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## Neymar Jr: Diver or Footballer?

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### Abstract

Neymar Jr, a player for Paris Saint Germain (PSG) and the Brazilian national team, is one of the best footballers in the world. He is known for theatrically falling (diving) to the ground in matches to win fouls. During PSG's pre-season match vs Gamba Osaka, Neymar's right ankle was clipped by the opposition's defender. He fell to the ground in agony and was awarded a penalty. This was very controversial, and many people accused him of blatantly diving. This paper argues that he is not diving in this case and due to his previous injuries on the same ankle and a fast reflex, he lost his balance and fell to the ground.

**Keywords:** Sports; Biology; Sports Science; Football; Reflex; Neymar Jr

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### Introduction



Figure 1 – Shows Neymar Jr clutching his right ankle in pain after a clash with Genta Miura in PSG's match against Gamba Osaka on the 25<sup>th</sup> of July 2022 [1].

Neymar da Silver Santos Junior, commonly known as Neymar Jr, is a Brazilian footballer who plays for Paris Saint Germain and the Brazilian national team. He is considered as one of the best footballers of this generation. At 31 years old, he has won a total of 26 trophies including a Champions League, leagues in Brazil, Spain and France and an Olympic Gold Medal [2]. In addition to his phenomenal football skills, he is also famous for his theatrical falls during matches. There is a lot of controversy surrounding his falls and it often seems that he is pretending to win a foul. His theatrics on the pitch leave rival fans feeling enraged and thus he is known as a 'diver'.

During PSG's friendly pre-season match against the Japan's Gamba Osaka, Neymar's fall was called a 'world-class dive' [3]. In the 30<sup>th</sup> minute of the match, Neymar was dribbling with the football when his right ankle was clipped slightly by Genta Miura, a defender for Gamba Osaka [3]. This led Neymar to fall dramatically to the ground in what seemed to appear as agonising pain. Despite the protesting from the opposing team, the referee awarded Neymar the foul and gave him a penalty [3]. This paper will explore why this was an actual foul and not a dive.

### Previous Injuries

His right ankle was involved in the contact [3]. Neymar has a history of serious injuries to his right ankle [4, 5]. In 2018, he endured a fissure of the fifth metatarsal fracture and a sprained ankle, as well as a torn ligament [6, 7]. A fifth metatarsal describes the long bone on the outside of a foot that joins to the pinky toe [8]. As shown in figure 2, Neymar suffered from an avulsion fracture which involves a part of the bone to break off [9]. The torn ankle ligament required surgery as the tissue was separated from the blood supply [10].

Injuries such as these have long-lasting effects, especially if they are not handled with care [7]. Chronic pain, a continuous pain over 3 months despite treatment, is very common with torn ligaments and fractures as the ankle becomes weaker

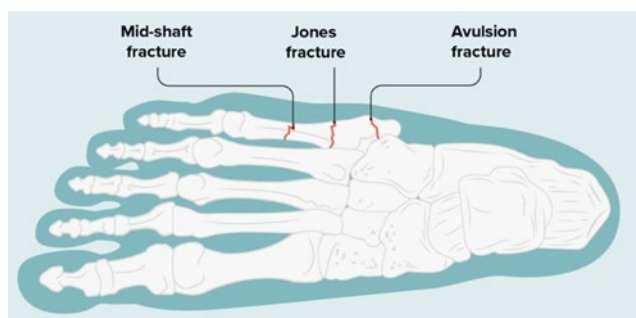


Figure 2 – Shows the three types of fractures that can occur on the fifth metatarsal [8].

after injury due to the trauma caused to the ligaments around the bones [11, 12]. These can take years to recover to full strength. Rest and care are required to avoid prolonged pain but due to his profession, his ankle is constantly facing pressure and knocks, hindering its recovery. As a result, he faced injuries on the same ankle in 2019 and 2021 [6]. Being injured on the same foot weakens the ankle and destabilises it which increases the chance of getting a worse injury in the future [7].

Therefore, it is probable that his ankle was still very delicate in the match due to his previous injuries. If the ankle is weakened, a greater injury will be sustained than if the ankle was in a healthy condition.

### Reflex

Having a weakened foot means that subconsciously a person would be more cautious to danger, like flinching. A withdrawal response, more commonly known as a reflex, is an automatic response of the effector tissue via the reflex arc in the spinal cord [13]. The nociceptors on his skin detect the stimuli which exceeds the sensory neuron threshold and causes the neuron to depolarise. The depolarisation causes electrical impulses to the central nervous system via pain fibres [13]. Then, the pain fibres send the electrical impulses to the sensory neuron which is in the dorsal root ganglia on the spinal cord [13]. The electrical impulses are relayed to the motor neurons which depolarises the target muscles on the knee which contract causing him to jump away from the original stimuli [13]. This sharp movement causes his centre of mass to pass on the outside of his base, causing him to fall as he loses his balance.

### Protective Fall

Once he is on the floor, he starts to roll. Neymar's theatrical rolls could be a way of him moving and twisting away from defenders as a reflex to prevent getting hurt further. The rolls would absorb the force and distribute it equally through the body rather than it being absorbed by just one bone; this is a technique used by Parkour Free Runners [14]. These falls seem overly animated to viewers as he resumes playing as normal once the theatrics are over. However, the energy from the collisions is transferred to him in many ways; some is transferred as elastic potential energy through the compression of his tissues, some is lost via sound energy. This means not all of it is causing direct injury to him, but he is still being impacted by it.

### Influence of the Opposition

In a match, players tend to over emphasise the impact of collisions in hope of winning a foul. The more important the match, the more dramatic the fall. Neymar is an expert in such falls. However, it must be noted that this match was played as a warm-up for the upcoming season, and it held no real importance or had any influence on the league. Moreover, by the 30<sup>th</sup> minute, PSG were just 1-0 up with most of their main players on the pitch [3]. This was also a team that played in the Japanese league, who do not possess the quality of PSG. Therefore, it would make no sense that Neymar would dive in a match that holds such low stakes.

### Conclusion

It does seem that Neymar's fall was due to his previously injured foot being hit which caused him to subconsciously move his foot back as a reflex. This caused him to lose his balance which caused him to fall. The roll he did was also subconsciously done in a similar tactic as Parkour Free Runners to prevent further injury. There is no reason why he would purposely fall in such a way as this match had no impact on his season. In this case, it can be said that he was not diving and was fouled. Irrespective of this, the same cannot always be said for all his falls; there are some dives that no amount of science can justify.

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