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## Run Up and Transition Characteristics in Javelin Throwing

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# RUN UP AND TRANSITION

CHARACTERISTICS IN JAVELIN THROWING

ANDREAS V. MAHERAS, PH.D.

In the course of a javelin throw the main goal is to develop the greatest possible javelin velocity before release. Although how this is accomplished hardly matters, for most throwers, sound biomechanical execution will produce the best performance. A discussion about javelin velocity will necessarily involve a discussion about rhythm which is of paramount importance in developing maximum velocity under control, both during the run up and the transition phases. The run up and the transition should be one smooth, rhythmical activity ordinarily consisting of thirteen or fifteen steps. The transition phase includes the javelin withdrawal which usually occurs during the second step of that phase.

## THE RUN UP

Rarely does the run up phase need to be longer than eight steps (figure 1). Too often, longer run ups result in excessive speed which creates the conditions for loss of rhythm and a slowing down during the transition phase. For all practical purposes, i.e., specificity of training and rhythm establishment, it is a good idea that the thrower uses the same number of steps throughout her career. If in the early years, the run up is shorter, that

Figure 1. The Eight Run Up Steps

Step 1 (Left)



Step 8 (Right)

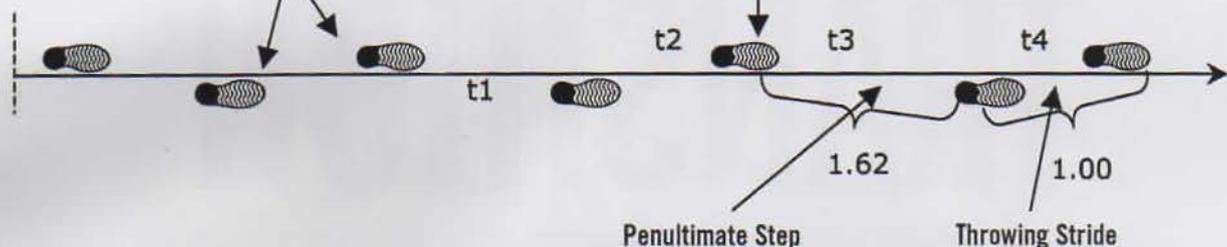
Figure 2. The Seven Transition Steps

Step 1 (Left)

Javelin withdrawal

Impulse step

Step 7 (plant - Left)



will be because the steps are shorter and slower not because they are fewer. As experience improves, the length of the run up will increase alike. Below, a rudimental 15-step execution is briefly described with eight run up and seven transition steps.

In a proper run up, the thrower stands just behind the check mark facing straight forward and the javelin comfortably supported above shoulder level with the tip down from horizontal. The thrower starts the run up by stepping on the check mark with the right foot and begins to run smoothly forward bringing the left foot forward (step one) and the throwing arm also moving rhythmically to the movement of the legs. The intensity of the rhythm gradually increases with each step. After executing eight steps, the right foot should hit the second check mark (if the thrower uses one), and the transition phase begins.

**THE TRANSITION**

As the right foot hits the second mark, the right hand moves naturally and rhythmically forward. This movement continues while the javelin hand starts moving back and the left foot (step one in the transi-

tion phase) contacts the ground. The backwards movement of the javelin continues as the right foot comes forward to conclude step two of this phase, and the javelin withdrawal is either completed in this step or concludes when the left foot touches down again in step three of the transition (figure 2). For the next two steps, four and five, the javelin remains withdrawn and left behind as the thrower moves forward. Following, a longer step with the right foot is executed as far as possible and without tension to complete step 6 of the transition. This exaggerated sixth step with the right leg/foot forces a shorter last step with the left foot, step seven in the transition, which is the plant of the throw.

As the thrower withdraws the javelin during the transition phase, the legs continue their task of driving dynamically forward to further accelerate the thrower-javelin system. All this culminates in the sixth, also called the penultimate, step to prepare the body for the final effort of the throw. Before the penultimate step, the run is fairly uniform with acceleration such that that it allows the thrower to achieve the optimum velocity for the ensuing throw. As the left foot pushes off

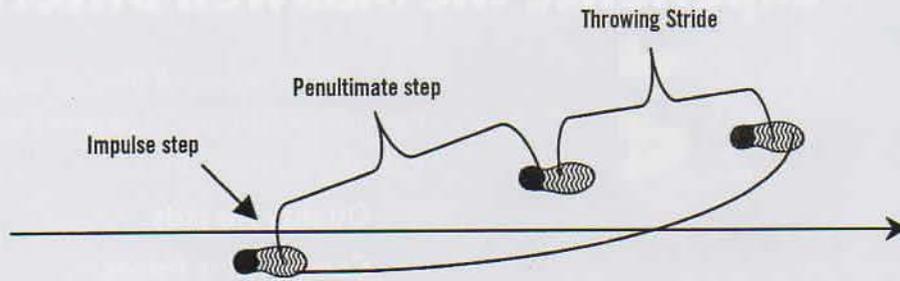
in step five of the transition phase, the withdrawal of the javelin has already been completed and at this point the upper body and to a lesser extent the hips turn sideways. The push off of the left foot during the penultimate step creates a cross step while the thrower is airborne. The landing of the right foot to complete the penultimate stride, step six, is quickly followed by the landing of the left foot which completes the seventh and last step of the transition phase.

**TRANSITION STEPS RELATIONSHIPS**

Over many years of analyses and observations, a numerical relationship was developed between the last two strides of the throw. This relationship in terms of both length and time seems to be extremely important for the throw. According to the veteran biomechanist, Terauds (1985), errors in this ratio upset the rhythm and damage the throw. He further postulated that the proper relationship between the last two strides is the key to a good throw.

The execution of the sixth and seventh steps should be such that the ratio between those two steps in distance is approximately 1.62 (figure 2). That means that the length of the penultimate

Figure 3. The Drift to the Left During the Last Three Steps of the Throw



step should be 1.62 times longer than the final throwing step. If the thrower has a throwing step of say two meters, then the penultimate step should be  $2 \times 1.62 = 3.24$  meters. From that relationship we estimate that the last step is  $(1/1.62) = 0.62$  of the penultimate. Similarly then, if a thrower has a penultimate step of say 3.24 meters then the throwing stride should be  $3.24 \times 0.62 = 2.00$  meters. In figure 2, during the last four transition steps of the throw, the penultimate,  $t_3$ , is the longest, followed by  $t_1$  which is the second longest and  $t_2$ , third longest, whereas the throwing stride,  $t_4$  is the shortest. In  $t_3$  there is an active landing of the left foot, the impulse, and the ensuing take off produces the penultimate step. The fact that  $t_2$  is shorter than  $t_1$ , shows a long jump like action on the part of the javelin thrower where the very last step, the one that precipitates the actual jump, is more or less shorter and quicker than the preceding steps. Similarly the javelin thrower wishes to achieve a long penultimate step on her way to establishing a favorable throwing stride. A shorter and quick impulse step will aid in that effort.

#### PATH OF RUN UP AND TRANSITION

As far as the direction of the whole movement, ideally, the most advantageous action for the run up and the transition is to follow a straight line. Indeed, many javelin throwers follow a straight path to the transition phase. However, many throwers, including high caliber throwers, deviate from a straight path, particularly during the transition phase following some individual pattern. According to a commonly observed

pattern, a greater release velocity can be achieved when the javelin is directed through the right of the right shoulder. For that to happen successfully, the thrower should curve to the left during the last two steps, steps six and seven, of the transition phase to enable the javelin to be in line with the overall direction of the run, up to that point. In this fashion, the right foot will land about 20-25cm to the left of the line and the left, planting foot, between 30-40 cm further to the left (figure 3). It should be noted here that the deviation to the left is precipitated by a placement of the fifth step (impulse) slightly to the right of the line so the center of mass is to the left of that foot. By executing this sequence in the last three steps, the javelin is directed through the right of the right shoulder and with a slight body lean to the left, the thrower enables the planting left foot to be directly under the javelin which may also marginally increase the height of release.

#### CONCLUSION

The execution of a javelin throw is a smooth and at the same time dynamic activity which is comprised of the run up and the transition steps/phases. Usually but not necessarily, 13 to 15 total steps are utilized. All steps are executed as one, evenly accelerated and coordinated movement. It is imperative that the thrower practice those two phases many times over, to establish a biomechanically sound pattern and create the foundations for the maximization of the final effort of the throw. The consideration of the observed relationships, between and among the transition steps, will aid

in increasing the thrower's technique effectiveness. Simple video or pictures of the thrower taken with ordinary hand-held cameras can be easily analyzed with pen and paper to assess the relationship between the transition steps.

Regarding the direction of the movement, drifting to the left during the latter parts of the transition phase is a preferred technique for many throwers. Similarly, there are throwers whose javelin lands outside the right (or left) sector. This error may be corrected by drifting to the left (or right) during the transition or by changing the direction of the run up along a diagonal path from the right to the left of the runway. Moreover, when the wind is from the left, it would be a good idea for the thrower to indeed run diagonally from right to left or if the wind comes from the right, to do the opposite. It is a mechanical error to move straight on the runway if distance can be increased by altering the direction of movement.

#### REFERENCES

- Terauds, J. (1986). *Biomechanics of the Javelin Throw*. Del Mar, California: Academic Publishers.
- Dunn, G. & McGill, K. (2003). *The Throws Manual*. Mountain View, CA: Tafnews Press. 

Dr. Andreas Maheras is the throws coach at Fort Hays State University in Kansas and is a frequent contributor to techniques.