Competitiveness in Bridge Bidding An Historical Analysis

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Abstract. In this article we analyse historical data to find out whether bridge bidding has changed during the past decades. As data set we use a collection of 26,00 records of deals played in Bermuda Bowl competitions from 1955-2013.

1 Introduction

Expert bridge players regularly discuss the fact bridge bidding has changed over years. In particular, it is said that bridge bidding has become much more competitive. This statement is almost certainly true, but there exists little to no statistical evidence to support that claim. The objectie of this article is to analyse historical records of expert bridge bidding in order to provide such evidence. One example analysis we want to do is to see wether and to what extent the frequency of opening a balanced hand with 11-12 HCP increased. In order to do this we need to analyse for each deal both the hands and the auction. This means we require some limited form of reasoning on top of database querying. As data we use in this study a set of some 20,000 hand records played during Bermuda Bowl championships in te period 1955-2013.

Taking a wider perspective, we see this study as one possible step towards a more evidence-based approach to the theory of bridge bidding. Through channels such as Bridge Base Online[1] more and more hand records become available for analysis. This provides us with data that can be used to analyse the effectiveness of particular bidding agreements. An example would be a comparison of the Multi opening and the natural Weak Two.

In the next section we discuss the overall approach. Sec. 3 data used in this study. Sec. 3 describes the data and the data pre-processing. In Sec. 4 we use the data to get statistical data about a number of questions that allows us to get more insight into whether and how bidding has changed. All data and software of this study can be found in GitHub[2].

2 Approach

We used hand records encoded with in the Portable Bridge Notation version 2.1 [1]. This plain-text notation is derived from a popular notation for chess (PGN)

[1] http://www.bridgebase.com

[2] https://github.com/guusschreiber/bidstat

and adapted to bridge by members of the Internet newsgroup `rec.games.bridge`. Several people have published sets of hand records in PBN format. Another popular format is the LIN (.lin) format used by BBO. Converters between these PBN and LIN exists.

Each hand record contains metadata about the event (e.g., time, place, tournament), table data (e.g., player names) and deal data (e.g., vulnerability, hands, auction, play). In this study we are mainly focus on data about hands and auction. We process the PBN data in four steps:

1. We first transform the PBN text with an information-preserving Perl parser into a Prolog representation. We opt for Prolog because logic programming is excellently suited for the type of reasoning we need to do with the data.
2. In the second step we derive for each deal Prolog facts about the hands and the auction, for example that the player in second position declarer has an **unbalanced** hand with a **1246** distribution and **8 HCP**, and has made a **jump overcall** at the **3 level**.
3. Subsequently, we create data tables that contain for every deal the year and one or more values a values for a particular bidding feature, such as whether it is a **contested auction**.
4. In the final step we process the data tables with statistical software (the R language).

In the next section we discuss the data processing in step 2 in some detail. In Sec. 4 we discuss the results of a number of analyses.

3 Data

In this study we analysed 19,660 hand records[3] from 23 Bermuda Bowls over a period of 60 years (see Table 1). The number of deals per tournament varies; recent tournaments typically have more records. We selected the Bermuda Bowl as data set because it is the only tournament for which data is available over a long period of time.

From each record the following data is used:

- year in which it was played
- the four hands (list with dealer first)
- vulnerability
- auction, including final contract and declarer
- result (number of tricks; 0 if passed out)

The data is represented in a computation-friendly way. For example, the auction is represented as a Prolog list of numbers. Her is one sample auction[4]:

[3] The PBN files contained 19,724 records; 64 records were put aside because no (correct) hand or auction information was available in the record.

[4] Auction on board 1 of the 1955 Bermuda Bowl between USA and Great Britain. NS: Mathe-Rosen; EW: Reese-Shapiro.

Table 1. Hand records used in this study. Columns indicate decades; rows a particular year within a decade. Hand records with incomplete or erroneous hand or auction data are left out.

Decade/Year	0	1	2	3	4	5	6	7	8	9	Total
50's						448		447		312	1207
60's			576					256			832
70's				256	192	191		192		192	1023
80's		192		352				350			894
90's		169				319		1211			1699
00's	702	317		1593		1994		1527		3114	9247
10's		3512		1246							4758
Total											19660

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[12,13,7,0,0,21,22,31,32,0,0,0]
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Each number encodes a bid: 12 stands for 1♢, 13 for 1♡, 21 for 2♣, etc. The numbers 0 and 7 encode a pass and a double, respectively.

For each record we derived three types of additional facts:

- Hand features that can be derived from the 13 cards of one player, e.g. high-card points (HCP), distribution, balanced/semi-balanced/unbalanced, 1/2/3-suited.
- Features of a bid independent of the auction, e.g. level, major/minor/NT,
- Features of a bid dependent on the auction, e.g. opening, overcall (direct, "live"), single/double/... jump.

These features form the basis for generating the data tables used for analysis.

4 Analysis

4.1 Preliminaries

As stated, our objective is to analyse whether competitive bidding style has changed over time. Before diving into this, we need to consider whether the fact that in earlier days were not computer-dealt influences the data set. We have not studied this feature in every detail, but Table 2 gives some indication. In this table we see the frequency of a having as dealer a balanced hand. This table suggest there is no strong effect of dealing by hand (or at least at the Bermuda Bowl manual dealing was methodical). Nevertheless, when we formulate concrete research questions we will take care that, whenever possible, this factor is ruled out.

For this study we selected four concrete questions to get insight into the overall issue of competitiveness:

1. How frequent is a balanced hand with 11-12 HCP opened in first and second position?

Table 2. Frequency of balanced first hand

Decade	Balanced	Total	% Balanced
50-59	600	1207	0.50
60-69	542	832	0.65
70-79	492	1023	0.48
80-89	502	894	0.56
90-99	902	1699	0.53
00-09	4740	9247	0.51
10-13	2565	4758	0.54
Total	10343	19660	0.53

2. If the dealer holds a six-card suit with 0-9 HCP, is the hand opened and at which level?
3. What is the relationship between suit length and level in preemptive openings bids and overcalls?
4. Whats is the frequency of contested auction'?

The questions cover by no means the full spectrum of competitiveness, but will hopefully give us some insight into the issue.

4.2 Opening a balanced hand with 11-12 HCP

As first question we took is one which is accepted as common wisdom: nowadays balanced hands with 11 or 12 HCP are opened much more frequent in first and second hand. We only consider the second hand if the first hand does not fit the "11-12 balanced" profile; otherwise we would biase the outcome.

Table 3. ..

Decade	Pass	Opening	Total	% Opened
50-59	105	66	171	0.39
60-69	44	44	88	0.50
70-79	74	80	154	0.52
80-89	47	61	108	0.56
90-99	63	133	196	0.68
00-09	363	803	1166	0.69
10-13	190	354	544	0.65
Total	886	1541	2427	

Table 3 shows the results. About 12.5% (2427) of the records fitted the profile. The frequencies have been aggregated in decades. The percentages suggest that a major change in style took place in the nineties, when the frequency of opening 11-12 balanced hands went up from "about half" to "about two-third". After the nineties no major change appears to have taken place. The results also suggest that there was a marked increase in frequency in the sixties.

4.3 Opening a hand with a 6-card and 0-9 HCP

In the second analysis we selected from the hand records those in which the dealer has some 6-card and less than 10 HCP. The reason we only looked at the dealer position is because in other positions the variation of the previous bids could easily biase the results (or better: we lacked the time and energy to consider all the consequences). If the hand was opened we recorded the level, which ranged from 1-4.

Table 4. Absolute and relative frequencies of dealer actions with a 6-card suit and less than 10 HCP. Data is aggregated per decade.

Decade	Pass		1 level		2 level		3 level		4 level		Total
	#	%	#	%	#	%	#	%	#	%	
50-59	89	0.86	2	0.02	10	0.10	3	0.03	0	0.00	104
60-69	57	0.84	2	0.03	5	0.07	4	0.06	0	0.00	68
70-79	69	0.86	0	0.00	8	0.10	3	0.04	0	0.00	80
80-89	32	0.64	6	0.12	8	0.16	4	0.08	0	0.00	50
90-99	78	0.70	4	0.04	19	0.17	11	0.10	0	0.00	112
00-09	461	0.63	35	0.05	196	0.27	37	0.05	4	0.01	733
10-13	198	0.58	14	0.04	87	0.26	37	0.11	4	0.01	340
Total	984		63		333		99		8		1487

Table 4 lists the results, again aggregated per decade. About 7.5% (1467) of the records match the profile. Since the eighties there is a marked increase in the frequency in which these hands are opened. Unfortunately, the number of deals for the eighties is very low. On manual inspection most hands there were opened at the 1-level turn out to be non-standard cases from the 1987 Bermuda Bowl. It is therefore more useful to look at the openings at the higher levels.

Fig. 1 shows of the cumulative frequencies for the seven decades. Unlike the 11-12 balanced hands the frequency keeps rising after the initial increase. If we check the data for the non-vulnerable situation[5] this trend is clear. In 2013 14 of these hands were opened at the 3-level, whereas only 6 at the 2-level.

4.4 Preempts

Our third question is related to the previous one, but is more genrally aimed at the frequency and nature of preempts. Defining the notion of preempt precisely is not trivial. We consider a bid to be a preempt if it satisfies the following conditions: (1) it is a jump bid; (2) the bid is either an opening or a direct/live overcall; (2) the bidder has less than 10 HCP; (4) the bid is made in the first round of bidding. This definition might be overly restrictive (for example: a bid

[5] These data are not included in the paper; see the results directory at the GitHub site

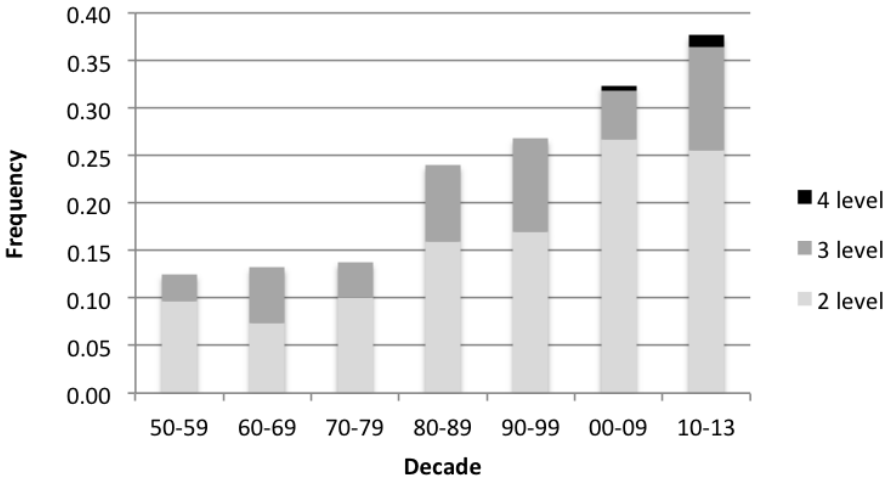

Fig. 1. Cumulative frequencies of for a 2/3/4-level opening with a 6 card and less than 10 HCP. Data is aggregated per decade.

after an original pass is not considered a preempt), but at least we know with high certainty that it is indeed a preemptive bid.

We also want to get information of the relationship between suit length and the level at which the preempt is made. We decided to compute for each preempt the value L, which the length of the longest suit minus the level at which the bid is made. Thus, a low value of L indicates an aggressive preempt.

Table 5. Frequency of preempts, aggregated per decade. The last column lists the mean of L: the length of the longest suit minus the level at which the preempt is made

Decade	No preempt	Preempt	Total	% Preempt	Mean of L
50-59	1133	74	1,207	0.06	3.82
60-69	794	38	832	0.05	3.87
70-79	971	52	1,023	0.05	3.79
80-89	825	69	894	0.08	3.61
90-99	1,556	143	1,699	0.08	3.71
00-09	8,292	955	9,247	0.10	3.82
10-13	4,225	533	4,758	0.11	3.50
Total	17,796	1,864	19,660		

Table 5 shows the resulting data for the Bermuda Bowl data set. The frequency of preempts appears to have increased constantly since the eighties. Over the course of six decades the frequency has roughly speaking doubled. However,

the L value has hardly changed over time. We see only in increase in recent years, but more data is needed to verify that this is not an accidental result.

4.5 Contested auction

Table 6. ..

Decade	No preempt	Preempt	Total	% Preempt

5 Discussion

Acknowledgements This study would not have been possible without the work on a select group of enthousiasts, who have started collecting hand records and making these publicly available. In particular, the author wants to acknowledge the support of Richard van Haaastrecht who provide through his website[6] the data for this study.

References

1. Tis Veugen and Kaj G. Backas. Portable bridge notation (pbn), version 2.1. Technical report, Internet newsgroup rec.games.bridge, 17 May 2007. Accessible via http://www.tistis.nl/pbn/.

[6] http://www.bridgetoernooi.com/

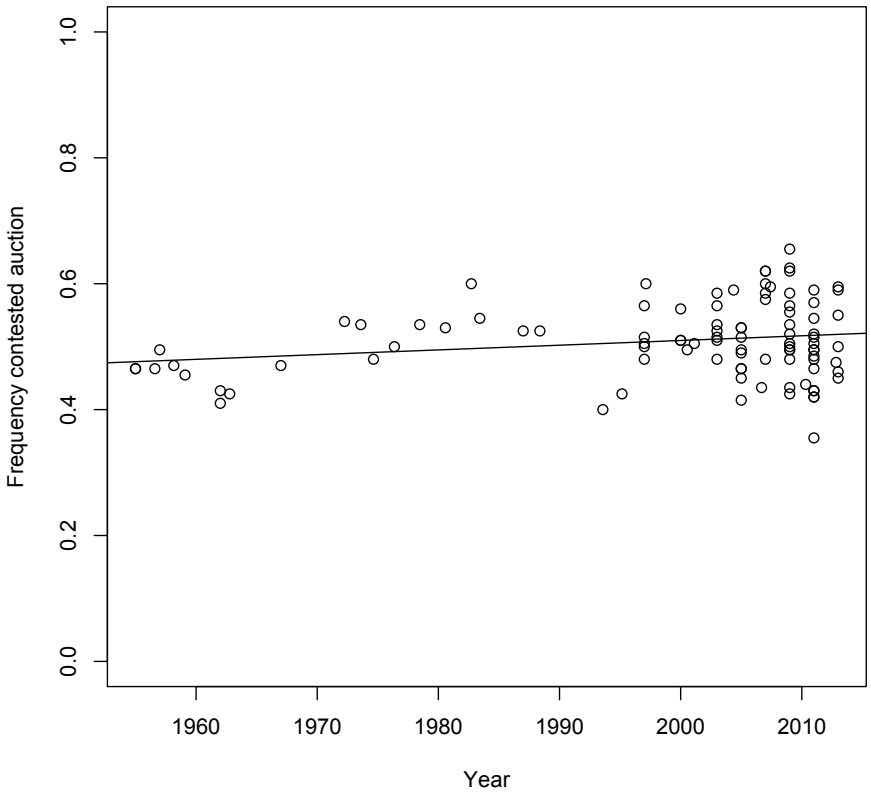

Fig. 2. Scatterplot and regression line of the relation between year (X-axis) and frequency of a contested auction (Y-axis). P-value of the linear model: