

A study of Double Dummy Analysis

Extract Presentation 4 – the 5xx1 Shape

by Andrew Simmons



1. FORWARD

Hand copies of deals generated by bridge duplicating software contain predicted outcomes. These are generated using sophisticated algorithms. The outputs, often referred to as “double-dummy” predictions, are made with the knowledge of the layout of all 52 cards and are therefore purely theoretical. Even so, many players use them for analysis of their games after receiving hand copies from a duplication session.

My database analysis of double-dummy predictions revealed facts about hand shapes and other issues that I found of interest. It particularly caught my attention that 4441 hand shape has trick making capacity in excess of expectation. Other issues such as trick making relative to trump fit and the merits of hand evaluation techniques like ‘suit quality test’ aroused my interest for further analysis.

Data is pure, simple and honest. Some analysis results challenge widely held belief but I have produced a truly random database and analysed it with due diligence and fairness. The information produced therefore has integrity. Also, outcomes that can be applied in terms of bidding method have been subjected to an objective trial that has supported the conclusions. Many examples of these trials have been recorded as evidence.

Material for analysis is out there in abundance. Therefore my analysis conclusions can readily be reproduced by anyone with a few database programming skills and a lot of time and patience.

2. METHODOLOGY

First of all I created an application using a standard database tool. I entered as many details as I could about each hand and its relationship to its partner's hand. At first I entered details for 1000 hands and checked out the results from that. Each hand is unique in terms of shape and high card quality and the performance of each hand is calculated by the double-dummy analysis produced by duplicator machine system software. I have recorded hand details and double dummy predictions straight from handout sheets as my raw data. Primary data being:

1. High Card Point Count - **HCP**
2. Partnership High Card Point Count – **PHCP**
3. Maximum Predicted Tricks – **MPT**
4. Maximum Predicted Score – **MPS**

My first analysis grouped the results by hand shape so that I could evaluate the relative merits of each. I followed this up with more detailed studies where the information pointed me.

At extreme HCP range there are often few hands in the sample and sometimes this throws up unusual results like two weak hands having a particularly good suit fit. It is tempting to apply statistical methods to rule out extreme results but I am determined not to manipulate the raw data in any way. I want recipients of the information produced to be in no doubt as to the honesty of the approach. So everything goes in, good or bad.

Benchmarks

Development of benchmarks has been undertaken in analysis of balanced hands for game making situations (Presentation 1) and hands that contained a 6-card suit for pre-emptive situations (Presentation 2). The benchmarks enable conceptualisation of the analysis results and produce compelling conclusions.

Benchmarks are derived from two widely used bidding strategies that are believed to be successful. This way the analysis is structured in a way that most bridge players can understand and believe in.

PRE-EMPTIVE BENCHMARK

Many are happy to bid weak at the two level with 6-card suits in the range 6-10 HCP. My analysis has shown that such hands are predicted by double-dummy to produce a trick making capability of between 7.7 to 9.5 MPT. Therefore it follows that the **“ZONE OF ACCEPTABILITY”** benchmark for pre-emptive bids is a hand that will achieve within the range 7.7 to 9.5 double-dummy MPT.

GAME MAKING BENCHMARK

Many people are happy with the concept that a pair of balanced hands with a combined total of 25 HCP should be bid to 3NT. Double-dummy analysis of my random collection of hands has shown that 50% of these hands are predicted to succeed and 50% to fail.

So the benchmark is that hands are worth bidding to **GAME level when there is a 50% double-dummy probability of success.**

These benchmarks are the foundation of the analysis. They relate to conventional wisdom. Achievement of MPT and MPS is factual, carefully documented and properly calculated. Also, the reader has no need to consider how good or bad double dummy predictions are because the information is all presented relative to the same method of calculating. All you have to believe is that the double dummy calculations are consistent (I know some people still don't trust computers).

Hand Pattern Probabilities

Throughout the analysis and presentation of results we are aware that hand shapes occur as follows:

Hand	Percentage	Hand	Percentage
4-4-3-2	21.55	6-4-3-0	1.33
5-3-3-2	15.52	5-4-4-0	1.24
5-4-3-1	12.93	5-5-3-0	0.90
5-4-2-2	10.58	6-5-1-1	0.71
4-3-3-3	10.54	6-5-2-0	0.65
6-3-2-2	5.64	7-2-2-2	0.51
6-4-2-1	4.70	7-4-1-1	0.39
6-3-3-1	3.45	7-4-2-0	0.36
5-5-2-1	3.17	7-3-3-0	0.27
4-4-4-1	2.99	Others	0.69
7-3-2-1	1.88		

Conventional Balanced Shape	47.6%
5 Card Suit with a Singleton or Void	17.0%
5 Card Suit with no Singleton or Void	26.1%
6 Card Suit	16.48%
Hands with a Void Suit	4.75%
Balanced 3 suited 4441 + 5440	4.23%
Hands with longest suit of 7 or more	3.41%

Fig 1 –Hand pattern probabilities summarised into groups for primary analysis

3. PRESENTATIONS

Information produced by the analysis is presented in a standard format for each hand shape analysed.

Ability of deals to produce varying card distributions (good and bad) is taken care of by using high sample numbers that evens out the effect of the variation. Double-dummy ignores that other big variation – the human intervention. For the analysis purposes therefore we are allowed to conclude that the trick making capability of the hands analysed is mainly influenced by:

- Strength of high cards – HCP
- Strength of high cards within a partnership – PHCP
- Degree of fit for a trump suit or extra trick making capacity

So the analysis uses these elements as necessary with the raw data summarised in tables that have been transcribed using spreadsheet charts into graphical form for presentation. This enables us to reach straightforward conclusions. All presentation of results is summarised for specific hand shapes. Typical outputs are:

A table of how a hand performs when you consider the HCP of one hand of a partnership. This is the only information that you have when making an opening bid and this analysis is of particular value when considering pre-emptive openings.

A table of how a partnership pair of hands perform when you consider the partnership strength PHCP. This is of particular interest for some bidding methods. Variability decreases when you add partner into the picture and so this data tends towards a straight-line progression except at the extreme ends of the PCHP range where there are fewer examples of hands in the data.

Probability of fit level is outlined in tables and charts to present what to expect in terms of MPT and Suit Fit Level based on the fit in one's own longest suit and the best fit available in the partnership (that may not always be in your long suit).

Scope of the database

The following hand shapes were identified for analysis:

Hand Shape	Mathematical Probability	Actual Occurrence in Original Sample
Balanced hands	47.60	42.50
5 Card Suit with a singleton or void	17.00	18.20
6 Card Suits	16.48	19.30
5-4-2-2 Shape	10.58	8.50
Hands with a void suit	4.75	5.30
Hands with 7 or more cards in longest suit	3.41	0.56
4441 Shape hands	2.99	2.70

Fig 2 – How hand shapes in the sample approximated to mathematical expectation

Because of the impact of initial findings I added more random data sets so that the final analysis is more robust in selected areas:

There were only 27 hands of the 4441 shape and 53 of Void Suit shape in the original analysis because of their low frequency of occurrence. But these hands are performing well on the analysis and merit a more detail analysis. To do this I obtained random data for a further 128 of each of these hand shapes.

Hands where the longest suit is five but also contain a singleton are the second most common hand shape after balanced hands. I had a random data set of hands of 5-4-3-1 shape and these make up most of the 5 cards plus a singleton hand shape (13% of the 17% total). This hand shape has interesting analysis so the extra data is worthwhile.

Hands which have a longest suit of 6 cards are defining a benchmark for pre-emptive weak 2. So to strengthen the data set I pulled in details for more of these hands using randomly produced handout sheets available.

Outputs from the database have been further analysed using spreadsheets and charts. For example by grouping data in HCP band ranges. It is this further analysis that reveals what is going on.

Presentation 4 - Hands with 5-x-x-1 Shape

Expectation of being dealt these hands is quite good. Shape 5431 has a 13% probability and that is the third most common hand shape. The other hand with this shape is 5521 that has 3% probability.

TRICK MAKING

Trick making capacity of the shape 5xx1 is set out in the following table:

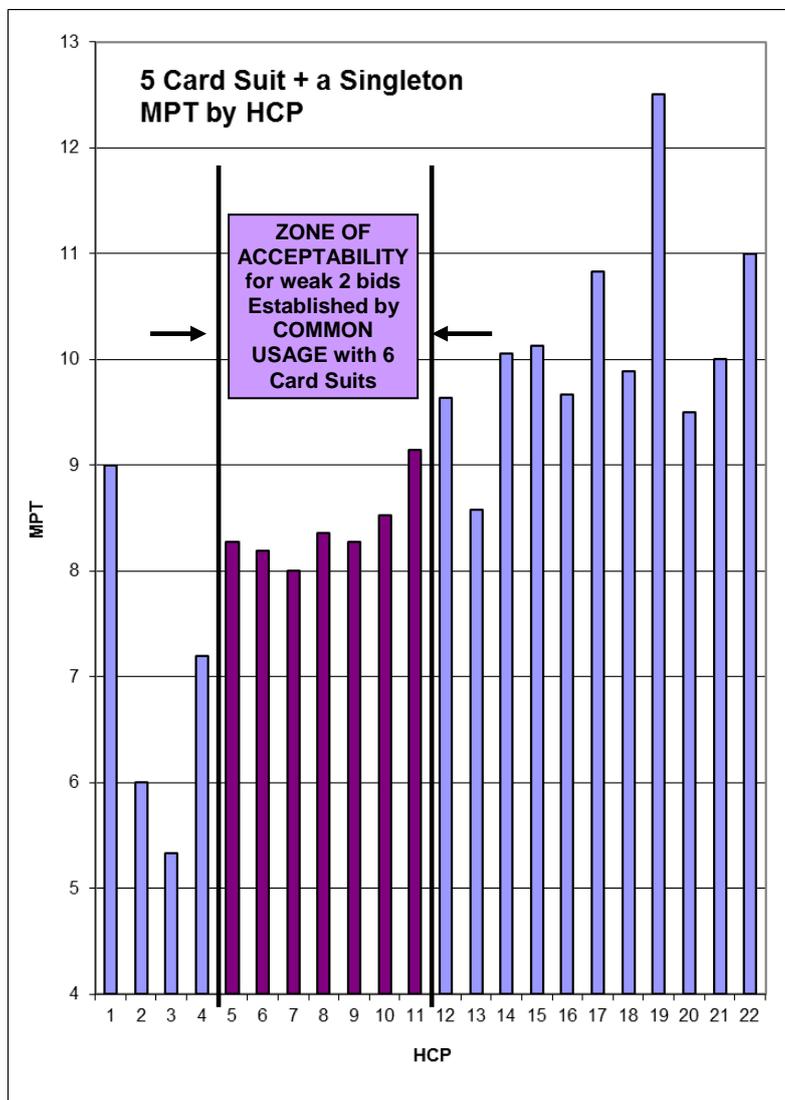


Fig 62 5xx1 MPT grouped by HCP

At an average 8.77 MPT these hands have good trick making capacity just short of 6-card suit shape. They also have a similar Zone of Acceptability for pre-emptive opening bids

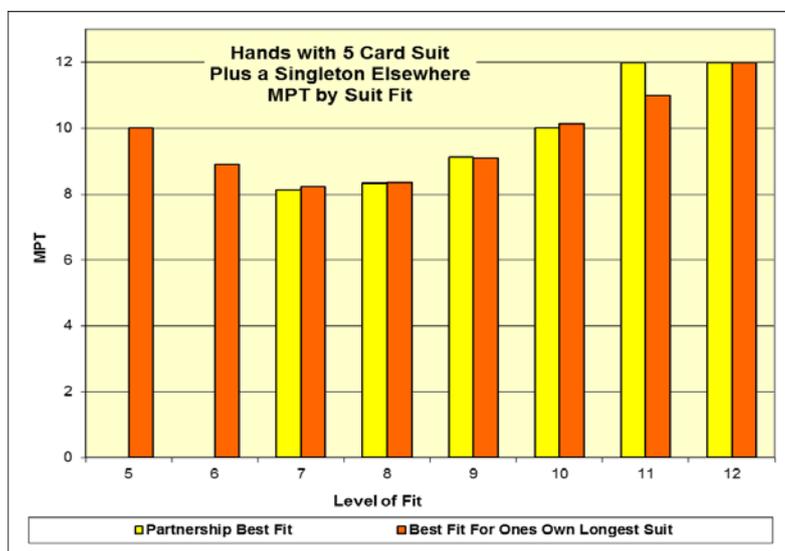


Fig 63 - 5xx1 MPT by Suit Fit

Trick making with 5xx1 hands is dependent on having a good fit in trumps and the fit situation needs to be considered. Here is an analysis of how the hands fit.

The situation is similar to 6-card suit hands where an extra fit level approximates to half an extra trick

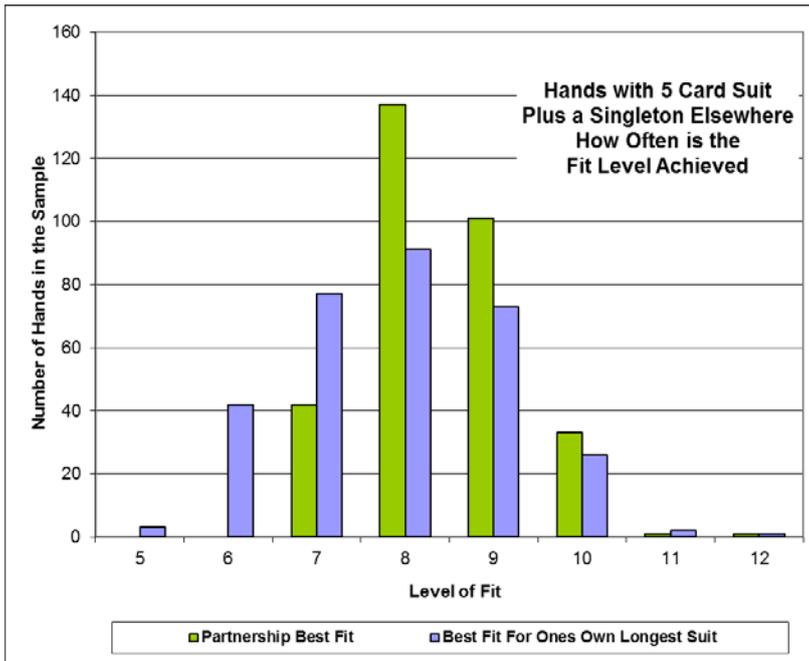


Fig 64 - 5xx1 Quality of fit

This analysis shows that there is often a better fit in partner's suit.

Overall we have an 86% chance of an 8-card trump fit but there is only a 61% chance of an 8-card fit for the five-card suit that is in the 5xx1 hand. When it matters (7-card fit or less) a better fit for trumps in another suit occurs – this happens 16% of the time.

Therefore, whilst on the face of it the 5xx1 hands are suitable for a pre-emptive opening, players doing so have to accept the risk of missing the best trump fit. A better approach may be to adopt a two suited pre-empt method.

Therefore more widely available weak openings like Lucas may be more attractive than a simple weak two 6-card suit as well as being the best way to take advantage of the 5xx1 pre-emptive bidding attribute. It could be combined with a multi-two that takes account of the weak 6-card major suit hands.

If you are a fan of opening weak you could consider that 54xx hands occur more frequently than 6xxx. Also some of the 6xxx also have 64xx.

Shape	Occurance
5431	12.93%
5422	10.58%
5440	1.24%
5521	3.17%
5530	0.90%
6421	4.70%
6430	1.33%
Total	34.85%

Fig 65 – Hands that may qualify for a two suited weak open

In half of these hands, Hearts or Spades would be the five card suit. A third of that half

Opening bid of 2♥ or 2♠ shows 6-10 HCP (5-9 with agreement) and at least 5 cards in the Major suit bid and at least 4 in a Minor suit.

Responses

- Raise to 3♥ or 3♠ = pre-emptive
- 2NT = Asks partner to bid the undisclosed Minor suit
- 3 of The other Major = Minimum 6 cards intending to play in that suit

Fig 66 – Example of “Lucas 2” bidding convention

