

# **Pianist Yuja Wang's high-heel shoes and the piano pedal techniques**

*by Hugues Bedouelle*

**Yuja Wang is an exceptional virtuoso pianist who has been nominated "Artist of the Year 2017" at the age of 30 by the magazine Musical America [1]. Yuja Wang wears high-heel shoes on stage and this peculiarity has been repeatedly commented upon and criticized as inducing heavy pedaling [2-4]. A careful anatomical analysis of renowned pianists' videos has revealed two different techniques of pedaling, corresponding to low and high positions of the heel, and therefore to either a dorsiflexion or a plantar flexion of the foot at rest [5]. None of the two techniques appears superior to the other for the control of the leg muscles and pedal. The heights of the shoe-heels and bench are used to adapt the pianist's morphology to the fixed dimensions of the piano and result in compromises between different components of the pianistic technique. This analysis could be useful to pianists of different ages and morphologies and for the pedagogy of piano playing.**

Yuja Wang's posture at the piano is especially correct and elegant, nearly exemplary [6, 7] and it has improved over the years as can be visualized by comparing her videos. She stands straight on the bench and does not bend towards the keyboard. She sits on her two ischions (the sitting bones), on the front half of the bench, which leaves the hip joints and therefore the legs free to move. Her thighs are nearly horizontal, i.e. parallel to the plane of the floor. This position of the thighs favors the pianist's equilibrium and avoids the arching or bending of the back. It also enables the upper part of the body to rotate easily around the points of contact between the ischions and the bench while keeping the feet on the pedals when both hands have to reach and play in the upper or lower end of the keyboard. The rotations of the pelvis around horizontal axes, perpendicular to the keyboard, are very visible in Yuja Wang's videos [8]; they are optimal to keep the shoulders in line with the keyboard and the arms free for virtuosity, when compared to rotations around a vertical axis that twist and destabilize the body. Sviatoslav Richter's position at the piano shares the same characteristics [9].

What are the physical constraints on piano playing?

- 1) The top of the white keys on a Steinway grand piano are 28 1/8" (71.5 cm) above the floor.
- 2) The height of the bench is usually adjusted so that the tip of the elbow is even with the top of the white keys. This adjustment is optimal for leaving the upper part of the body, i.e. shoulders, arms and hands, free to move.
- 3) As explained above, the pianist's thighs should be nearly parallel to the floor.
- 4) The knees must have sufficient space under the keyboard to move up and down.

Constraints 1 and 2 determine the height of the bench and therefore of the ischions above the floor. Constraints 3) and 4) then determine the distance of the knees to the floor.

Yuja Wang is usually described, either by herself or interviewers, as tiny or petite and slender [10]. It would be ridiculous to state that her feet cannot reach the pedals because of her small size. There are videos of very young children using adequately the pedals [11]. However, it is obvious that Yuja Wang's heel bones cannot reach the floor with the four constraints described above. In rare videos where Yuja Wang sits at the piano with bare feet, her posture is far from optimal. Thus, Yuja Wang must wear high-heel shoes if she wants to maintain an optimal posture at the piano, from virtuosity and aesthetics viewpoints.

What are the consequences of wearing high-heel shoes for the technique of pedaling? In the usual way of pedaling, the heel-bone rests on the floor and the movement of the foot occurs at the ankle joint which is in front of the heel-bone [6]. When the pedal is at rest, the foot above the pedal is in a slight dorsiflexion (up position of the foot), the muscles in the anterior part of the leg are contracted whereas the muscles in the posterior part of the leg are stretched. The pressure of the foot on the pedal is mainly controlled by the degree of contraction of the anterior muscles. When the foot is equipped with high-heel shoes and the pedal at rest, the foot is in a slight plantar flexion (down position of the foot), the muscles in the posterior part of the leg are either relaxed or slightly contracted whereas the

muscles in the anterior part of the leg are stretched. The pressure of the foot on the pedal is obtained by further contraction of the posterior muscles of the leg.

The feet are naturally in plantar flexion when one is lying down or sitting with the legs hanging down. Thus the muscles of the legs could be less stressed with high-heel shoes. With low-heel shoes moreover, the anterior muscles of the leg are less contracted (more relaxed) when the pedal is depressed; whereas with high-heel shoes, the posterior muscles are less contracted when the pedal is at rest. Thus, low-heel shoes might induce heavier pedaling than high-heel shoes, contrary to the common belief. Whether the precision and latency time of action are optimal when the foot is in a zero position at rest, as when one is standing up, remains to be determined. Martha Argerich used to wear high-heel shoes when she was young and her foot was therefore in a plantar flexion at rest. Thus, her control of the pedal used the same muscles and mechanism as Yuja Wang. However, her heels were smaller than Yuja Wang's ones, her thighs were at an angle with the floor and she slightly leant forward [12].

When a pianist, as Yuja Wang, has a balanced sitting on the bench, correct pedaling involves small movements of the knee and hip joint [6]. These small movements can be readily observed in Yuja Wang's videos [7]. In fact, one can observe that sometimes her shoe heel does not even rest on the floor and that the action of her leg and foot on the pedal is similar to that of an organist on a pedal board [13]. The same phenomenon can be observed furtively in Richter's videos [9].

In conclusion, there are two main techniques of pedaling : 1) with flat or low-heel shoes, the foot in a dorsiflexion at rest, mainly adopted by tall pianists; 2) with high-heel shoes, the foot in plantar flexion at rest, mainly adopted by smaller persons, typically women. The balance and coordination of action between the anterior and posterior muscles of the leg are clearly different in the two techniques. Both techniques have advantages and disadvantages in terms of controlled tension, relaxation, contraction and coordination of the leg muscles, and none appears superior to the other. Given the unnecessary violence with which the pedal is occasionally actioned in fast or loud music passages, an important aspect of the pedal technique may be to obtain not only coordination but also independency between the feet and hands. In that respect, playing the organ might be a good training.

The pianist's posture and its consequences on technique result from a compromise between the pianist's morphology, the adjustable position and height of the bench and the fixed dimensions of the piano. Yuja Wang's high-heel shoes are obviously a way to optimize this compromise. Her videos give the watchful observer a mine of technical and anatomical details, including the interplay of her arm, shoulder, back, abdominal and leg muscles, breathing, etc. of pedagogical interest. I have also a small request for the video technicians, in line with Vasili Safonov's advice to his students (quoted in [14]): Please give more light and attention to the pianist's feet.

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