# OBSERVATION OF TECHNIQUES OF SEVERAL WORLD-CLASS POLE-VAULTERS

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Ken Goodall and myself studied a slow-motion film of pole-vaulting techniques as performed by world-class vaulters.

There were limitations to our study, i.e. lack of time and the fact that some of the vaulters were only filmed from one angle, the result being that we could not examine certain movements.

Nevertheless, I regard the importance of this report to be the raising of some interesting points, which may be used by coaches who take films or video-tapes of their athletes.

*Elchanan Bar-Lev*

## CRITERIA FOR OBSERVATION OF POLE-VAULTING TECHNIQUES

1. The angle between the top arm and the perpendicular through the shoulder joint - as the take-off leg leaves the ground.

2. The angle between the take-off leg and the perpendicular through the hip - as the take-off foot leaves the ground.

3. Vertical difference between the hands at take-off (in eights of an arm).

4. Angle of leading thigh to horizontal at take-off.

5. Whether front leg straightens during hang/swing phase (yes or no).

6. Amount of straightening (in eights of a leg).

7. Whether spine is <u>rounded</u> or <u>flat</u> when horizontal in rock-back.

8. Whether head flexed (+1 or +2) parallel to spine (0) or extended (-1 or -2).

9. Angle of top arm to perpendicular, through shoulder when horizontal during rock-back.

10. Angle of thighs to trunk when horizontal during rock-back.

11. Position of top hand in relation to saggital plane before turn and pull begins. (1 to 3 - see picture).

12. Whether pull is executed with straight arm or whether arm flexed during pull phase.

13. Is clearance made by using "Jack-knife" ($90^{o}+$) or "Fly-away" ($90^{o}-$) techniques.

## CONCLUSIONS

1. Angles of the top hands behind the shoulders in take-off ranged between 22° and 45°. Ignoring the extreme two scores, they averaged at 29°.

2. Angles of take-off legs behind in take-off were fairly close in all - 22° to 30°.

3. With two exceptions, the difference in height between top and bottom hands at take-off lay between 2/8 and 4/8 of an arm's length, from which we may conclude that the front hand of most of the vaulters was extended upward in front of and above the head.

4. Angles of the leading legs to the horizontal provided a wide range in the scores, extending from horizontal (Baird and Tsakow) to 52° (Kozakiewicz).

5. Only Baird fails to lengthen his leading leg during the hang/swing phase.

6. The degree of lengthening varied between:
   (a) Foot level with knee of opposite leg (Baird);
   (b) Feet almost together (Kozakiewicz).

7. Some of the vaulters flexed their spine during rock-back while others kept it straight.

8. With one exception (Tracanelli) the vaulters did not bend their heads backwards during rock-back.

9. When the back is horizontal, the top arm may be seen to have an angle of between 5° and 15° behind the perpendicular through the shoulder joint (only 4/7 vaulters were observed).

10. The degree of tuck varied between being very compact, with the knees almost touching the chin (Tsakow) and a fairly open position with the thighs at 124° from the horizontal (Löhre).

11. Of the vaulters observed (5/7) only Tracanelli pulled with the right arm close to his right side.

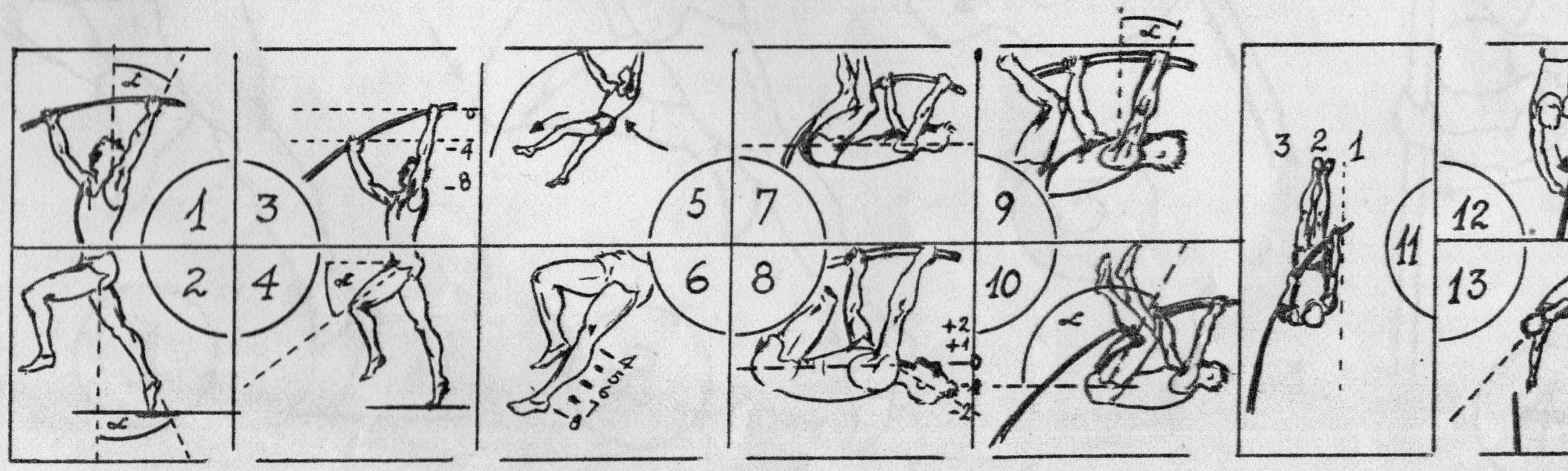
    (N.B. - Baird and Kalliomaki are left-handed vaulters)

12. All the vaulters observed (5/7) used a straight or fairly straight top arm during the pull phase.

13. Two of the seven vaulters (Kalliomaki and Löhre) tended to "Jack-knife" during the clearance. The remainder (5/7) used a "Fly-away" clearance.

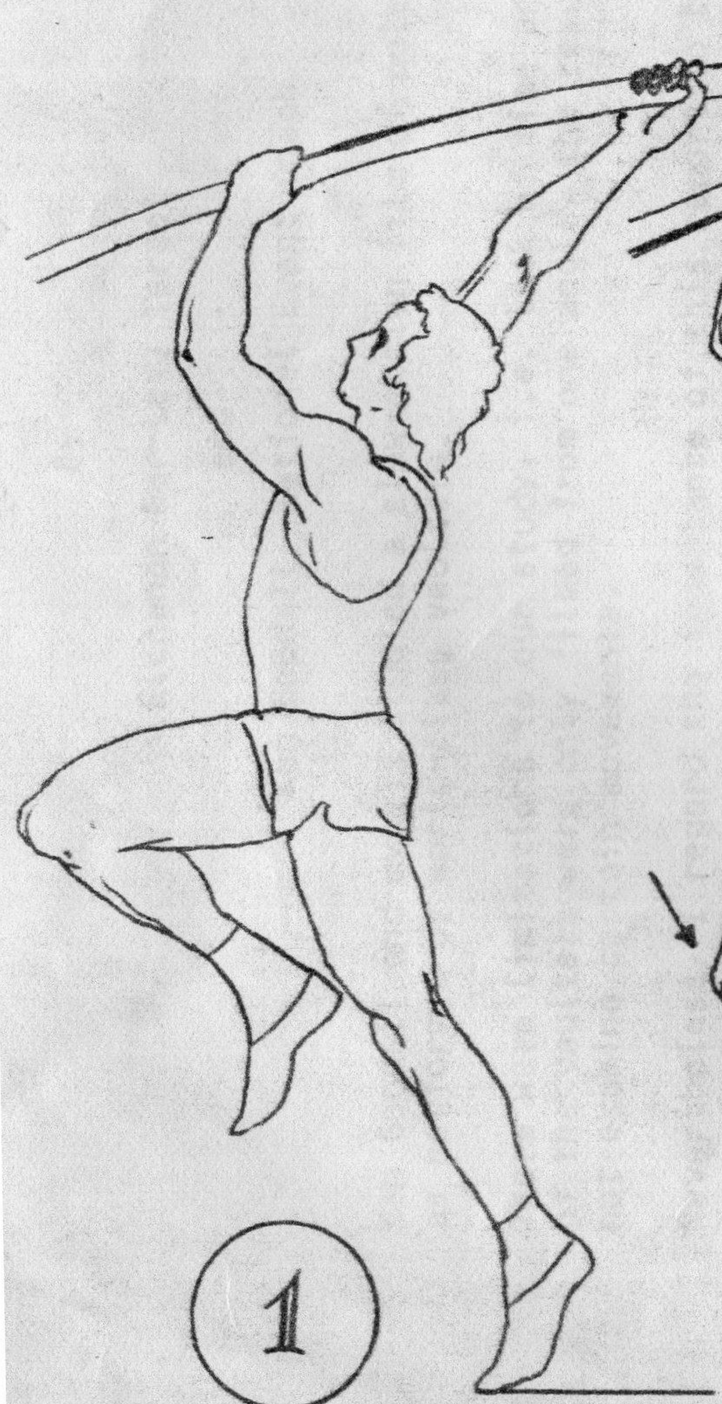
    Note: As a mere 1 or 2 vaults of each vaulter were observed, we could not prove that the style of the clearance is changed while jumping to different heights.

| NAME \ MOVEMENT Nº. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DON BAIRD, AUST. | 45° | 30° | -1/8 | 0° | No | 4/8 | Ft. | +1 | | | 3 |
| YURIY ISSAKOW, USSR | 22°/40° | 26°/24° | 5/8/3/8 | 0°/0° | yes/yes | 3/8/7/8 | Ft./Ft. | 0/0 | -5°/ | 160°/ | 3/3 |
| WLADISLAW KOZAKIEWICZ, POL. | 30° | 22° | 3/8 | 52° | yes | 7.5/8 | Ft. | 0 | | | |
| ANTTI KALLIOMAKI, FIN. | 27° | 27° | 2/8 | 45° | yes(-) | 5/8 | Ft. | +2 | | | 3 |
| PATRIK ABADA, FR. | 31° | 30° | 3/8 | 22° | yes(-) | 5/8 | Rd. | 0 | -15° | 130° | 3 |
| GÜNTER LÖHRE, WG. | 34° | 22° | 4/8 | 11° | yes | 7/8 | Rd. | +1 | -15° | 124° | |
| FRANÇOIS TRACANELI, FR. | 25° | 25° | 4/8 | 20° | yes | 6/8 | Rd. | -1 | -15° | 135° | 1 |



Some of the variations:

1. In picture 2 we can see the position of Kozakiewicz's take-off. The arrow shows his leading knee being 52° to the horizontal. His countryman Buciarski (picture 1) drives his leading knee close to horizontal position while taking-off.
2. Tsakow tends to "trap" his right hand between his legs just prior to lifting them upwards (picture 3)
3. Picture 4 shows Tsakow's phase when pulling-up. Note how far is the pole from his centre of gravity.



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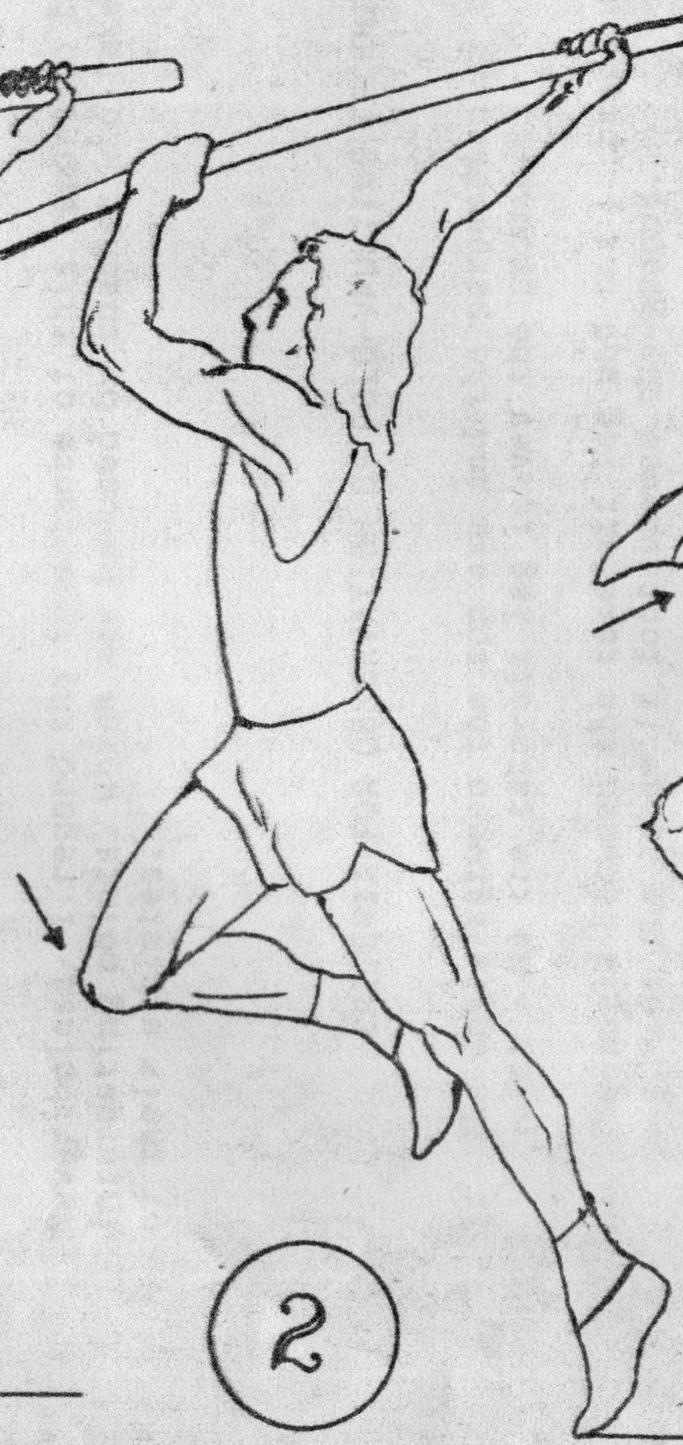

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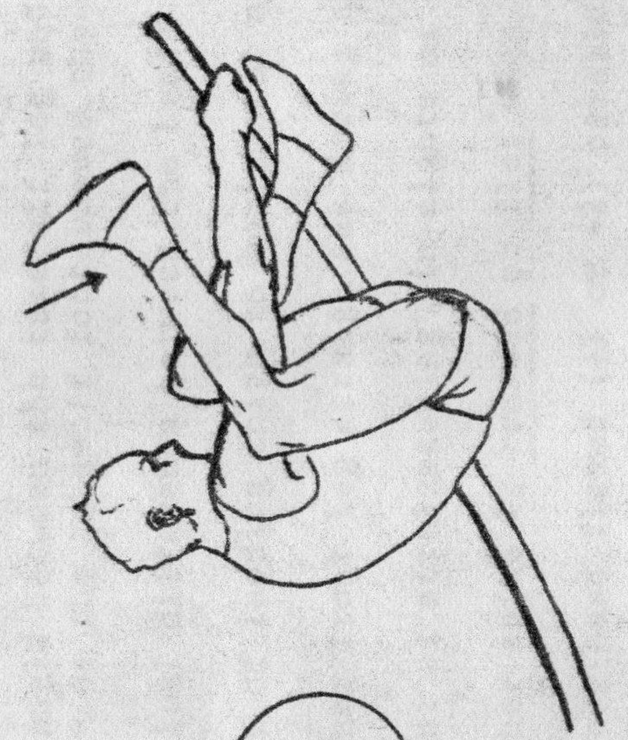

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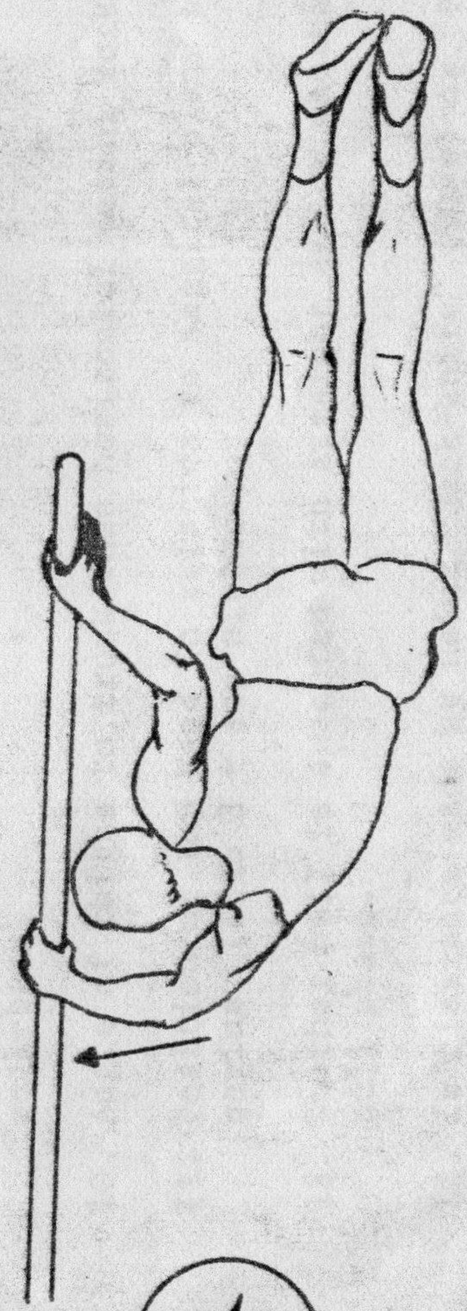

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