and are nowhere near the loss ratios shown in the presentation, especially the 1943 and 1944 ratios. Equally telling, is that that even if we substitute Overmans irrecoverable loss data on the BA archival irrecoverable loss data (i.e. assume Overmans figures are correct and accurate), by including wounded and other casualties the ratios are still very much in the German favour, and still nowhere near the loss ratios shown in the presentation. In other

words, any such comparisons, without considering all casualty types, is next to meaningless and actually quite useless in further studies (such as for analysing Relative Overall Combat Proficiencies (ROCPs)).

PROBLEM 2. In the table from the Price of Victory, the German Allies are treated (mathematically) as though they were exactly like German Wehrmacht and Waffen SS soldiers. It is assumed they had the same training, equipment, leadership, support, etc, which is completely ridiculous. Apart from the obvious training and leadership issues, throughout the war the Rumanian, Hungarian, and Slovakian forces in the East were desperately short of all types of AFVs (and those they had were semi-obsolete), very short of all types of artillery and anti-tank guns, and possessed inferior small arms (especially LMGs). The Finnish and Italian forces fielded in the East were almost as badly off (except the Finns had excellent training and leadership for defence in the terrain they were in). These units were very lucky to inflict a 1 to 1 kill/loss ratio on the opposing Red Army forces, especially if they attacked any sort of prepared defence. In fact, in many regards, the Red Army was on average better equipped (even in 1941) than the large majority of Germany's Allies. This situation only grew worse as WWII progressed.

Despite all this, Lopukhovsky and Kavalerchik have casually added 1,038,700 German Allied irrecoverable losses to the German 4,941,600 irrecoverable losses in the chart. Mathematically, this means the Wehrmacht effectively fielded and lost over an additional million soldiers! Completely absurd! The Soviet Allies losses are treated in the same way; but here a paltry 119,400 casualties are considered over the whole war. In addition, by 1944-45 these troops (mainly Poles, Rumanians, Czechs and Bulgarians), were as experienced as their Soviet counterparts and much closer to the average Red Army soldier in training and leadership. What should have been done, and what would have been reasonable, is to assume the German Allied forces inflicted around a 1 to 1 kill/loss ratio on the Soviet and Soviet Allied forces, while the remaining Soviet and Soviet Allied casualties were sustained in combat with the German forces.

If we do this totally reasonable, needed and minimal adjustment, we get a ratio of:

Year	Adjusted Ratio	Ratio Presented in video
1941	15.1	12.2
1942	6.3	5.0
1943	3.5	3.3
1944	1.0	1.0
1945	0.4	0.4
Totals	2.8	2,5

Why Lopukhovsky and Kavalerchik couldn't do such a simple and obvious adjustments, even with poor and inaccurate German source data, is very hard to understand! (Unless of course their agenda is to maximize apparent German irrecoverable losses; but this is really treating the reader without any respect at all).

PROBLEM 3. The many problems with using Overmans study to directly compare military front-line casualties have been largely covered, so we won't labour the point here. As shown already, it should not be used for computing military casualties at the front due to combat operations, but this is exactly what Lopukhovsky and Kavalerchik have done in the chart presented. Noticeably, the OKW/OKH Bundesarchiv (BArch) data is the much preferred source used by almost all historians studying military campaigns, including Glantz and Liedtke (who are both used as references in this video), and the German Research Institute for Military History.

As an example of the almost ridiculous figures being used from Overmans study, there is strong evidence in the video itself (which the presenter either ignored or didn't even notice). In the first 'ratio' table he presents the German 1941 irrecoverable losses as 312,600 (based on Overmans, in the Price of Victory). Later he presents a slide from Liedtke (page 169), which quotes 1,094,251 casualties in 1941, including 201,868 irrecoverable losses (using BA archive data). In other words, in the same presentation he shows a difference of 110,732 German irrecoverable losses in 1941! Thus the Overmans figure is almost 1.55 times greater than multiple OKH and OKW archive figures. In other words, the Overmans figure represents a gross exaggeration of the German irrecoverable losses attributable to combat operations on the East Front in 1941, and, again, almost useless for our purposes. And yet, this is still what Lopukhovsky and Kavalerchik have used in their book! There is no serious corroborating evidence anywhere, to my knowledge, to support Overmans 1941 figure.

If Overmans 1941 figure is this bad (when used in this context), then why would the 1942 to 1945 figures be any better? Well the answer is, they aren't. For example, Overmans states the German irrecoverable losses from 1st January to 9th May 1945 included no less than 1,230,045 'military' personnel killed in action or permanently missing (excludes POWs). According to the Overmans study, this means the Wehrmacht lost as many men killed in 4 months in 1945 as the entire number killed and missing on the East Front in the entire 1944 period (1,232,900). When one has studied the almost continuous and massive battles right across the East Front during all of 1944 (including Operation Bagration and the destruction of Army Group Centre), this is very hard to believe. This equates to no less than 9,600 killed per day, or almost an entire division killed per day! For this to have happened the Soviets and Western Allies would have to both have committed mass genocide (almost on the spot) on the hundreds of thousands of German POWs that surrendered in the last few months of the war. In fact, POWs represented by far the largest German casualty type in 1945 (especially in the West).

Of this apparent 1,230,045 'military' personnel killed in 1945, it is estimated by Lopukhovsky and Kavalerchik (on page 117) that 783,000 must have perished on the East Front and around 447,000 were killed fighting the Western Allies. Roberto Muehlenkamp carried out a study (Feb 2017) of every major engagement between the US and British and Commonwealth Armies, and the Wehrmacht and Waffen SS, in 1945 (including the later stages of the Battle of the Bulge, crossing the Rhine and the Ruhr Pocket). Despite dragging the 'bottom of the barrel' to find every German irrecoverable casualty in both Allied and German archives (in every engagement, and each studied separately), he found the figure for German killed in action reached only around 21% of Overmans' figure! Even the massive Ruhr Pocket (7th March to 21st April, 1945) yielded only around 11,500 Wehrmacht (including Volkssturm popular militia members) and Waffen SS killed. Despite the large scale of this operation, in which about 317,000 German POWs were taken, heavy casualties on both sides were comparatively low because the encircled German forces, aware that their cause was lost (and not spurred on by the same fear of the enemy as they were on the Eastern Front), no longer put up much of a fight and essentially surrendered en masse. For example, starting on 15th April 1945, Field Marshal Model dissolved his command and discharged his troops, allowing them to go home or

surrender to the enemy as they saw fit! The bottom line is that Overmans' 1945 figure is not really defensible at all (although he has apparently tried on several occasions).

Whichever way you cut it, Overmans' WWII figures (and especially for 1945) are misused if applied to this type of study. It is apparent that doing so results in a gross exaggeration and overestimation of the German irrecoverable 'front losses' during WWII. This conclusion is also supported by the large majority of the German OKW and OKH archival data stored in the German Federal Archives.

2. The comparative strengths of combat forces table (used in the presentation) (taken from pages 383-389 of the book 'When Titans Clashed').

Generally speaking, I have fewer issues with this table than the Price of Victory ratio table, but it is still easy to spot several major statistical manipulations happening here (if you have the data available). Unsurprisingly, these manipulations are clearly designed to favour the Soviet's perspective. They mainly concern what constitutes 'Front Strength' for the Soviets in this table, because this is the only Soviet figure used in the table for all the relative strength comparisons.

Firstly, it is apparent that for the Axis side (including all the German Allies) the 'Front strength' is basically any paramilitary formation they had anywhere on the Eastern Front (including Luftwaffe ground units and, of course, all types of SS units). Essentially if it was in or east of the Baltic States, Belorussia or the Ukraine, then it counts. No matter how far to the rear it was, or what it was doing, it is still considered part of the Axis 'Front Strength'. Thus, for example, any OKH reserve units sitting in Minsk, many hundreds of kilometers from the 'front line', are still considered part of the Axis 'Front Strength'. Similarly, dispersed German security division, operating in the western Ukraine in 1942 and thousands of kilometers from any front, are, apparently, still considered part of the Axis 'Front Strength'.

We can verify this in some detail as well, just to be sure. For example, my own extensive study of German forces in 1941 (Volume IIA and IIB of 'Operation Barbarossa: the complete Organisational and Statistical Analysis') shows the entire German force on the Eastern Front (up to 4th July 1941) had around 3,359,000 men (page 74, Vol IIB). This includes around 87,600 in the Northern Norway command (Bef. Fin.), and 238,700 in OKH Reserve units (some of which had not yet arrived in the East). It includes all personnel in the German Army (including the security units), Waffen SS, Luftwaffe ground forces and even naval coastal artillery (in the East). This figure compares very well with the figure in the table (around 3,119,000) derived from Earl Ziemke's book (which is used as the Axis source in the chart). My higher figure takes account of the dozen or so German divisions that arrived on the East front from the West between 23rd June and 4th July 1941. There is no significant 'fat to spare', so to speak: almost every individual unit is accounted for no matter where it was deployed on the Eastern Front. It seems likely this philosophy has been carried through on the Axis side (of the chart) for the subsequent years.

Unfortunately, this is clearly not the case for the Soviet side of the table. When reading the small print on the table it states the Soviet figures show the strength of the Operating Armies and Fronts in the RKKA at the front. It specifically states that all other forces, such as the NKVD, PVO, Navy (possibly including naval ground forces? significant in 1941-42), and Army units in the rear are not included as 'Front Forces' but are included in the figure in parenthesis. This is something the presenter in the

video completely failed to state or highlight, and yet it is a key point on the whole table if it is being used to compare combat force strengths.

As a start, the When Titans Clashed table shows a 'Front Strength' of 2,743,000 on 22nd June 1941 (probably, also from Krivosheev, which itself has many dubious front strength figures). The number of 4,901,800 on strength constituted Army and other formation types elsewhere in the USSR, and presumably nowhere near the front lines. It turns out that even this number is totally incorrect. My own studies indicate that the Soviet Armed forces contained a total of 5,448,000 personnel (rounded, including 74,945 servicemen and military construction workers serving in formations which came under civilian departments). This figure is confirmed by Glantz in his outstanding book 'Stumbling Colossus' (1998, page 293) and Krivosheev (1997, page 91). Therefore, before we even really start, the first Soviet overall strength figure is out by over 10% (i.e. its missing 546,200 men!).

The Front Strength in this case is presumably meant to be the total strength in the Leningrad, Baltic, Western Special, Kiev Special and Odessa Military Districts (i.e. the Western Special Military Districts, on borders with potential hostile forces in the Western USSR). My own extensive study of Soviet forces in 1941 (Volume IIIA and (upcoming) Volume IIIB of 'Operation Barbarossa: the complete Organisational and Statistical Analysis') shows these Military Districts actually had a total of 2,692,000 (rounded) personnel on 22nd June 1941. However, this figure EXCLUDES a large and separate RVGK Stavka Reserve force which numbered 619,000 men. These were deployed in the 16th, 19th, 20th, 21st, 22nd, and 24th Armies, and were either already within the area controlled by a Western Special Military District or very close to a border. Many of the RVGK Stavka Reserve units were in better shape than the units under the command of the Western Military Districts, and were deployed as 2nd echelon forces to meet any invasion. Within days (and in some cases hours) of Barbarossa starting, significant forces (especially mechanised units) had already started moving westwards from their base areas in the Western Special Military Districts, as well as from the Orel, Kharkov and Moscow Military Districts. And yet, it is clear that the entire RVGK Stavka Reserve force is EXCLUDED from the 'Front Strength' figure used in the When Titans Clashed table. There is absolutely no way these forces should be excluded from the Soviet 'Front Strength' calculations; especially as every German man and his dog appear to be included on the German side.

It is also clear that the RVGK Stavka Reserves (many held in the large Reserve Front, and sometimes held in what were called Reserve Armies) are excluded from Soviet 'Front Strength' figures in the subsequent years (in the When Titans Clashed chart). This number varied from around 400,000 to well over a million men at various points in the war. They were almost always deployed in echelon waves immediately behind (often only a few 100 kilometers) the front lines. In addition, these forces often included mechanised/or armoured units and were often quickly assigned to an Operating Army when a particular operation was planned. By the simple expedient of them NOT historically being assigned to an Operating Army or Front (also called an Active Army or Front), the authors of the When Titans Clashed table can conveniently exclude them from any comparison with the opposing Axis forces. Simply brilliant, but highly effective as it seems the large majority of people remain completely oblivious. In the end, however, it remains a piece of statistical manipulation to support a fundamental untruth. (As an aside, it should also always be remembered that in order to create such a ready reserve, the front line needs to be stable or at least well manned. In order to do this you have to first have a significant overall numerical superiority at the strategic level).

In addition, let us now briefly examine NKVD and PVO ground forces (also excluded from the Soviet 'Front Strength' figures). In June 1941 the NKVD had 472,000 personnel on strength (490,000 including the NKGB (State Security)) and of these 388,800 were in units capable of combat (albeit

very limited combat in some cases). This data is detailed at great length in my work in Vol IIA (page 370). The When Titans Clashed table states there were 334,900 NKVD personnel in June 1941, which is incorrect and also may only refer to NKVD combat capable units (the NKVD was a very complex organisation with many facets during the whole of WWII, and grew to well over 650,000 men by 1945). Anyway, the point is that around half the NKVD combat capable units were deployed in the Western Military Districts (with the NKVD border troops being literally the first to be hit by the Wehrmacht on 22nd June 1941), which constitutes at least another 194,000 that can be added to the Soviet 'Front strength' for June 1941. During 1941 entire NKVD tactical divisions were mobilised, and Wehrmacht units often came into direct contact with NKVD units (especially near cities). Again, there is absolutely no way these NKVD forces should be excluded from the Soviet 'Front Strength' calculations. Its equivalent to excluding German Waffen SS units from German Front strength figures, and yet this is exactly what has been done throughout the force comparison table in When Titans Clashed.

Another significant Soviet ground-force conveniently 'brushed under the table' is the PVO (Strategic Air Defence) ground forces. In addition to a large PVO air force (which had most of the new MiG-3 fighters) there was a very large PVO ground force. In June 1941 this force comprised 182,000 men with 5,689 76/85mm and 335 37mm AA guns (detailed in Vol IIA page 522). The forces in the 1st PVO defensive belt, in the Western Special Military Districts, comprised 116,000 men with 3,939 AA guns. These force were concentrated around cities and major rail junctions (especially Kiev, Leningrad, Minsk, etc.) and as well as shooting down Luftwaffe aircraft they often came into contact with German ground forces. This was largely because they were relatively immobile and often could not get out of pockets created by encircling forces. Just because the PVO was not as proficient as the Luftwaffe Flak forces at engaging ground targets does not mean they were not there! Excluding PVO ground forces in 'Front Strength' figures is the equivalent of excluding Luftwaffe Flak units on the East Front; and there is no doubt these are included in the Axis side of the When Titans Clashed Table. I am constantly amazed how the assessment rules applied to the Wehrmacht are not applied to the Western Allies or Soviet forces in so many studies of 'WWII modern history'.

I also just wanted to mention Partisans, another factor totally forgotten as somehow 'insignificant' when establishing Axis and Soviet relative force strengths. From 1943 onwards, partisans became a major issue on the East front. Erickson has estimated that by mid-1944 (just before Bagration) there may have been as many as a million partisans operating behind the Axis lines. By this time, in addition to German security units (and even some Army units), virtually all the Hungarian forces and over half the Rumanian forces on the East front were garrisoning key areas or fighting the partisans. This was a large-scale, brutal, bloody and often forgotten war, that significantly reduced German and Axis strength (and supplies) at the front. And yet, these hundreds of thousands of Soviet-side combatants are not registered anywhere on the Soviet 'Front Strengths' (as they were, after all, not officially part of the RKKKA) in the When Titans Clashed table. But, apparently, the German and German allied forces devoted to combat them are included as part of the Axis 'Front Strengths' (as they were, after all, officially part of one of the Axis side's armies!).

So, just for June 1941 we can (completely) justifiably add at least 929,000 men to the Soviet 'Front Strength' in the When Titans Clashed table (the RVGK Stavka Reserves, most in the Western Military Districts anyway, and the NKVD and PVO ground combat units in the Western Military Districts). In the table, this means the Soviets actually had at least 3,672,000 men as 'Front Strength' in June 1941,

giving the Soviets a superiority of 1.18 to 1 from the start. This is already significantly different to the 1 to 1.14 in the German favour shown in the chart on day one. And we haven't even got started yet!!

Just to illustrate how ridiculous some of the figures are in the When Titans Clashed table, consider the 1st November 1941 figures. According to the data the Soviet armed force had 6,983,814 personnel, but only 2,200,000 can be considered to be in anywhere near Axis forces. I haven't done a full analysis (it's hardly worth the effort), but we are expected to believe that: at a time when the USSR was fighting for its very existence, when the Germans are actually in the process of encircling Moscow, and after almost every available unit in the Far East, Siberia and the Transbaikal has already been transferred to the front, that only 31% of the Soviet armed forces were actually defending the Motherland (in this case even being within several hundreds of kilometers of any Axis forces). I don't know about you, but I expect the books I am reading to treat me (the audience) with some semblance of respect. It appears that the researchers/authors of some of these works often think their audience is made up of complete imbeciles.

Having winged a lot (as they say in Australia), I would finish this section by saying the When Titans Clashed table is still a very useful document for gauging relative overall (approximate) force strengths. As a rule of thumb only, I would say the reader should add around 600,000 men to the 1941 Soviet 'Front Strength' figures (while ignoring the 1st November figure!), around 700,000 to the 1942 figures, and around 800,000 to the 1943 onwards figures. This would at least take care of the RVGK Stavka Reserves and other 'none RKKA' forces which were really 'at or very close to the front' in any meaningful military sense. There are several other issues to do with this table, especially around how the Axis allied forces are portrayed. However, I believe that if the reader hasn't got the picture by now, then it's not going to happen.

3. A lack of understanding of what it means to be outnumbered (by even 2 to 1), especially at the operational level in modern warfare.

When watching the U-tube presentation, the moment when I almost choked on my coffee came when the presenter said (or at least implied) that 'being outnumbered 2 to 3 to 1 wasn't really that bad, and it was nothing like the 10 to 1 (or so) Soviet hordes that some German accounts would have us believe'! Well apart from no one of any significance really ever believing any 10 to 1 stories (except, in the occasional local tactical situation), I suddenly realized that the presenter had no real understanding of what 2 (or 3) to 1 odds across the whole front actually meant in real terms, or how this related to combat proficiency. I also soon realized that relatively few people seem to understand what this means. I therefore decided to put down a few facts on what this means in practical terms.

Application of the Lanchester Square Law.

I can't go into the mathematics here (its proof is essentially the result of a simple differential equation solution), but this is the result for combat situations (ok, bear with me here). Assume side A outnumbers side B by a factor x . If all elements of both sides engage in combat simultaneously, then in order for side B to maintain what is termed the 'Force Equilibrium Ratio' (in this case x to 1), then each of side B's men will have to have x squared 'Casualty Inflicting Efficiency' relative to each of side A's men.

Thus, if side B is outnumbered 2 to 1, then in order for it to maintain this 2 to 1 ratio over time, the relative Casualty Inflicting Efficiency of side B's men will need to be 4 times that of side A's men.

Similarly, if side B is outnumbered 3 to 1, then in order for it to maintain this 3 to 1 ratio over time, the relative Casualty Inflicting Efficiency of side B's men will need to be 9 times that of side A's men!

If side B's men do not have the required Casualty Inflicting Efficiency superiority, then in very short order side B's relative strength will diminish much more rapidly than side A's relative strength. As time progresses (or with each round of combat of you like) this effect gets progressively bigger as side A will outnumber side B by a progressively larger figure, until side B disappears altogether. This is why even a much larger but inferior quality force (i.e. one with a lower Casualty Inflicting Efficiency) can quickly overwhelm a smaller and higher quality force, and still have far fewer casualties in the final count. Few people seem to grasp this fact: the general feeling is that a smaller higher quality force will always sustain fewer casualties against an inferior quality force regardless of the odds. But no, it actually means that, all other things being equal, having numerical superiority translates directly into fewer casualties in the final count.

Also note, the Lanchester Square Law also makes a mockery of the myth that the attacking force will necessarily sustain more casualties than the defending force. I generally find that people who still think that being the defender is a major advantage in modern war do not understand the maths, or how simple numerical superiority can have a dramatic effect on the battle's outcome and the casualties sustained.

It should also be noted that if side B has a Casualty Inflicting Efficiency superiority of say y , then this DOES NOT mean that each man in side B can take on y men from side A; but rather the square root of that. Thus, say side B has a relative Casualty Inflicting Efficiency superiority of 5, then this does not mean each man in side B can take on 5 men from side A, but they can take on 2.24 men.

In order to use all this practically, to assess overall combat performance, many other factors have to be included. These include: defensive or offensive posture (attacking or defending), terrain, weather, relative weapons technology (by main types) and weapon densities, and the relative levels of supply (especially over longer time periods). This makes the basic formulas complex but it can be done with suitable data available and I am working on this for a future book (Volume V in the series on Operation Barbarossa).

Going back to the When Titans Clashed force strength table, we can see that even with the figures shown (which we have demonstrated are significantly skewed in the Soviet favour), that the Germans were easily outnumbered at the operational and strategic level by 2-3 to 1 in 1942-43, and 3-4 to 1 in 1944+. I will let the reader do their own calculations, but it is pretty obvious that (even with all the other factors mentioned) the Wehrmacht needed an average Casualty Inflicting Efficiency superiority of between 4 and 9 (at different times) to simply prevent itself being rapidly annihilated.

Also, of note is that when the Force Equilibrium Ratio reached anything remotely like 1 to 1, the Wehrmacht's enemies in WWII were always soon in very big trouble. This happened in France in 1940, North Africa in 1940-41, the USSR in 1941, etc. Also note, that when the Germans were the attacking force (strategically and operationally), their kill/loss ratios were much higher than when they were the defending force (from 1943 onwards).

The additional burden of being outnumbered at the Operational - Strategic Level on a 2000 -3000km front.

Being outnumbered on an entire long front, which was the case on the East front, is actually far worse than being outnumbered to the same level on a single battlefield. This is because at the tactical level a superior enemy often has problems concentrating their forces against a defender. Effectively, the defender does not have to engage the enemy simultaneously, so the effect of the Lanchester Square Law diminishes. In effect, a smaller battlefield relative to the forces involved helps the defender (who usually has the smaller force). (As an aside this was one of the problems for the Allies in Normandy: even though they had a vastly superior force overall, which grew to around 4 to 1 by late July, they had great difficulty centering such a force in the relatively small battlefield to gain an 'unstoppable' local superiority. This was the exact opposite of the Soviet's Operation Bagration).

However, as the battlefield widens, the smaller battlefield effect rapidly diminishes. What does this mean in practice? Well in a nutshell, it means the numerically superior force is able to defend strongly everywhere, and still concentrate powerful forces to attack the enemy at any particular location of choice. The longer the front, the bigger the force disparity, the easier this is. It gets worse. If the numerically superior force concentrates at two or more locations simultaneously on a long front, they can attack with massive local superiority, achieve a breakthrough and encircle the section of the front line between the breakthrough points. This will happen even if the much smaller defending force has a much higher average Casualty Inflicting Efficiency, and, almost regardless of the attacker's losses at the breakthrough points, the overall losses will favour the attacker due to the encircled defending force elements. This is the single biggest reason the Wehrmacht casualties were so much higher from 1943-45 compared to 1939-42.

The only army in WWII to consistently achieve the above multi-breakthrough scenario, while still having an overall average 1 to 1 force parity (and quite often even a 1 to 2 force inferiority), was the German Army (*Heer*). They achieved this all over Western Europe and North Africa in the early war years, and in the USSR until late 1942. Even at Kursk in mid-1943, incredibly, they were mounted a serious offensive when the overall 'front force ratio' was well over 2 to 1 in the Red Army's favour.

As a final comment I find it remarkable when I read about some of the battles from ancient times, and find statements along the lines 'Alexander the Great was one of the greatest military leaders of all time; he won the battle even though he was outnumbered by almost 2 to 1'. However, for some reason when the Wehrmacht won battles or campaigns when facing similar odds, or faced an enemy with a 2 - 4 numerical superiority across enormous fronts for years, and without disintegrating and whilst inflicting massive casualties, it apparently 'wasn't such a big deal because the odds weren't that great anyway'!

By all means watch and enjoy this U tube presentation, and I recommend the books mentioned. However, to get a properly balanced picture and understand better why so many learned historians rate the German Army, I would also recommend books like: *Fighting Power* by Martin van Creveld, *Numbers Predictions and War* by Colonel Trevor Dupuy, *German Panzers on the Offensive* by Colonel R. Stolfi, or *German Battle Tactics on the Russian Front 1941-1945* by Steven Newton.
