

The new Javelin: effects on level of performance

A. Lennart Julin

“The author compares 1986 year lists with similar lists for preceding years in order to observe the effects of the new implement on the performances achieved in the men’s javelin throw. His observations lead him to the unexpected conclusion that the importance of technique in this discipline has greatly increased after the radical changes in the specifications of the men’s javelin.”

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Abrupt changes in fundamental rules have been very scarce in the history of athletics. Continuity has been carefully guarded as an important part of the character of our sport. Therefore it was not surprising that the proposal from the IAAF Technical Committee to the 1984 Congress concerning radical changes in the 800g-javelin ignited an intense debate.

Athletes, coaches and fans: they all made very negative comments on the proposal. They viewed it as a “castration” which diminished not only the performances but also the aesthetic values traditionally associated with the javelin throw. The proposal however was passed by a large majority at the Congress which took place just a few weeks after the 104.80m throw by Uwe Hohn. Hohn’s effort demonstrated to everyone that the event was not far from “out-growing” the traditional arena.

But the decision did not stop the debate and during the period leading up to the date of change – 1 April 1986 – many people published negative views about the change. Although most of them had never thrown or even seen the new implement they had very firm opinions about the effects it would have on the event.

One often repeated assertion was that the change would favour physical strength and make technique of very little importance. What practical proofs there were for this assertion however were never mentioned. It seemed as if the critics used each other as sources, mistakenly regarding opinions as scientifically proven facts.

Now, after having experienced the

first two years with the new javelin, it is clear that the critics were far from correct in their forecasts concerning the effects. Of course the level of performance was lowered to some extent but the drop at the "normal interval" was not at all as large as predicted.

And even more interesting: the assumption that technique would be more or less without importance seems

Table 1 - World

(Source: "International Athletics Annual" compiled by ATFS (Association of Track and Field Statisticians))

Position No	1982 cm	1983 cm	1984 cm	1985 cm	1986 cm	Diff cm	Diff %
1	9580	9972	10480	9696	8574	1120	11.6
5	9072	9144	9242	9294	8320	974	10.5
10	8840	9058	9094	9156	8186	970	10.6
15	8772	8902	8920	8986	8130	856	9.5
20	8678	8780	8768	8858	8066	792	8.9
25	8604	8720	8690	8756	8028	728	8.3
30	8582	8616	8620	8670	7958	712	8.2
35	8552	8562	8586	8624	7904	720	8.3
40	8514	8528	8552	8572	7856	716	8.4
45	8458	8480	8484	8510	7818	692	8.1
50	8400	8456	8464	8470	7738	732	8.6
55	8326	8370	8400	8426	7714	712	8.5
60	8294	8292	8370	8418	7684	734	8.7
65	8246	8278	8350	8350	7648	702	8.4
70	8192	8252	8322	8342	7616	726	8.7
75	8166	8222	8276	8284	7602	682	8.2
80	8136	8200	8252	8252	7586	666	8.1
85	8120	8176	8234	8234	7574	660	8.0
90	8096	8136	8218	8220	7548	672	8.2
95	8074	8130	8198	8188	7538	650	7.9
100	8048	8114	8152	8140	7530	610	7.5
105	8020	8078	8138	8126	7500	626	7.7
110	7996	8060	8130	8108	7492	616	7.6
115	7970	8044	8068	8082	7476	606	7.5
120	7942	8020	8050	8064	7464	600	7.4
125	7932	8002	8034	8050	7446	604	7.5
130	7910	7970	8010	8022	7440	582	7.3
135	7898	7960	8000	8004	7408	596	7.5
140	7894	7940	7974	7978	7386	592	7.4
145	7874	7918	7964	7970	7358	612	7.7
150	7858	7908	7936	7960	7352	608	7.6
155	7852	7900	7928	7928	7340	588	7.4
160		7886	7914	7916	7326	590	7.5
165		7878	7886	7910	7300	610	7.7

Table 2 - USA

(Source: The annual issue of "Track & Field News")

Position No	1982 cm	1983 cm	1984 cm	1985 cm	1986 cm	Diff cm	Diff %
1	9580	9972	9344	9510	8538	972	10.2
5	8490	8550	8920	8764	7390	1174	13.4
10	8050	8178	8320	8256	7580	726	8.8
15	7842	7922	8138	7970	7260	710	8.9
20	7694	7684	7970	7852	7130	720	9.2
25	7626	7642	7868	7772	7018	754	9.7
30	7322	7730	7820	7646	6962	684	8.9
35	7458	7648	7670	7558	6884	674	8.9
40	7368	7568	7574	7426	6818	608	8.2
45	7292	7488	7538	7384	6786	596	8.1
50	7256	7468	7496	7360	6710	650	8.8

Table 3 - Finland

(Source: Finnish national year lists compiled by Juhani Jalava)

Position No	1982 cm	1983 cm	1984 cm	1985 cm	1986 cm	Diff cm	Diff %
1	9018	9090	9342	8930	8172	758	8.3
5	8698	8728	8678	8572	7818	754	8.6
10	8292	8420	8394	8244	7570	674	8.2
15	7976	8120	8138	8038	7440	598	7.4
20	7802	7940	7996	7956	7326	630	7.9
25	7686	7746	7916	7858	7216	642	8.2
30	7526	7662	7766	7742	7142	600	7.7
35	7446	7538	7628	7646	7106	540	7.1
40	7338	7476	7410	7500	7010	490	6.5
45	7270	7334	7338	7356	6908	448	6.1
50	7200	7226	7244	7310	6808	502	6.9
55	7144	7128	7172	7218	6796	422	5.8
60	7032	7006	7080	7112	6740	372	5.2
65	6956	6940	7032	7044	6710	334	4.7
70	6896	6892	6994	6934	6630	304	4.4
75	6852	6810	6906	6908	6564	344	5.0
80	6826	6780	6844	6868	6494	374	5.4
85	6764	6732	6792	6810	6436	374	5.5
90	6736	6686	6746	6748	6398	350	5.2
95	6700	6624	6714	6716	6352	364	5.4
100	6648	6578	6646	6668	6300	368	5.5
105	6614	6536	6586	6634	6282	352	5.3
110	6566		6530	6604	6240	364	5.5
115	6514		6498	6546	6208	338	5.2
120	6490		6446	6506	6166	340	5.2
125	6452		6432	6444	6130	314	4.9
130	6396		6404	6410	6104	306	4.8
135			6370	6370	6068	302	4.7
140			6356	6350	6040	310	4.9
145			6314	6310	6018	292	4.6

Table 4 - Sweden

(Source: The national statistical annual "Sverige-Bästa" published by the Swedish Athletic Association. Compiler of men's lists A. Lennart Julin)

Position No	1982 cm	1983 cm	1984 cm	1985 cm	1986 cm	Diff cm	Diff %
1	8798	9114	8708	9220	8186	1034	11.2
5	8020	8226	8209	8112	7506	606	7.6
10	7820	7914	7800	7820	7212	608	7.8
15	7544	7496	7464	7480	6906	574	7.7
20	7296	7234	7290	7402	6726	676	9.1
25	7050	7094	7082	7240	6654	586	8.1
30	6960	6978	7002	7074	6558	516	7.3
35	6706	6666	6800	6808	6362	446	6.6
40	6554	6616	6634	6712	6256	456	6.8
45	6454	6570	6498	6468	6200	268	4.1
50	6376	6396	6386	6412	6102	310	4.8
55	6282	6246	6320	6252	6000	252	4.0
60	6190	6192	6240	6146	5954	192	3.1
65	6132	6128	6150	6084	5924	160	2.6
70	6110	6084	6072	6052	5880	172	2.8
75	6060	6008	5960	6014	5828	186	3.1
80	6014	5950	5932	5994	5750	244	4.1
85	5940	5854	5904	5956	5710	246	4.1
90	5870	5814	5886	5894	5656	238	4.0
95	5812	5766	5812	5880	5620	260	4.4
100	5752	5736	5768	5834	5574	260	4.5
105	5688	5710	5728	5766	5510	256	4.4

Table 5 - Norway

(source: Norwegian national year-lists published by the Norwegian Athletic Association. Principal compiler Jan Jørgen Moe)

Position No	1982 cm	1983 cm	1984 cm	1985 cm	1986 cm	Diff cm	Diff %
1	8582	9030	8846	8854	7762	1092	12.3
5	7694	7466	7868	7378	6884	494	6.7
10	7142	7166	7068	6866	6444	422	6.1
15	6694	6758	6788	6596	6232	364	5.5
20	6524	6514	6604	6604	6144	360	5.5
25	6380	6384	6404	6310	6020	290	4.6
30	6302	6180	6188	6166	5950	216	3.5
35	6196	6050	6108	6098	5884	214	3.5
40	6090	5928	6044	5984	5818	166	2.8
45	6042	5882	5906	5944	5722	222	3.7
50	5958	5828	5782	5864	5688	176	3.0
55	5848	5782	5676	5798	5602	196	3.4
60	5790	5708	5636	5744	5510	234	4.1
65	5758	5690	5586	5700	5454	246	4.3
70	5702	5614	5538	5636	5418	218	3.9
75	5636	5578		5590	5394	196	3.5
80	5614	5510			5278	278	5.0
85	5580			5528	5224	304	5.5

to be totally wrong! In fact the statistical evidence that can be collected strongly indicates that technique has increased its significance with the change in design of the javelin!

Although just one year with the new implement is not sufficient to get an absolutely clear picture of the true effect, I thought it would be interesting to try to see what could be deduced by comparing the year-lists of 1986 with similar lists for the preceding years.

To avoid getting the picture clouded by individual effects, I decided to compare the results necessary to reach certain positions in the year-lists. The material available to me was the world list (165 deep) and the lists of the USA (50 deep), Finland (145 deep), Sweden (105 deep) and Norway (85 deep).

By making comparisons a few years back it was obvious that the situation is fairly stable below the top 10 in all lists. This is especially true for the national lists, except for the US where the fluctuations caused by the 1984 Olympics are clearly visible. In the world list a slow but steady improvement is noticeable. These observations showed that it would be sufficient for this purpose to compare 1986 with just 1985 (instead of e.g. an average of 1981-1985). The complete set of figures can be found in Tables 1-5.

The difference (the loss) between 1985 and 1986 as a function of the 1985 performances has been depicted in Figure 1. The diagram also includes – as references – a 10% line as well as the curves predicted in advance by Didier Poppé (France, "Athlétisme", March 1986) and Anders Borgström (Sweden, "Friidrott", No 6/1986).

Before I discuss what could be deduced from the diagram I would like to mention the possible short-comings of

this study and how they can influence the results.

1. Only two years are compared. Concerning the situation with the old javelin the statistical material in Tables 1-5 shows that this is no major problem. As for the new javelin only one year is available so far for the national lists.

2. 1986 was the first year with the new javelin. Although the transitional problems obviously were not as big as expected it is most likely that throwers will improve further by just getting used to the new implement. It should also be noted that the very negative attitude that every (?) thrower had to the change almost certainly influenced their performances in a detrimental way. Now that the first year has passed and everyone has seen that the change did not "kill" the event – on the contrary it only "killed" the unacceptable arbitrariness in the judgement of the landings – the attitude will be reversed. This positive atmosphere will most likely lead to improved performances.

It could also be added that the – in advance – widespread opinion that "brute" strength would be much more important than refined technique might have misled many athletes into the wrong emphasis when planning their training. A re-adjustment might add to the suspected "delayed" development in the future.

3. The new implements were not available the whole year to every thrower in the world. This means that many throwers did not have as many competitive opportunities as in a normal year. This means that a slight "automatic" further improvement could be expected in the 1987 national lists.

4. In 1986 a couple of models existed that were considered by the 1986 IAAF Congress to take advantage of loop-holes in the rules. Every evidence points to the fact that the performance gain by these models was more or less negligible (at least less than 50 cm). It should be noted that *these models were used neither at the European Championships (where the level of performance was high) nor at the meet in Como, Italy on 21 September (where Klaus Tafelmeiner made the longest throw of the year 85.74).*

5. The manufacturers are still "searching" for the best construction. The models of the "old" javelin were the result of several years of experiments and theoretical studies. It thus seems likely that the manufactures will be able to improve the design for their models meeting the specifications of the new rule. Of course the effects will not be as large as with the old javelin.

6. The change perhaps favoured a totally different type of thrower. Comparing the names in the top 50 in the world in the year-lists since 1981 (see Table 6) there is no sign of any ab-

normal "turnover" between 1986 and 1985 as compared to what happened between other consecutive years. The new implement has caused some minor changes in relative capacity but the throwers most successful with the new implement were established on a high level with the old implement. (The top 5 of 1986 all had previous personal bests over 91m). So there is no reason to believe that the study is giving a distorted picture.

No 1., 2., 3. and 5 make it probable that the differential ("loss") between "old" and "new" performances will shrink slightly in the future and No 4. seems to have no noticeable effect in the other direction. So by analysing 1986 we will certainly not underestimate the negative influence of the change on the levels of performance.

This assumption is supported by the statistical material in Table 7 where the development 1982-1983 are compared to the development 1986-1987. (The years chosen for this comparison are in the same position within the Olympic cycle). It is obvious that the development 1986-1987, as expected, is notably larger than "normal" because of a factor of "delayed" improvement which should be attributed to the increased "familiarity" with the new implement.

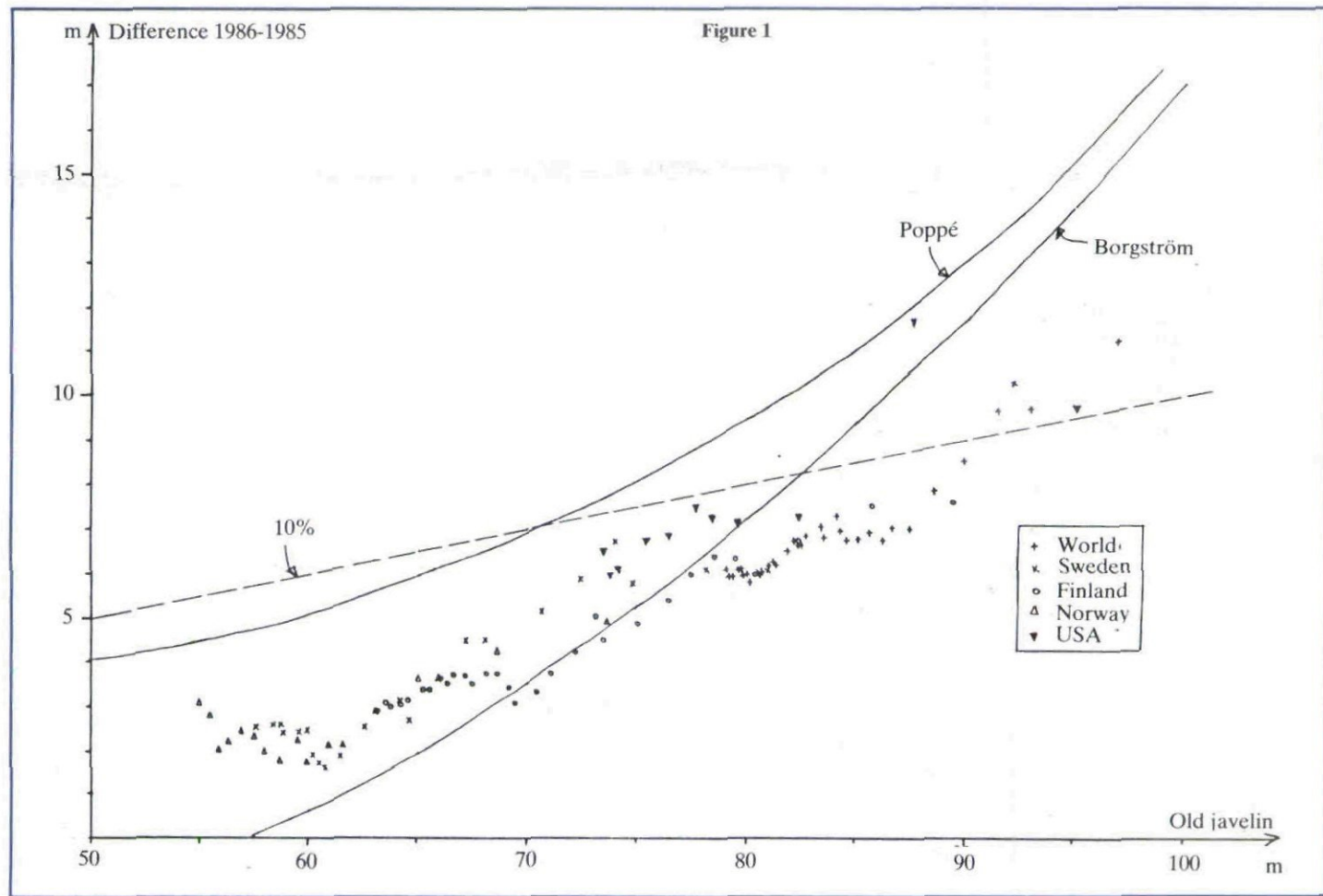
What then does Figure 1 tell us? The predictions foresaw either a proportional or a progressive loss. The study shows that neither assumption was absolutely correct. Especially interesting are the two obvious "plateaux" that are connected by sections of progressive improvement. One plateau where the loss is approximately 3m covers the interval 64-70m and another plateau at 6-7 covers 78-87m. (The plateaux are even more conspicuous if the loss is ex-

Table 6 - "Turnover" in the world list

(Source: See Table 1)

Transition	A	B	C
1981 to 1982	31	4	8
1982 to 1983	31	7	9
1983 to 1984	31	4	7
1984 to 1985	27	5	10
1985 to 1986	25	3	7

A = Number of athletes remaining in the top 50
 B = Number of athletes remaining in the top 10
 C = Number of top 10 athletes remaining in the top 50



pressed in percentages instead of in absolute numbers – see far right column in Tables 3 and 1 respectively!).

Both plateaux seem to be real as the first one falls in the dense region of the Finnish national list and the other in the dense region of the World list. It could also be noted that the dense region of the Swedish list indicates a drop around 60m with an increased loss at lower distances!

At levels of 90m or more the material is too meagre to make any reliable conclusions possible. However it seems as if the loss increases rather steeply in this region.

Two sets of points clearly deviate from the "main stream". That is Sweden in the interval 68-74m and the USA in the interval 73-87m! How can these deviations be explained? As far as Sweden is concerned it is definitely not due to lack of implements as new javelins were available at all meets at all levels (just 4-5 known exceptions) during the whole summer.

The differences in this interval compared to Finland must probably be attributed instead to a lower average level of technique! In Finland javelin throw is a "national sport" which almost every one tries at an early age with knowledgeable coaching. This creates a unique high technical niveau on the national level. Sweden, cannot match that and with the new implement it is obviously harder to compensate for technical limitations by improving the physical capability.

As far as the USA is concerned (please also notice that the "loss" would have been even worse in a comparison between 1984 and 1986!) it is probably a combination of lack of implements locally and a relatively low average technical level. The latter

could be traced back to the fact that the javelin throw is included in the high school programme only in a few of the member states! It should also be remembered that in US college competition all landings – even flat or on the rear end of the javelin – were considered legal! This enhanced the numerical loss in the transition as throws that the IAAF rules classified as fouls were counted in the pre-1986 US lists.

The surprising conclusion that technique has increased its importance in the javelin throw is also supported by the tendency to a rise in the "loss" at levels below 60m! Even further circumstantial evidence is given by some experimental observation.

1. With the old javelin the correlation between the speed of release and the distance thrown is listed as 0.93 in a Japanese study (Ikegami, Miura, Matsui & Hashimoto, 1981) while an analysis in Sweden (Borgström & Almström, 1986) the past summer indicates that the figure for the new implement might be significantly lower (0.80-0.87).

2. Comparisons between performances by a "javelin canon" and human throwers indicates that "the humans" – that don't have the perfect technique of the canon – lose more on the transition from the "old" to the "new" javelin (Borgström, 1986).

The change of the 800g-implement has fulfilled the goals of undisputable landings (it is more or less impossible to get the javelin to land in another way than by hitting the ground with the tip, the metal head making a distinct mark) and a decrease in distances achieved by top throwers to a level that is a good compromise between "beauty" and "security". As a bonus, wind and/or

wind change is no longer influencing the results as before and thereby the risk of throws blowing way out of the sector has also diminished considerably.

But another very positive change – obviously totally unsuspected by javelin experts – is that the statistical material from the first year strongly indicates that the technique has gained increased importance. To be successful a thrower needs a balanced combination of technique and physique, just as it should be!

The overwhelmingly positive effects of this new rule must lead to a similar change in the 600g-implement used by women. In a sport like athletics – guided by the principles of precision and objectivity – it is unacceptable that the arbitrariness created by the more

or less flat landings should exist when it is possible to eliminate.

Just as with the 800g-implement the change must affect all levels internationally and nationally. The reasons:

1. Athletics is ONE sport with detailed rules constructed to make it meaningful to compare results from any meet with results from any other meet. We must always avoid rules that create a gap between, different categories of competitions;

2. Two different types of implements will mean a terrible confusion as to which javelin has been used in which instance. And how should we explain to the public that performances in national meets might be better than those in the major international competitions?

Table 7 - Yearly world development

(Source: "International Athletics Annual" compiled by ATFS (Association of Track and Field Statisticians. For 1987 a provisional list has been used, courtesy of Richard Hymans. ATFS.)

Position No	1982 cm	1983 cm	Diff cm	1986 cm	1987 cm	Diff cm
1	9580	9972	392	8574	8766	202
5	9072	9144	72	8320	8430	110
10	8840	9058	218	8186	8324	138
15	8772	8902	130	8130	8220	90
20	8678	8780	102	8066	8142	76
25	8604	8720	116	8028	8074	46
30	8582	8616	34	7958	8060	102
35	8552	8562	10	7904	7984	80
40	8514	8528	14	7856	7948	92
45	8458	8480	22	7818	7928	110
50	8400	8458	58	7738	7902	164
55	8326	8370	44	7714	7854	140
60	8294	8292	-2	7684	7810	126
65	8246	8278	32	7648	7766	118
70	8192	8252	60	7616	7740	124
75	8166	8222	56	7602	7718	116
80	8136	8200	64	7586	7704	118
85	8120	8176	56	7574	7670	96
90	8096	8138	42	7546	7654	108
95	8074	8130	56	7540	7636	96
100	8048	8114	66	7530	7590	60
105	8020	8078	58	7506	7562	56

3. Most importantly, the reason for the change – to get rid of the flat landings – is as important locally and nationally as internationally! Every person joining our sport as an athlete should get a fair treatment. The disputable landings are in fact much more common on a less advanced level of throwing and also the ability of the judges are probably quite often lower in national meets.

The male javelin throwers already

have been fortunate enough to have their implements modified in a way that guarantees fair competition. Their female colleagues at all levels all over the world deserve the same favour! It is also necessary for the credibility of our sport as one of precise and objective judgement of the efforts. The credibility that was restored for the 800g javelin on 1 April 1986.

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