

ANALYSIS OF LINE UMPIRE ASSESSMENTS AND ALTERNATIVE GRADING SYSTEMS

1. EXECUTIVE SUMMARY

The following motion was carried at the 2019 ABTO AGM:

“Can the ABTO Committee consider having a review of the weighting assigned to mark 4 in the grading system as compared to the weighting of the N/A mark with the aim of equalising the two weightings if a mark 4 is found to have a detrimental effect on the overall grade of the LTA Licensed official - line umpire when compared to receiving the equivalent number of the N/A mark?”

At the start of 2020, the ABTO Management Committee asked the ABTO Grading Panel to undertake a detailed analysis on its behalf in response to the motion and to formulate a recommendation to be presented to the LTA Officiating Department.

The ABTO Grading Panel noted that assessments of “N/A” are not recorded and therefore could not be directly considered. The ABTO Grading Panel therefore extended the scope of the original motion to consider a number of alternative grading systems to the current system. These alternative systems looked at different weights being assigned to each line umpire assessment, including weights being assigned to line umpire assessments of “4”, which currently receive a weighting of zero. The ABTO Grading Panel also considered whether to include all assessments of 4 or just those obtained at tournaments where the prize money was more than \$25k.

In total the ABTO Grading Panel considered five alternative grading systems as follows:

- **System 1:** As per the current grading system, except that a weighting of 0.5 is assigned to a line umpire assessment of 4. Only those line umpire assessments of 4 obtained at tournaments where the prize money was more than \$25k were included in the calculations.
- **System 2:** As per System 1, except that all line umpire assessments of 4 were included in the calculations.
- **System 3:** The weights applied to each line umpire assessment were the same as the line umpire assessment itself. Only those line umpire assessments of 4 obtained at tournaments where the prize money was more than \$25k were included in the calculations.
- **System 4:** As per System 3, except that all line umpire assessments of 4 were included in the calculations.
- **System 5:** As per System 3, except that line umpire assessments of 3, 2 and 1 were assigned a weight of zero.

In each case the alternative system was compared to the current grading system using each of the 2017, 2018 and 2019 full year data. The data used was anonymised by the LTA Officiating Department so that the ABTO Grading Panel did not know the names of the individual Line Umpires.

All other considerations that normally occur during the grading process at the end of each year were also taken into account, ie special circumstances, number of days worked, number of assessments required, etc, as per the current grading system. However, the ABTO Grading Panel did not review service line requirements in detail and for the purposes of the analysis any official who could not be promoted due to not satisfying service line requirements was not promoted under the alternative systems being considered.

In each case, the various systems graded the vast majority of Officials the same although a small number of Officials were assigned to different grades. Nevertheless, to evaluate the relative merits of each alternative system compared with the current system, the ABTO Grading Panel looked in detail at the actual line umpire assessments obtained by the affected Officials, considering factors such as the number of below average assessments received, the number of assessments of 5, 6 and 7 obtained, as well as the level of events worked and how many assessments of 4 were obtained at events where the prize money was \$25k or less.

Taking all of these factors into consideration, the ABTO Grading Panel concluded that the current system was superior to each of the alternative systems considered. The areas where the Panel considered that the alternative systems were less ideal than the current grading system varied from system to system and included the following:

- Some systems would assign Officials with a less favourable percentage of assessments of 5 and above, to higher grades.
- Some systems would assign Officials who work less to higher grades, which would have a detrimental effect on Officials who work more at the lower level professional events.
- Some systems could discourage officials from applying to work at events with prize money of \$25k and below. This could make it difficult to service these tournaments and could make the selections for other events more difficult.
- Some systems would assign Officials with a higher rate of below average assessments to higher grades, ahead of other Officials who have no below average assessments.
- Some systems would assign Officials who have achieved a higher percentage of assessments of 5 and above, but have achieved fewer assessments of 6 and 7, to higher grades.

The ABTO Grading Panel presented its findings to the ABTO Management Committee through a series of meetings, where the Grading Panel explained the work carried out and their subsequent findings. The ABTO Management Committee agreed with the findings of the ABTO Grading Panel and subsequently recommended to the LTA Officiating Department that no changes should be made to the Line Umpire Grading Structure for 2021. In making such a recommendation, the ABTO Management Committee noted that the different systems considered by the ABTO Grading Panel were not an exhaustive list of possible grading systems and the ABTO Management Committee has committed to working closely with the LTA to investigate alternative systems throughout the course of 2021.

The ABTO Grading Panel's specific concerns of each alternative grading system considered are detailed in the relevant sections of this report. The data presented in the body of this report relates to 2019 only. Similar analyses were carried out using the 2017 and 2018 data, the results of which are detailed in the corresponding appendices.

The ABTO Management Committee is happy to answer any questions that members may have in relation to the analysis carried out and the conclusions reached. Such queries should be sent to abto.grading@gmail.com. In addition, the ABTO Management Committee is planning to hold a webinar to discuss the contents of this report and answer any questions arising. This webinar will take place in early 2021.

2. CURRENT SYSTEM

In calculating retention and promotion requirements, line umpire assessments are weighted to give a converted score for each line umpire. The following weights are used:

7 = +5
6 = +3
5 = +1
4 = 0
3 = -3
2 = -6
1 = -9

For each line umpire an average score per assessment received is calculated by dividing the converted score obtained by the total number of assessments received. This calculation includes all assessments of 7, 6, 5, 3, 2 and 1 obtained at every tournament. In addition, any assessments of 4 obtained at the following tournaments are included in the calculation:

- The Championships, Wimbledon (excluding Wimbledon Wild Card Playoff)
- Davis/Fed Cup
- ATP/WTA Tour (including ATP Challenger Tour)
- ITF World Tennis Tour events with prize money of \$60k and above

Line umpire assessments may be awarded at additional events (e.g. Junior, Wheelchair) held alongside a professional event. However, line umpire assessments of 4 obtained on these matches are not be included in the calculation of a line umpire's average score per assessment received.

In the annual grading process, line umpires are ranked according to their average score per assessment received. The top 55 existing L1s and L2s are graded L1 for the following year. All remaining existing L1s are graded L2 for the following year. In total, there are 55 L2s each year. The remaining L2s for the following year are taken from the existing L2s and L3s with the highest average score per assessment received. Any remaining existing L2s and L3s are graded L3 for the following year. Line umpires cannot change grade by more than one line grade per calendar year.

3. DATA

There were 14,684 line umpire assessments awarded in 2019 which are summarised as follows:

Assessment	No. Awarded at >\$25k	No. Awarded at \$25k & Below	Total Assessments	%
7	40	0	40	0.27%
6	1599	139	1738	11.84%
5	7021	1240	8261	56.26%
4	3358	1176	4534	30.88%
3	96	7	103	0.70%
2	7	1	8	0.05%
1	0	0	0	0%

The key statistics from the above which are important to highlight are:

- 56.26% of assessments awarded are assessments of 5
- Only 12.11% of all assessments awarded are assessments of 6 and 7
- Only 0.75% of all assessments awarded are below average
- 46% of assessments at events with prize money of \$25k or less are assessments of 4
- 27.7% of assessments at events with prize money of more than \$25k are assessments of 4

4. CONSIDERATIONS

The Grading Panel considered and analysed the following alternative grading systems:

System 1

Providing a weighting of 0.5 or 1 for an assessment of 4 (with adjustments of weighting of other assessments where necessary). Assessments of 4 only achieved at events with prize money higher than \$25k included in the calculation of an average score.

System 2

Providing a weighting of 0.5 or 1 for an assessment of 4 (with adjustments of weighting of other assessments where necessary). All assessments of 4 achieved at all events included in the calculation of an average score.

System 3

Introduction of a new grading system using the raw scores, meaning that the weighting is the same as the assessment as follows:

7 = +7
6 = +6
5 = +5
4 = +4
3 = +3
2 = +2
1 = +1

The total score is then divided by the number of assessments received. Assessments of 4 only achieved at events with prize money higher than \$25k included in the calculation of an average score.

System 4

Introduction of a new grading system using the raw scores, meaning that the weighting is the same as the assessment as follows:

7 = +7
6 = +6
5 = +5
4 = +4
3 = +3
2 = +2
1 = +1

The total score is then divided by the number of assessments received. All assessments of 4 achieved at all events included in the calculation of an average score.

System 5

Introduction of a new grading system using the raw scores, meaning that the weighting is the same as the assessment for assessments of 4 and above. Weightings for assessments of 3, 2 and 1 adjusted to reflect the infrequency of these assessments being awarded. The full weighting is as follows:

$$7 = +7$$

$$6 = +6$$

$$5 = +5$$

$$4 = +4$$

$$3 = +0$$

$$2 = +0$$

$$1 = +0$$

The total score is then divided by the number of assessments received. Assessments of 4 only achieved at events with prize money higher than \$25k included in the calculation of an average score.

The results of each of the above were compared to the actual grading process at the end of 2019. The Grading Panel reviewed the results, which were anonymised, to compare systems which are detailed below.

5. SYSTEM 1

Explanation: The Grading Structure would remain as it is now but a weighting of 0.5 or 1 would be given for every assessment of 4 received at events with prize money more than \$25k. The reason to introduce this change would be to provide line umpires with a weighting for a satisfactory performance. It is understood that an assessment of 4 can be viewed negatively and making this change would go some way to improving the perception of the current system. It may also provide a positive impact on the psychology of officials in that an assessment of 4 may be improving their overall average score or at least not having as much of a negative impact on their overall average score.

If providing a weighting of 0.5 for a 4, the full weightings would be as follows:

$$7 = 5$$

$$6 = 3$$

$$5 = 1$$

$$4 = 0.5$$

$$3 = -3$$

$$2 = -6$$

$$1 = -9$$

If providing a weighting of 1 for a 4, the full weightings would be as follows:

7 = 10
6 = 6
5 = 2
4 = 1
3 = -6
2 = -12
1 = -18

Both weighting systems would provide the same results as everything is effectively doubled.

Results: When comparing this system with the current grading system (using 2019 data), it provided the following differences:

- One official graded L1 at the end of 2019 would be graded L2 using System 1
- One official graded L2 at the end of 2019 would be graded L1 using System 1
- Four officials graded L2 at the end of 2019 would be graded L3 using System 1
- Four officials graded L3 at the end of 2019 would be graded L2 using System 1

In order to determine if the above provides a system where officials are in the right grades, the Grading Panel looked at the assessments the officials received. As only two officials would be affected between the L1 and L2 grades, it was easy to make a direct comparison.

For the purposes of anonymity:

- the official graded L1 at the end of 2019 who would be graded L2 using System 1 is referred to as Official 1
- the official graded L2 at the end of 2019 who would be graded L1 using System 1 is referred to as Official 2.

Both of the above officials are extremely close using both systems:

- Official 1 received an average score that was 0.00587 higher than Official 2 using the current system;
- Using System 1, Official 2 would receive an average score that is 0.00572 higher than Official 1;
- Official 1 received one below average assessment (i.e. an assessment of 3 or lower) compared with none received by Official 2; and
- Official 1 received a higher percentage of above average assessments (i.e. assessments of 5 and higher) than Official 2. The difference was 1.3 percentage points.

Moving on to officials in the L2 and L3 categories, it is not possible to compare individuals and therefore a comparison was made between groups of officials.

The four officials graded L2 at the end of 2019 (Group1) that would be graded L3 using System 1 received the following assessments as a collective group:

Assessment	No. of Assessments (250 Total)	%
7	0	0%
6	20	8%
5	181	72.4%
4	46	18.4%
3	3	1.2%
2	0	0%
1	0	0%

The four officials graded L3 at the end of 2019 (Group 2) that would be graded L2 using System 1 received the following assessments as a collective group:

Assessment	No. of Assessments (213 Total)	%
7	0	0%
6	30	14.08%
5	95	44.6%
4	87	40.85%
3	1	0.47%
2	0	0%
1	0	0%

Whilst the number of officials affected is minimal in these categories, the above data clearly shows the significant impact of including a weighting for an assessment of 4.

The data for Group 1 shows that 80.4% of their assessments are 5s and 6s. There are three assessments of 3 within that group of officials, but they have clearly been able to offset those assessments with significant numbers of above average assessments.

The data for Group 2 shows that only 58.68% of their assessments are 5s and 6s and the percentage of 4s achieved by that group of officials is more than double that of the first group.

6. SYSTEM 2

Explanation: The grading structure would remain as it is now but a weighting of 0.5 or 1 would be given for every assessment of 4 at all events. The reason to introduce this change would be to provide line umpires with a weighting for a satisfactory performance. It is understood that an assessment of 4 can be viewed negatively and making this change would go some way to improving the perception of the system. It may also provide a positive impact on the psychology of officials in that an assessment of 4 may be improving their overall average score or at least not having as much of a negative impact on their overall average score.

The weighting systems would be the same as in System 1.

Results: When comparing this system with the current grading system (using 2019 data), it provided the following differences:

- Six officials graded L1 at the end of 2019 would be graded L2 using System 2
- Six officials graded L2 at the end of 2019 would be graded L1 using System 2
- Six officials graded L2 at the end of 2019 would be graded L3 using System 2
- Six officials graded L3 at the end of 2019 would be graded L2 using System 2

As multiple officials are involved in the differences this system produced, the Grading Panel again looked at the affected officials within groups.

The six officials graded L1 at the end of 2019 (Group1) that would be graded L2 using System 2 received the following assessments as a collective group:

Assessment	No. of Assessments (564 Total)	%
7	0	0%
6	72	12.77%
5	323	57.27%
4	168	29.79%
3	1	0.17%
2	0	0%
1	0	0%

The six officials graded L2 at the end of 2019 (Group 2) that would be graded L1 using System 2 received the following assessments as a collective group:

Assessment	No. of Assessments (484 Total)	%
7	1	0.2%
6	75	15.5%
5	278	57.44%
4	127	26.24%
3	3	0.62%
2	0	0%
1	0	0%

The above appears to be an anomaly in that Group 1 has a lower combined percentage of assessments of 5 and 6 (and 7). However, the reason that there would be a differential with the new system is because the officials in Group 1 achieved a total of 95 assessments of 4 at events with prize money of \$25k or less which were not included in the calculation of their current grade. Group 2 officials only achieved 9 assessments of 4 at events with prize money of \$25k or less and therefore their average, when including these assessments, did not dramatically change.

Group 1 officials worked an average of just under 50 days, whilst Group 2 officials worked an average of just under 40 days. It is likely that System 2 would benefit officials who do not work many events with prize money of \$25k or less and would “penalise” officials who are working more and supporting these lower level events.

In terms of officials in the L2 and L3 categories, again a comparison was made between groups of officials.

The six officials graded L2 at the end of 2019 (Group 3) that would be graded L3 using System 2 received the following assessments as a collective group:

Assessment	No. of Assessments (617 Total)	%
7	0	0%
6	47	7.62%
5	349	56.56%
4	219	35.49%
3	2	0.32%
2	0	0%
1	0	0%

The six officials graded L3 at the end of 2019 (Group 4) that would be graded L2 using System 2 received the following assessments as a collective group:

Assessment	No. of Assessments (351 Total)	%
7	0	0%
6	43	12.25%
5	188	53.56%
4	115	32.76%
3	5	1.42%
2	0	0%
1	0	0%

Similar to the L1s and L2s, Group 4 has a higher percentage of 5s and 6s and a lower percentage of 4s. Group 3 officials worked an average of just over 46 days while Group 4 officials worked an average of just over 31 days. Again, similar to the L1s and L2s, it appears to be the assessments of 4 at events with prize money of \$25k or less that is making a very big difference. Group 3 officials achieved 94 assessments of 4 at events with prize money of \$25k or less whilst Group 4 officials achieved just three assessments of 4 at the same levels of event. It is therefore highly likely that Group 3 officials would be “penalised” for working more events, particularly the lower level events.

7. SYSTEM 3

Explanation: The Grading Structure would change completely, moving to a system used by other officiating bodies. Each assessment would carry a weighting equal to the number of the assessment. The total score will then be divided by the number of assessments received, with assessments of 4 only achieved at events with prize money higher than \$25k included in the calculation of an average score. Other requirements, such as serve scores, etc would require a review although for the purposes of this paper, any official who could not be promoted due to not satisfying service line requirements, etc was not promoted using the new system.

The major benefits of this system are firstly that it is used elsewhere, so it is easier to benchmark performance against officials worldwide and secondly, it is easier to understand than the current system. It may also provide a positive impact on the psychology of the officials in that every assessment received equates to a positive number.

The weightings for this system are as follows:

- 7 = +7
- 6 = +6
- 5 = +5
- 4 = +4
- 3 = +3
- 2 = +2
- 1 = +1

Results: When comparing this system with the current grading system (using 2019 data), it provided the following differences:

- Four officials graded L2 at the end of 2019 would be graded L3 using System 3
- Four officials graded L3 at the end of 2019 would be graded L2 using System 3

There were no differences in the allocations of the L1 grade.

A comparison was made between the two groups of officials:

The four officials graded L2 at the end of 2019 (Group 1) that would be graded L3 using System 3 received the following assessments as a collective group:

Assessment	No. of Assessments (265 Total)	%
7	0	0%
6	31	11.7%
5	128	48.3%
4	105	39.62%
3	1	0.38%
2	0	0%
1	0	0%

The four officials graded L3 at the end of 2019 (Group 2) that would be graded L2 using System 3 received the following assessments as a collective group:

Assessment	No. of Assessments (320 Total)	%
7	0	0%
6	24	7.5%
5	192	60%
4	100	31.25%
3	4	1.25%
2	0	0%
1	0	0%

Group 2 have a higher rate of assessments of 5 and 6 combined but each of the four officials received an assessment of 3 in 2019. A similar data pattern is shown in the data from 2017 & 2018 in that officials who receive a higher rate of below average assessments would be graded higher than officials who achieved a lower rate of below average assessments. This is a concern for the ABTO Management Committee as the rate of below average assessments across all officials is just 0.75%.

8. SYSTEM 4

Explanation: The Grading Structure would change completely, moving to a system used by other officiating bodies. Each assessment would carry a weighting equal to the number of the assessment. The total score will then be divided by the number of assessments received at all events. Other requirements, such as serve scores etc would require a review although for the purposes of this paper, any official who could not be promoted due to not satisfying service line requirements etc were not promoted using the new system.

The major benefits of this system are firstly that it is used elsewhere, so it is easier to benchmark performance against worldwide officials and secondly, it is easier to understand than the current system. It may also provide a positive impact on the psychology of the officials in that every assessment received equates to a positive number.

The weightings for this system are as follows:

7 = +7
6 = +6
5 = +5
4 = +4
3 = +3
2 = +2
1 = +1

Results: When comparing this system with the current grading system (using 2019 data), it provided the following differences:

- Seven officials graded L1 at the end of 2019 would be graded L2 using System 4
- Eight officials graded L2 at the end of 2019 would be graded L1 using System 4*
- Nine officials graded L2 at the end of 2019 would be graded L3 using System 4
- Nine officials graded L3 at the end of 2019 would be graded L2 using System 4

*Due to a tie, there would be 56 L1s using System 4.

The seven officials graded L1 at the end of 2019 (Group 1) that would be graded L2 using System 4 received the following assessments as a collective group:

Assessment	No. of Assessments (710* Total)	%
7	1	0.14%
6	93	13.1%
5	398	56.06%
4	218	30.7%
3	0	0%
2	0	0%
1	0	0%

*276 of the 710 assessments achieved were at events with prize money of \$25k or less.

The eight officials graded L2 at the end of 2019 (Group 2) that would be graded L1 using System 4 received the following assessments as a collective group:

Assessment	No. of Assessments (572* Total)	%
7	1	0.17%
6	72	12.59%
5	371	64.86%
4	123	21.5%
3	5	0.87%
2	0	0%
1	0	0%

*4 of the 572 assessments achieved were at events with prize money of \$25k or less.

Group 2 have a higher rate of assessments of 5 and 6 but none of Group 1 received any below average assessments. Group 2 officials achieved their assessments more or less exclusively at events with prize money of more than \$25k. As with System 3, there is a risk that officials who work more, and support lower level events, would be impacted most negatively by this system.

Moving on to officials in the L2 and L3 categories, again a comparison was made between groups of officials.

The nine officials graded L2 at the end of 2019 (Group 3) that would be graded L3 using System 2 received the following assessments as a collective group:

Assessment	No. of Assessments (826* Total)	%
7	0	0%
6	68	8.23%
5	460	55.69%
4	295	35.71%
3	3	0.36%
2	0	0%
1	0	0%

*270 of the 826 assessments achieved were at events with prize money of \$25k or less.

The nine officials graded L3 at the end of 2019 (Group 4) that would be graded L2 using System 2 received the following assessments as a collective group:

Assessment	No. of Assessments (514* Total)	%
7	0	0%
6	42	8.17%
5	320	62.26%
4	147	28.6%
3	5	0.97%
2	0	0%
1	0	0%

*36 of the 514 assessments achieved were at events with prize money of \$25k or less.

Once again, Group 4 have a higher rate of assessments of 5 and 6 but Group 3 have a lower rate of below average negative assessments. Group 4 officials achieved their assessments more or less exclusively at events with prize money of more than \$25k. There is a risk that officials who work more, and support lower level events, would be impacted most negatively by this system.

9. SYSTEM 5

Explanation: The Grading Structure would change completely, moving to a similar system to that used by the ATP and other worldwide bodies. Each assessment of 4 or above would carry a weighting equal to the number of the assessment. Assessments of 3, 2 and 1 would not receive a weighting but the assessment would be included in the calculation of an official's average score. The total score will then be divided by the number of assessments received, with assessments of 4 only achieved at events with prize money higher than \$25k included in the calculation of an average score. Other requirements, such as serve scores etc would require a review although for the purposes of this paper, any official who could not be promoted due to not satisfying service line requirements etc were not promoted using the new system.

The major benefits of this system are firstly that it is similar to that used elsewhere, and secondly, it is easier to understand than the current system. It may also provide a positive impact on the psychology of the officials in that it provides a weighting to the majority of assessments of 4.

The weightings for this system are as follows:

7 = +7
6 = +6
5 = +5
4 = +4
3 = +0
2 = +0
1 = +0

Results: When comparing this system with the current grading system (using 2019 data), it provided the following differences:

- Two officials graded L1 at the end of 2019 would be graded L2 using System 5
- Two officials graded L2 at the end of 2019 would be graded L1 using System 5
- Five officials graded L2 at the end of 2019 would be graded L3 using System 5
- Five officials graded L3 at the end of 2019 would be graded L2 using System 5

A comparison was made between the groups of officials:

The two officials graded L1 at the end of 2019 (Group 1) that would be graded L2 using System 5 received the following assessments as a collective group:

Assessment	No. of Assessments (150 Total)	%
7	0	0.00%
6	26	17.33%
5	92	61.33%
4	30	20.00%
3	2	1.33%
2	0	0.00%
1	0	0.00%

The two officials graded L2 at the end of 2019 (Group 2) that would be graded L1 using System 5 received the following assessments as a collective group:

Assessment	No. of Assessments (144 Total)	%
7	0	0.00%
6	21	14.58%
5	90	62.50%
4	33	22.92%
3	0	0.00%
2	0	0.00%
1	0	0.00%

Group 1 have a higher percentage of assessments of 5 and 6 combined, but also have a higher rate of assessments of 3. The data from 2017 and 2018 shows a similar pattern in that Group 1 officials have more assessments of 3. However, in both 2017 and 2018, Group 2 officials have a higher rate of assessments of 5 and 6. Across all three years, Group 1 officials have a higher rate of assessments of 6. The above data appears to be an anomaly in the pattern across all three years.

Moving on to officials in the L2 and L3 categories, again a comparison was made between groups of officials.

The five officials graded L2 at the end of 2019 (Group 3) that would be graded L3 using System 5 received the following assessments as a collective group:

Assessment	No. of Assessments (265 Total)	%
7	0	0.00%
6	37	13.96%
5	147	55.47%
4	77	29.06%
3	4	1.51%
2	0	0.00%
1	0	0.00%

The five officials graded L3 at the end of 2019 (Group 4) that would be graded L2 using System 5 received the following assessments as a collective group:

Assessment	No. of Assessments (356 Total)	%
7	0	0.00%
6	26	7.30%
5	243	68.26%
4	85	23.88%
3	2	0.56%
2	0	0.00%
1	0	0.00%

The above data shows the same pattern of differences when using System 5 compared to the current system.

Group 4 officials have a higher combined rate of assessments of 5 and 6 and a lower rate of assessments of 3. However, Group 3 officials have a higher rate of assessments of 6 (which only make up 11.84% of assessments).

10. CONCLUSION

The initial brief for the Grading Panel, as per the motion put forward to the AGM in 2019, was to review the weighting of an assessment of 4 compared to an assessment of N/A. Whilst the two are not comparable as N/As are not recorded, the Grading Panel widened the scope of the brief to look at various options as detailed in this paper.

It is appreciated that the systems detailed in this paper are not an exhaustive list of possible grading systems. Outside of systems used in other countries, there are a number of possible changes that could be made to the grading structure which would require a significant amount of time and work to assess.

There are concerns from the Grading Panel and ABTO Management Committee around introducing a weighting for an assessment of 4, or indeed changing the current grading structure altogether. The clear concerns of each system put forward in this paper are:

System 1:

- Introducing a weighting of 0.5 may add confusion to an already complex system.
- Introducing a weighting of 1 would mean that all other weightings would need to be adjusted accordingly. The ABTO Management Committee would not be comfortable on the psychological effect of using weightings of -6, -12 or -18.
- The system would promote officials with a less favourable assessment percentage of assessments of 5 and above.

For the above reasons, the ABTO Management Committee does not recommend using System 1 for the grading of line umpires.

System 2:

- Introducing a weighting of 0.5 may add confusion to an already complex system.
- Introducing a weighting of 1 would mean that all other weightings would need to be adjusted accordingly. The ABTO Management Committee would not be comfortable on the psychological effect of using weightings of -6, -12 or -18.
- The system would promote officials who work less and would have a detrimental effect on officials who work more at lower level professional events.
- It could discourage officials from applying to work at events with prize money of \$25k and below. This could make it difficult to service these tournaments, and could make selections for other events more difficult.

For the above reasons, the ABTO Management Committee does not recommend using System 2 for the grading of line umpires.

System 3:

- The system would promote officials with a higher rate of below average assessments over others who have no below average assessments.
- As below average assessments are rare (111 out of 14,684), the ABTO Management Committee has concerns that this system would not appropriately grade officials who receive no below average assessments.

For the above reasons, the ABTO Management Committee does not recommend using System 3 for the grading of line umpires.

System 4:

- The system would promote officials who work less and would have a detrimental effect on officials who work more at lower level professional events.
- It could discourage officials from applying to work at events with prize money of \$25k and below. This could make it difficult to service these tournaments, and could make selections for other events more difficult.
- The system would promote officials with a higher rate of below average assessments over others who have no below average assessments.

For the above reasons, the ABTO Management Committee does not recommend using System 4 for the grading of line umpires.

System 5:

- The system promotes officials who have achieved a higher percentage of assessments of 5 and above, but have achieved fewer assessments of 6 and 7.
- The system does not appropriately grade officials who achieve a higher rate of assessments of 6 and 7, which make up only 12% of all assessments, as much as the current system.
- Whilst the system is potentially easier to understand than the current system and provides a weighting for some assessments of 4, the benefit of that doesn't outweigh the necessity of assigning officials to the appropriate grade.

For the above reasons, the ABTO Management Committee does not recommend using System 5 for the grading of line umpires.

11. RECOMMENDATION

Based on all of the above, the ABTO Management Committee has recommended to the LTA Officiating Team that the current Line Umpire Grading System is maintained for 2021.

The ABTO Management Committee is committed to working closely with the LTA to investigate alternative systems throughout 2021.

**ABTO Management Committee
January 2021**

Appendix 1 – Grading Data 2017

Appendix 2 – Grading Data 2018

Appendix 1 - Grading Data 2017

System 1 - 2017 - Weighting of 0.5/1 for a 4 with 4s at \$25k & below excluded

Four officials graded L1 at the end of 2017 would be graded L2 using System 1*
 Two officials graded L2 at the end of 2017 would be graded L1 using System 1*
 Zero officials graded L2 at the end of 2017 would be graded L3 using System 1
 Zero officials graded L3 at the end of 2017 would be graded L2 using System 1

*This year there were 57 L1s & 53 L2s

Four officials graded L1 at the end of 2017 who would be graded L2 using System 1:

Assessment	No. of Assessments (270 Total)	%
7	1	0.37%
6	28	10.37%
5	195	72.22%
4	43	15.93%
3	3	1.11%
2	0	0.00%
1	0	0.00%

Average of 37 days worked per official
 82.96% of assessments 5 or above

Zero officials graded L2 at the end of 2017 who would be graded L3 using System 1:

Assessment	No. of Assessments	%
7	N/A	N/A
6	N/A	N/A
5	N/A	N/A
4	N/A	N/A
3	N/A	N/A
2	N/A	N/A
1	N/A	N/A

Two officials graded L2 at the end of 2017 who would be graded L1 using System 1:

Assessment	No. of Assessments (134 Total)	%
7	2	1.49%
6	19	14.18%
5	64	47.76%
4	48	35.82%
3	1	0.75%
2	0	0.00%
1	0	0.00%

Average of 42 days worked per official
 63.43% of assessments 5 or above

Zero officials graded L3 at the end of 2017 who would be graded L2 using System 1:

Assessment	No. of Assessments (101 Total)	%
7	N/A	N/A
6	N/A	N/A
5	N/A	N/A
4	N/A	N/A
3	N/A	N/A
2	N/A	N/A
1	N/A	N/A

System 2 - 2017 - Weighting of 0.5/1 for a 4 with all 4s included

Five officials graded L1 at the end of 2017 would be graded L2 using System 2*
 Three officials graded L2 at the end of 2017 would be graded L1 using System 2*
 Five officials graded L2 at the end of 2017 would be graded L3 using System 2
 Five officials graded L3 at the end of 2017 would be graded L2 using System 2

Five officials graded L1 at the end of 2017 who would be graded L2 using System 2:

Assessment	No. of Assessments (462 Total)	%
7	0	0.00%
6	47	10.17%
5	265	57.36%
4	147	31.82%
3	3	0.65%
2	0	0.00%
1	0	0.00%

Average of 42 days worked per official
 67.53% of assessments 5 or above
 80 assessments of 4 received at \$25k & below events

Five officials graded L2 at the end of 2017 who would be graded L3 using System 2:

Assessment	No. of Assessments (375 Total)	%
7	1	0.27%
6	18	4.80%
5	183	48.80%
4	171	45.60%
3	2	0.53%
2	0	0.00%
1	0	0.00%

Average of 43 days worked per official
 53.87% of assessments 5 or above
 112 assessments of 4 received at \$25k & below events

*This year there were 57 L1s & 53 L2s

Three officials graded L2 at the end of 2017 who would be graded L1 using System 2:

Assessment	No. of Assessments (146 Total)	%
7	1	0.68%
6	20	13.70%
5	73	50.00%
4	51	34.93%
3	1	0.68%
2	0	0.00%
1	0	0.00%

Average of 30 days worked per official
 64.38% of assessments 5 or above
 0 assessments of 4 received at \$25k & below events

Five officials graded L3 at the end of 2017 who would be graded L2 using System 2:

Assessment	No. of Assessments (267 Total)	%
7	0	0.00%
6	21	7.87%
5	149	55.81%
4	94	35.21%
3	3	1.12%
2	0	0.00%
1	0	0.00%

Average of 28 days worked per official
 63.67% of assessments 5 or above
 3 assessments of 4 received at \$25k & below events

System 3 - 2017 - Raw score data with 4s at \$25k & below excluded

Five officials graded L1 at the end of 2017 would be graded L2 using System 3*
 Three officials graded L2 at the end of 2017 would be graded L1 using System 3*
 Six officials graded L2 at the end of 2017 would be graded L3 using System 3
 Six officials graded L3 at the end of 2017 would be graded L2 using System 3

Five officials graded L1 at the end of 2017 who would be graded L2 using System 3:

Assessment	No. of Assessments (245 Total)	%
7	0	0.00%
6	35	14.29%
5	143	58.37%
4	67	27.35%
3	0	0.00%
2	0	0.00%
1	0	0.00%

Average of 35 days worked per official
 72.65% of assessments 5 or above

Six officials graded L2 at the end of 2017 who would be graded L3 using System 3:

Assessment	No. of Assessments (240 Total)	%
7	0	0.00%
6	28	11.67%
5	126	52.50%
4	84	35.00%
3	2	0.83%
2	0	0.00%
1	0	0.00%

Average of 27 days worked per official
 64.17% of assessments 5 or above

*This year there were 57 L1s & 53 L2s

Three officials graded L2 at the end of 2017 who would be graded L1 using System 3:

Assessment	No. of Assessments (142 Total)	%
7	1	0.70%
6	12	8.45%
5	106	74.65%
4	21	14.79%
3	2	1.41%
2	0	0.00%
1	0	0.00%

Average of 34 days worked per official
 83.8% of assessments 5 or above

Six officials graded L3 at the end of 2017 who would be graded L2 using System 3:

Assessment	No. of Assessments (296 Total)	%
7	0	0.00%
6	17	5.74%
5	204	68.92%
4	70	23.65%
3	5	1.69%
2	0	0.00%
1	0	0.00%

Average of 32 days worked per official
 74.66% of assessments 5 or above
 5 assessments of 3 received by 4 officials

System 4 - 2017 - Raw score data with all 4s included

Seven officials graded L1 at the end of 2017 would be graded L2 using System 4*
 Five officials graded L2 at the end of 2017 would be graded L1 using System 4*
 Seven officials graded L2 at the end of 2017 would be graded L3 using System 4
 Seven officials graded L3 at the end of 2017 would be graded L2 using System 4

Seven officials graded L1 at the end of 2017 who would be graded L2 using System 4:

Assessment	No. of Assessments (594 Total)	%
7	0	0.00%
6	73	12.29%
5	304	51.18%
4	216	36.36%
3	1	0.17%
2	0	0.00%
1	0	0.00%

Average of 36 days worked per official
 63.47% of assessments 5 or above
 118 assessments of 4 received at \$25k & below events

Seven officials graded L2 at the end of 2017 who would be graded L3 using System 4:

Assessment	No. of Assessments (477 Total)	%
7	1	0.21%
6	28	5.87%
5	228	47.80%
4	219	45.91%
3	1	0.21%
2	0	0.00%
1	0	0.00%

Average of 36 days worked per official
 53.88% of assessments 5 or above
 135 assessments of 4 received at \$25k & below events

*This year there were 57 L1s & 53 L2s

Five officials graded L2 at the end of 2017 who would be graded L1 using System 4:

Assessment	No. of Assessments (297 Total)	%
7	1	0.34%
6	32	10.77%
5	183	61.62%
4	76	25.59%
3	5	1.68%
2	0	0.00%
1	0	0.00%

Average of 31 days worked per official
 72.73% of assessments 5 or above
 12 assessments of 4 received at \$25k & below events

Seven officials graded L3 at the end of 2017 who would be graded L2 using System 4:

Assessment	No. of Assessments (320 Total)	%
7	0	0.00%
6	17	5.31%
5	206	64.38%
4	92	28.75%
3	5	1.56%
2	0	0.00%
1	0	0.00%

Average of 25 days worked per official
 69.69% of assessments 5 or above
 1 assessment of 4 received at \$25k & below events
 5 assessments of 3 received by 4 officials

System 5 - 2017 - Raw Score Weighting Excluding 4s at \$25k & Below - Weighting of 0 for 3s & 2s

Three officials graded L1 at the end of 2017 would be graded L2 using System 5*
 One official graded L2 at the end of 2017 would be graded L1 using System 5*
 Four officials graded L2 at the end of 2017 would be graded L3 using System 5
 Four officials graded L3 at the end of 2017 would be graded L2 using System 5

*This year there were 57 L1s & 53 L2s

Three officials graded L1 at the end of 2017 who would be graded L2 using System 5:

Assessment	No. of Assessments (154 Total)	%
7	2	1.30%
6	20	12.99%
5	93	60.39%
4	37	24.03%
3	2	1.30%
2	0	0.00%
1	0	0.00%

Average of 31 days worked per official
 74.68% of assessments 5 or above

The one official graded L2 at the end of 2017 would be graded L1 using System 5 received a higher percentage of assessments of 5 or higher than the average of the three officials above.
 The one official graded L2 at the end of 2017 would be graded L1 using System 5 received a lower percentage of assessments of 6 or higher than the average of the three officials above.

Four officials graded L2 at the end of 2017 who would be graded L3 using System 5:

Assessment	No. of Assessments (179 Total)	%
7	1	0.56%
6	23	12.85%
5	92	51.40%
4	60	33.52%
3	3	1.68%
2	0	0.00%
1	0	0.00%

Average of 31 days worked per official
 64.80% of assessments 5 or above

Four officials graded L3 at the end of 2017 who would be graded L2 using System 5:

Assessment	No. of Assessments (201 Total)	%
7	0	0.00%
6	8	3.98%
5	142	70.65%
4	50	24.88%
3	0	0.00%
2	1	0.50%
1	0	0.00%

Average of 34 days worked per official
 74.636.49% of assessments 5 or above

Appendix 2 - Grading Data 2018

System 1 - 2018 - Weighting of 0.5/1 for a 4 with 4s at \$25k & below excluded

Two officials graded L1 at the end of 2018 would be graded L2 using System 1

Two officials graded L2 at the end of 2018 would be graded L1 using System 1

Two officials graded L2 at the end of 2018 would be graded L3 using System 1

Two officials graded L3 at the end of 2018 would be graded L2 using System 1

Two officials graded L1 at the end of 2018 who would be graded L2 using System 1:

Assessment	No. of Assessments (246 Total)	%
7	0	0.00%
6	28	11.38%
5	171	69.51%
4	46	18.70%
3	1	0.41%
2	0	0.00%
1	0	0.00%

Average of 49 days worked per official
80.89% of assessments 5 or above

Two officials graded L2 at the end of 2018 who would be graded L3 using System 1:

Assessment	No. of Assessments (122 Total)	%
7	1	0.82%
6	9	7.38%
5	79	64.75%
4	31	25.41%
3	2	1.64%
2	0	0.00%
1	0	0.00%

Average of 29 days worked per official
72.95% of assessments 5 or above

Two officials graded L2 at the end of 2018 who would be graded L1 using System 1:

Assessment	No. of Assessments (148 Total)	%
7	1	0.68%
6	21	14.19%
5	82	55.41%
4	43	29.05%
3	1	0.68%
2	0	0.00%
1	0	0.00%

Average of 30 days worked per official
70.27% of assessments 5 or above

Two officials graded L3 at the end of 2018 who would be graded L2 using System 1:

Assessment	No. of Assessments (101 Total)	%
7	0	0.00%
6	9	8.91%
5	56	55.45%
4	36	24.32%
3	0	0.00%
2	0	0.00%
1	0	0.00%

Average of 25 days worked per official
64.36% of assessments 5 or above

System 2 - 2018 - Weighting of 0.5/1 for a 4 with all 4s included

Four officials graded L1 at the end of 2018 would be graded L2 using System 2
 Four officials graded L2 at the end of 2018 would be graded L1 using System 2
 Eleven officials graded L2 at the end of 2018 would be graded L3 using System 2
 Eleven officials graded L3 at the end of 2018 would be graded L2 using System 2

Four officials graded L1 at the end of 2018 who would be graded L2 using System 2:

Assessment	No. of Assessments (341 Total)	%
7	1	0.29%
6	39	11.44%
5	210	61.58%
4	91	26.69%
3	0	0.00%
2	0	0.00%
1	0	0.00%

Average of 39 days worked per official
 73.31% of assessments 5 or above
 30 assessments of 4 received at \$25k & below events

Eleven officials graded L2 at the end of 2018 who would be graded L3 using System 2:

Assessment	No. of Assessments (869 Total)	%
7	1	0.12%
6	73	8.40%
5	516	59.38%
4	270	31.07%
3	9	1.04%
2	0	0.00%
1	0	0.00%

Average of 39 days worked per official
 67.89% of assessments 5 or above
 68 assessments of 4 received at \$25k & below events

Four officials graded L2 at the end of 2018 who would be graded L1 using System 2:

Assessment	No. of Assessments (269 Total)	%
7	0	0.00%
6	35	13.01%
5	158	58.74%
4	74	27.51%
3	2	0.74%
2	0	0.00%
1	0	0.00%

Average of 40 days worked per official
 71.75% of assessments 5 or above
 1 assessment of 4 received at \$25k & below events

Eleven officials graded L3 at the end of 2018 who would be graded L2 using System 2:

Assessment	No. of Assessments (614 Total)	%
7	1	0.16%
6	44	7.17%
5	369	60.10%
4	195	31.76%
3	5	0.81%
2	0	0.00%
1	0	0.00%

Average of 28 days worked per official
 67.43% of assessments 5 or above
 3 assessments of 4 received at \$25k & below events
 3 assessments of 3 received by one official

System 3 - 2018 - Raw score data with 4s at \$25k & below excluded

Three officials graded L1 at the end of 2018 would be graded L2 using System 3
 Three officials graded L2 at the end of 2018 would be graded L1 using System 3
 Seven officials graded L2 at the end of 2018 would be graded L3 using System 3
 Seven officials graded L3 at the end of 2018 would be graded L2 using System 3

Three officials graded L1 at the end of 2018 who would be graded L2 using System 3:

Assessment	No. of Assessments (271 Total)	%
7	0	0.00%
6	42	15.50%
5	153	56.46%
4	76	28.04%
3	0	0.00%
2	0	0.00%
1	0	0.00%

Average of 36 days worked per official
 71.96% of assessments 5 or above

Seven officials graded L2 at the end of 2018 who would be graded L3 using System 3:

Assessment	No. of Assessments (463 Total)	%
7	0	0.00%
6	46	9.94%
5	261	56.37%
4	156	33.69%
3	0	0.00%
2	0	0.00%
1	0	0.00%

Average of 34 days worked per official
 66.31% of assessments 5 or above

Three officials graded L2 at the end of 2018 who would be graded L1 using System 3:

Assessment	No. of Assessments (192 Total)	%
7	0	0.00%
6	22	11.46%
5	130	67.71%
4	38	19.79%
3	2	1.04%
2	0	0.00%
1	0	0.00%

Average of 39 days worked per official
 79.17% of assessments 5 or above

Seven officials graded L3 at the end of 2018 who would be graded L2 using System 3:

Assessment	No. of Assessments (410 Total)	%
7	0	0.00%
6	24	5.85%
5	279	68.05%
4	102	24.88%
3	5	1.22%
2	0	0.00%
1	0	0.00%

Average of 31 days worked per official
 73.9% of assessments 5 or above
 5 assessments of 3 received by 2 officials

System 4 - 2018 - Raw score data with all 4s included

Four officials graded L1 at the end of 2018 would be graded L2 using System 4

Four officials graded L2 at the end of 2018 would be graded L1 using System 4

Eight officials graded L2 at the end of 2018 would be graded L3 using System 4

Eight officials graded L3 at the end of 2018 would be graded L2 using System 4

Four officials graded L1 at the end of 2018 who would be graded L2 using System 4:

Assessment	No. of Assessments (407 Total)	%
7	0	0.00%
6	57	14.00%
5	224	55.04%
4	126	30.96%
3	0	0.00%
2	0	0.00%
1	0	0.00%

Average of 45 days worked per official

69.04% of assessments 5 or above

31 assessments of 4 received at \$25k & below events

Eight officials graded L2 at the end of 2018 who would be graded L3 using System 4:

Assessment	No. of Assessments (617 Total)	%
7	0	0.00%
6	54	8.75%
5	340	55.11%
4	221	35.82%
3	2	0.32%
2	0	0.00%
1	0	0.00%

Average of 40 days worked per official

63.86% of assessments 5 or above

48 assessments of 4 received at \$25k & below events

Four officials graded L2 at the end of 2018 who would be graded L1 using System 4:

Assessment	No. of Assessments (315 Total)	%
7	0	0.00%
6	44	13.97%
5	188	59.68%
4	79	25.08%
3	4	1.27%
2	0	0.00%
1	0	0.00%

Average of 35 days worked per official

73.65% of assessments 5 or above

5 assessments of 4 received at \$25k & below events - all for 1 official

Eight officials graded L3 at the end of 2018 who would be graded L2 using System 4:

Assessment	No. of Assessments (462 Total)	%
7	1	0.22%
6	32	6.93%
5	297	64.29%
4	124	26.84%
3	8	1.73%
2	0	0.00%
1	0	0.00%

Average of 29 days worked per official

71.43% of assessments 5 or above

0 assessments of 4 received at \$25k & below events

8 assessments of 3 received by 4 officials

System 5 - 2018 - Raw Score Weighting Excluding 4s at \$25k & Below - Weighting of 0 for 3s & 2s

One official graded L1 at the end of 2018 would be graded L2 using System 5 (Official 1)

One official graded L2 at the end of 2018 would be graded L1 using System 5 (Official 2)

Six officials graded L2 at the end of 2018 would be graded L3 using System 5

Six officials graded L3 at the end of 2018 would be graded L2 using System 5

Official 1 graded L1 at the end of 2018 who would be graded L2 using System 5 received an average score which is 0.02823 lower than Official 2.

Using the current system, Official 1 would have an average score 0.00962 higher than Official 2.

Official 2 received a higher percentage of assessments of 5 or above than Official 1. The difference was 6.61 percentage points.

Official 1 received a higher percentage of assessments of 6 or above than Official 2. The difference was 3.78 percentage points.

Six officials graded L2 at the end of 2018 who would be graded L3 using System 5:

Assessment	No. of Assessments (415 Total)	%
7	2	0.48%
6	41	9.88%
5	237	57.11%
4	132	31.81%
3	3	0.72%
2	0	0.00%
1	0	0.00%

Average of 34 days worked per official

67.47% of assessments 5 or above

Six officials graded L3 at the end of 2018 who would be graded L2 using System 5:

Assessment	No. of Assessments (369 Total)	%
7	0	0.00%
6	17	4.61%
5	255	69.11%
4	97	26.29%
3	0	0.00%
2	0	0.00%
1	0	0.00%

Average of 34 days worked per official

73.72% of assessments 5 or above