Busbridge Duplicate Bridge Club

Duplimate Trial

When proposing the trial we described its **aims** as being to establish the reality of:

(A) The perceived advantages of a dealing machine, namely:

(1) Records of the hands dealt and computer assessments of makeable contracts, providing opportunities for learning and improvement.

(2) Genuinely 'random' deals, providing more varied and therefore more interesting hands.

(3) Automated dealing of specified hands (for Sims competitions and the Christmas Party).

(B) The perceived disadvantages of a dealing machine, namely:

(1) Cost.

(2) 'Freak' hands, making it impossible to rely on normal methods of bidding and play.

(3) Boards of a different shape from those in current use, making them less easy to handle.

What the trial tells us about each of these is reported below.

Records of the hands dealt and computer assessments of makeable contracts, providing opportunities for learning and improvement.

What use is being made of these opportunities is unknown. However, 38% of players have taken away paper copies of the hand records.

This figure may underestimate members' interest: on a couple of occasions all copies were taken, possibly leaving some demand unfulfilled; and members not taking paper copies may be viewing the hand records on the website.

There have been other indications of interest: several people have explicitly asked for a hand record printout or asked questions about them; and a few have said they did not understand what the printouts showed.[1]

Genuinely 'random' deals, providing more varied and therefore more interesting hands. 'Freak' hands, making it impossible to rely on normal methods of bidding and play.

These may as well be considered together.

Theory says that hands 'dealt' by the Duplimate machine's software (DupSoft, which uses the 'Big Deal' algorithm), are consistent with true randomness: each of every possible hand has the same probability of being 'dealt'. It also says that hands dealt manually will not be random unless they are thoroughly shuffled and, if this does not happen, there are good reasons for expecting them to be relatively 'flat'.[2]

Practice. Statistics on machine- and manually-dealt hands have been collected; they are tabulated under 'Results'. As yet they are inconclusive. They suggest that machine-dealt hands are pretty consistently in line with what would be expected from random dealing; in particular, they are *not* 'freak'. However, they do *not* demonstrate that manually-dealt hands are unduly 'flat' or otherwise definitely inconsistent with 'randomness'.

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[1] Sadly, after as well as before an 'explanation' – annexed at the end – was provided.

[2] Big Deal http://www.xs4all.nl/~sater/doc.html; manual shuffling http://en.wikipedia.org/wiki/Shuffling.

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Automated dealing of specified hands (for Sims competitions and the Christmas Party).

There have been three such uses so far (Surrey Sims on 27 July and 20 September, EBU Sims on 13 September); they seem to have been trouble-free. Presumably not having to find members prepared to deal the boards (and forgo playing) was an advantage, as was their not having to deal them.

Cost.

The capital cost of the Duplimate machine is of course known (£2,955). There is no new information about its running costs.

The machine itself has performed reliably throughout the trial, with no mechanical breakdowns and no maintenance required. For the most part, machine dealing is trouble free but there are occasional card-handling errors. They seem to come in batches: on one occasion we had 8 'jams' in the course of dealing 32 boards, but have since dealt many more without problem. The error rate is currently 2%.

One unanticipated problem arose:

> The bar-coded cards supplied with the Duplimate machine have fainter colours for the minor suits than for the majors (apparently this is the new standard introduced to make them easier to be read by the visually impaired) and caused problems for some members. This was particularly the case on Tuesdays, and the cards for Tuesday use have been replaced with bar-coded ones in 'strong' colours. Unfortunately they are extremely slippery (Mr Bridge, 103, page 8) and – when new – caused the Duplimate operator considerable problems.
>
> For this reason we have had a demonstration of the alternative make of dealing machine, the Play Bridge Dealer 4, which handled the slippery cards with absolutely no problem.

'Duplimating' on its own takes about 20 minutes if there are no problems. Connecting the Duplimate to the computer beforehand and disconnecting it again at the end takes a few moments, so it makes sense to deal several sets at a time.

At the end of each set, a few more moments are required to make a copy of the hand records and the deal file (the latter is needed when scoring if the hands are to be incorporated in the travellers on the website); if the set is for GDBC then that needs to be logged. It also takes a minute or so to print off the paper copies of the hand records. In addition, during the trial period, the hand statistics need to be recorded, and any problems logged.

Boards of a different shape from those in current use, making them less easy to handle.

In our experience:

- The Duplimate-style boards do not fit our tables as well as the squarer ones used for manual deals: the long axis on the board is N-S but on the table it is E-W. (We could turn the tables through 90° but would then run out of floor-space if there were more than say 12 tables. The alternative is to leave the tables the way they are but declare the positions on the table's long axis to be N-S – i.e. make a permanent 'arrow switch'.)
- It is marginally more difficult to get the hands in and out of their pockets.
- It is marginally more difficult to tuck the traveller into the board, and necessary to turn it over first. On the other hand, folding the traveller is – or can be – simpler.

The Committee
22 November 2010

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Results

We have results for 1608 machine-dealt boards (used on Monday and Tuesday sessions) and 403 manually-dealt boards (used on Friday sessions).

The information assembled is for:

(a) The number of voids the hands contained.
(b) The number of singletons the hands contained.
(c) The number of hands containing a 7-card or longer suit.
(d) The number of hands that are either balanced (4333, 443, 5332) or 5422 in shape.
(e) The number of HCP the hands contained (for 1512 machine-dealt hands only).

The results for each hand orientation (N, E, S, W) are presented in the table below. For (a) to (d), the number is expressed as a percentage of the number of hands.

The first row ("Theory / Mean") shows the values that are to be expected if the hands are dealt perfectly randomly.

Below that are shown the values that have actually occurred ("Manual / Mean" and "Machine / Mean").

To put the actual values in context, the "95% range" shows the ranges in which we would expect them to fall; and "Prob" shows the probabilities (in the range 0% = impossible to 100% = certain) that values as extreme as the actual ones would arise by chance – a value lower than 5% is regarded as 'significant'.

		N	E	S	W	N	E	S	W	N	E	S	W	N	E	S	W	N	E	S	W
		Voids				Singletons				7(+)-card suit				Balanced or 5422				HCP per board			
Theory	**Mean**	**5.12%**				**32.0%**				**4.03%**				**58.2%**				**10.00**			
Manual	**Mean**	**5.71%**	**2.73%**	**5.96%**	**2.48%**	**34.0%**	**29.0%**	**27.8%**	**36.5%**	**4.71%**	**2.98%**	**3.72%**	**3.97%**	**55.8%**	**62.5%**	**59.3%**	**55.3%**				
	95% Range	2.92-7.32%				27.1-36.9%				2.07-5.99%				53.3-63.1%							
	Prob	59%	3%	45%	2%	42%	22%	9%	7%	49%	28%	75%	95%	34%	8%	65%	25%				
Machine	**Mean**	**3.98%**	**5.29%**	**4.85%**	**5.29%**	**32.5%**	**33.3%**	**30.0%**	**33.5%**	**4.04%**	**3.92%**	**3.98%**	**4.04%**	**59.5%**	**56.3%**	**58.3%**	**55.7%**	**9.87**	**10.15**	**9.89**	**10.09**
	95% Range	4.02-6.22%				29.6-34.5%				3.05-5.01%				55.7-60.6%				9.79-10.21			
	Prob	4%	76%	63%	76%	72%	31%	10%	24%	98%	82%	92%	98%	28%	12%	94%	5%	22%	15%	29%	40%

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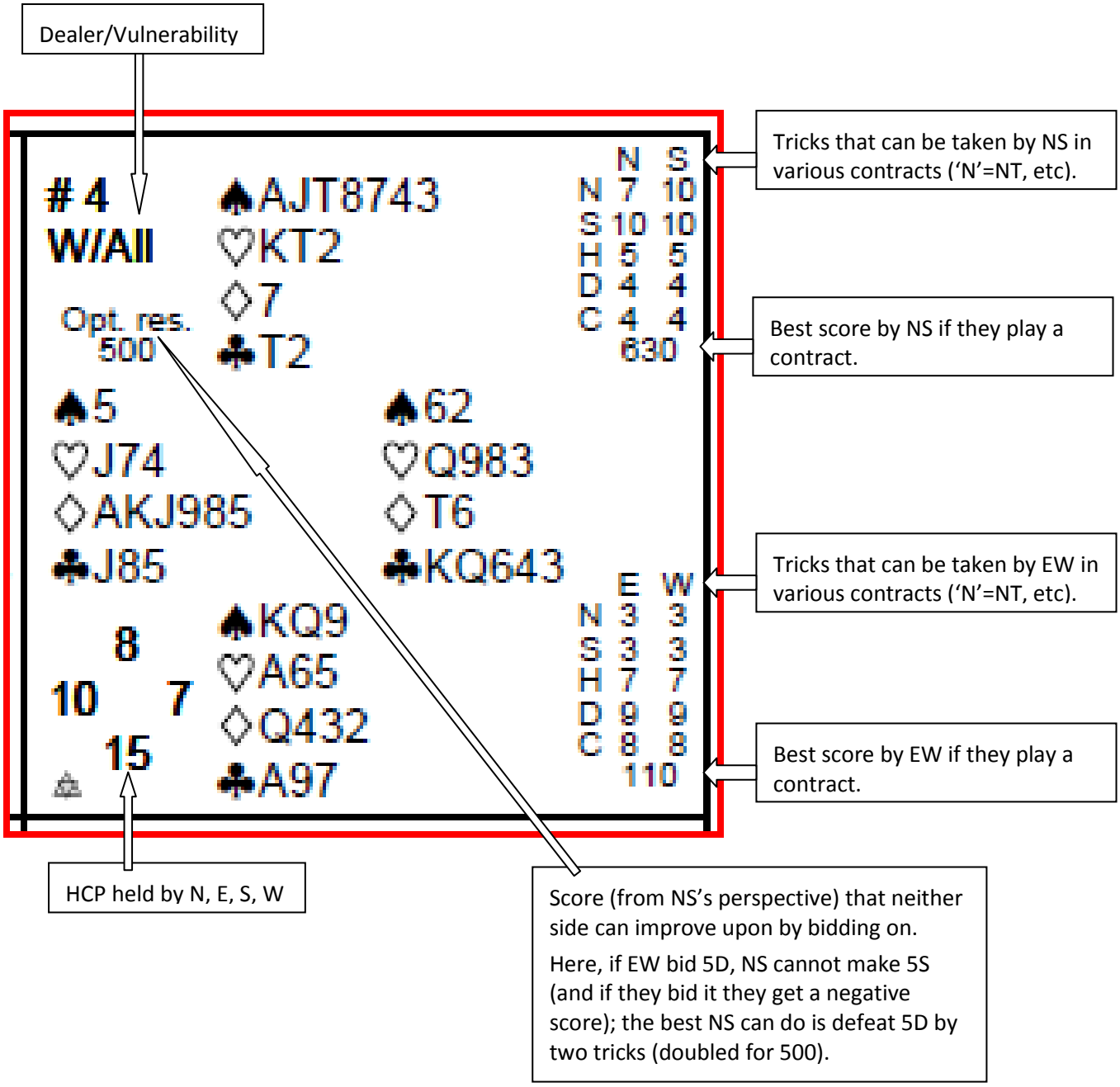

N HPC	E HPC	S HPC	W HPC	---Voids---				--Singletons---				- >=7suit -				---Balanced----			
10.03	10.25	10.22	9.50	1	4	1	2	12	8	6	13	1	3	0	1	19	15	22	18

Average HPC for N, E, S & W

No. of Voids (etc) held by N, E, S & W.

NB: xx00 shape counts as 2 voids, T111 as 3 singletons. 'Balanced' seems to include 5422 as well as 4333, 4432 & 5332 shapes.