Base Values for Jump Elements in IJS

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Introduction

The most common criticisms of the Jump SoV we aware of are these:

- The value for the triple Axel is too low.
- The value for the quads are too low.
- The value of jumps should increase exponentially with difficulty, and not linearly.
- The second and third jump in a jump combination should get more points than the Base Value of that jump executed alone.
- The Base Value for a sequence should be the sum of the Base Values for the two jumps scored.
- The value of any triple-triple combination should be less than the value of a solo quad jump.

Since the beginning of IJS there has been no effort we know of to determine the intrinsic value of the elements in a quantitatively rigorous way. Indeed there probably isn't even consensus for how one would do that. Does one determine the value of the elements based on some theoretical calculation of the physiology and kinematics of jumps? Should it be based on the perceived difficulty of teaching each jump to the average skater, or how long it takes the average skater to learn the jumps? Should it be based on how frequently each jump is successfully executed in competition? The reality is, at this time, no one knows what the intrinsic difficulty is for each jump element for the average skater. Consequently, the best one can do at this time is adopt a plausible set of basic principles for jump values and see if a reasonable SoV can be derived.

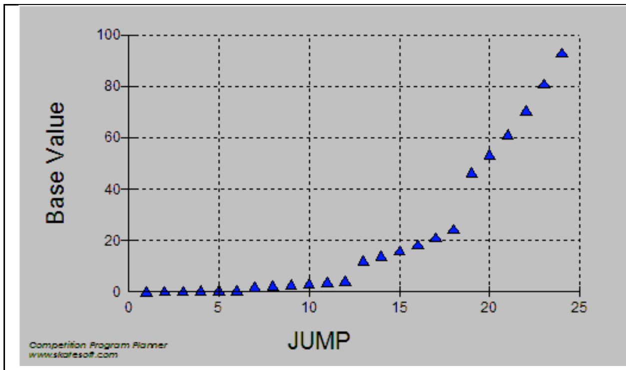
Specifically, we begin with the following principles:

1. The SoV should be consistent for all jumps from 1T through 4A, in the standard order of perceived difficulty.
2. The SoV should be valid for use at all divisions from "No-Test" executing single jumps through Senior executing quadruple jumps.
3. The BV of the solo jumps should increase exponentially.
4. The Base values of triple Axel and the quad jumps should be increased, but not excessively so.
5. For the same number of rotations, the Base Value for the Axel should be twice the value for the toe loop.
6. The second and third jumps in a jump combination should receive more points than the Base Value of that jump executed alone.
7. The value of jump combinations of "n" rotations should be less than the value of any solo jump of "n+1" rotations. (For example, a combination consisting of any double + double + double should have a Base Value less than any triple jump.)

Calculating the Base Values

Several different mathematical models have been tested, and most have been found to have "fatal" problems. The approach that comes closest to satisfying the desired principles for the SoV is a piecewise exponential model.

Piecewise refers to the fact that in this SoV the single, double, triple and quad jumps are treated as separate pieces, with a gap in value from one piece to the next. The gap is chosen so that the values of the combinations are greater than the value of the corresponding Axel jump but less than the value of the next higher toe loop (the idea that 3A+3Lo should be greater than 3A and less than 4T). Here is one attempt at such a SoV.



	Single	Double	Triple	Quad
T	0.400	2.215	12.267	46.568
S	0.459	2.544	14.091	53.491
Lo	0.528	2.923	16.186	61.443
F	0.606	3.357	18.592	70.578
Lz	0.696	3.856	21.356	81.070
A	0.800	4.430	24.530	93.122
A + Lo	1.380	7.645	42.335	
A + Lo + Lo	2.014	11.152	61.757	

This model meets most the desired conditions; however, the value of triples and quads is substantially higher than the current SoV. This model has the further problem that the increase in points from doubles to triples, and triples to quads is not practical. Such a large increase tends to render most divisions one-jump competitions

One way to eliminate both these problems is to scale down the points values by a factor of four. So if we set the Base Value of 1T to 0.10 points and make a few other minor adjustments we get the following potential SoV:

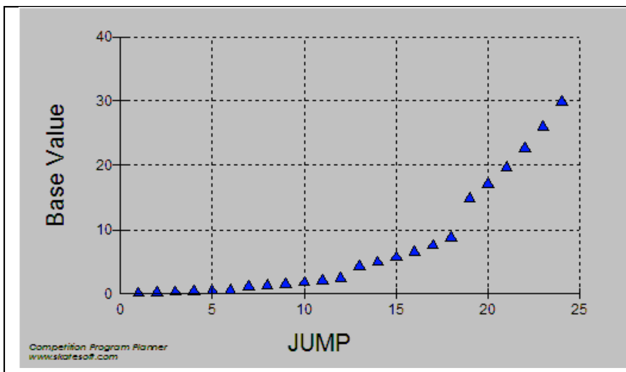
	Single	Double	Triple	Quad
T	0.100	0.529	2.794	10.126
S	0.115	0.607	3.210	11.631
Lo	0.132	0.697	3.687	13.360
F	0.152	0.801	4.235	15.346
Lz	0.174	0.920	4.865	17.627
A	0.200	1.057	5.588	20.248
A + Lo	0.345	1.824	9.643	
A + Lo + Lo	0.503	2.661	14.068	

Now the values of the triple and quad jumps are more reasonable, and most of the goals for the SoV are met – except that the SoV work for all divisions. With this SoV the values of triple and quads works for the upper level divisions, but the low values for singles and doubles renders this SoV useless for the lowest level divisions.

The problem is, the condition that the second and third jumps in combinations be valued higher than if they were executed alone is in conflict with the condition that values of jump combinations should be higher than the value for the corresponding Axel but less than the value of the next higher toe loop. As you drive up the value of the jump combinations, the values of the toe loops must increase geometrically to stay ahead. As a result, you end up with quads values at stratospheric values, or single jumps that are worthless.

One has to make a choice, then. Which is more important, placing the value of the combinations with respect to the Axels and toe loops, or giving a higher reward to the second and third jumps in combinations.

In the following model we eliminate the condition that the second and third jumps in jump combinations receive higher values than when they are executed alone. We also require that only the Axel plus loop jump must be worth less than the next higher toe loop, and let the value of the Axel with two loop jumps fall where it will.



	Single	Double	Triple	Quad
T	0.400	1.341	4.495	15.070
S	0.459	1.540	5.164	17.310
Lo	0.528	1.769	5.931	19.883
F	0.606	2.032	6.813	22.839
Lz	0.696	2.334	7.826	26.234
A	0.800	2.681	8.989	30.135
A + Lo	1.328	4.451	14.920	
A + Lo + Lo	1.855	6.220	20.851	

This model seems a little closer to what we want. Specifically, compared to the current SoV:

- The values of the triple Axels and quads are a little higher.
- The BVs increase exponentially with jump difficulty.
- For most jump combinations, the value of the combination is more than the corresponding Axel and less than the next higher toe loop.

In addition, the values are sufficiently similar to the current SoV that these new values would be usable for all divisions.

The steep rise in the value of the quad jumps after quad toe loop, however, is a little troubling.

If we simplify the above values to one decimal place, and knock down the values of 4S through 4A a little (so the 4A is 1.6 times the value of the 4T instead of 2.0), we obtain the following SoV:

	Single	Double	Triple	Quad
T	0.40	1.30	4.50	15.00
S	0.40	1.50	5.20	16.60
Lo	0.50	1.70	5.90	18.30
F	0.60	2.00	6.80	20.10
Lz	0.70	2.30	7.80	22.00
A	0.80	2.70	9.00	24.00
A + Lo	1.30	4.40	14.90	
A + Lo + Lo	1.80	6.40	20.80	

Conclusion

There is no SoV for the jumps that accomplishes everything asked of it by coaches. The reasonable compromise is the table of Base Value given immediately above.

Giving greater value to the second and third jumps in combinations creates worse problems than the disease it aims to cure. This may be a hint that a completely different method of evaluating the Base Value of jump combinations is needed so that their values are placed exactly where consensus thinks they should be.

Making the Base Value of sequences equal to the sum of the Base Values of the two jumps scored is not precluded by these Base Values.

There is a certain amount of latitude for manually tweaking these Base Values.

> The values of 4S through 4A could be further reduced.
>
> The value for 2A could be increased together with 3T, though that would reduce the spread in value of the 3A compared to the 3T (no longer a factor of 2).