

## Trips Versus Slips

One type of accident that investigators are often asked to evaluate is a slip/trip and fall. In this type of investigation, a person has typically suffered a fall and subsequent injuries which they believe to be the fault of the entity(s) which controls the property (e.g., owner, lessee, maintenance company). Not surprisingly, the circumstances surrounding any single event are unique and require careful consideration, but there are several recurring themes that often arise including the difference between a trip and a slip event. Hence a basic understanding of these concepts is important regardless if representing either the plaintiff or defendant(s) in the matter as they relate to the basic physics and engineering behind the fall event.

One of the first considerations should always be to determine if the scenarios involved a slip or a trip. A casual observer may find little distinction between the two, but the physics and ultimately the cause of the fall are fundamentally very different. A proper understanding of the two may impact the value of the injured party's testimony or the defendant's culpability.

Walking (or running) can be reasonably described as placing all of one's weight on one leg and then intentionally falling forward. This causes the person's center of gravity to move in front of the supporting leg. Without any further action, the person would fall forward. Normally, however, the fall is arrested by moving the opposite leg and foot out in front of the body and stepping down. As the person's momentum carries them forward, the process is repeated.

During a trip, a person's foot strikes something during its forward movement. This prevents the leg/foot from moving far enough forward to arrest the fall. Many times, during a minor trip, the person will stumble forward and eventually catch themselves before falling. But if they are not able to do such, they will typically fall forward (in the direction of their momentum). A typical response to a face forward fall is to put up your hands and arms to protect yourself. Injuries subsequently typically occur on both knees, hands, or forearms and on the head/face. Of course, there are a myriad of scenarios that may result in a trip-fall that results in injuries in other areas of the body (e.g., a trip followed by running into an object may experience top of the head or shoulder injuries). An investigator should carefully consider the specific circumstances of any alleged trip-fall accident to ensure there is (or is not) a valid explanation for any abnormal injury patterns.



A slip, on the other hand, can generally be characterized as a person's foot losing traction and sliding on a walking surface. The slip can be a toe slip, where the toe of the trailing foot slides backwards. This, however, does not typically result in a (serious) fall because the person's weight has already been primarily transferred to the lead foot. A heel slip, where the lead foot loses traction and slides forward is a more common cause of a significant fall. During a heel slip, the walker has attempted to transfer their

weight onto the front foot, which is in front of the body and its center of gravity. When the foot slips, the result is often the person falling backwards or one leg is forward and the second back (doing a 'split'). Whereas a trip-fall typically causes injuries to the front of a person's body, a slip-fall backwards often displays injuries to the elbows, back, buttocks, and back of the head. A person doing the splits may suffer hip, knee, or ankle joint injuries along with possible scrapes/bruises to hands, elbows, or knees on one side but not both. As with a trip-fall, an analysis of the injury patterns can lead to vital conclusions regarding the circumstances of the incident.



*Case Study 1* – One example of this type of analysis providing useful information was in a case where a person claimed to have tripped over a temporary telecommunications wire strung across an exterior walkway/stairway descending a shallow grade in an apartment complex. The plaintiff claimed that he was walking down the stairs when his foot caught on the wire tripping him. However, the only reported injury was that he struck the back of his head. No other scrapes or bruises were reported, and the scene photograph showed the plaintiff with his legs further down the steps than his head. Based on the injuries and testimony, the plaintiff fell backwards. In this scenario, not only would a trip event not likely lead to a back of the head injury, the act of going down the stairs would further result to a face-forward fall. Taken together, the plaintiff slipped rather than tripped. The analysis cast significant doubt on the plaintiff's description of events and the role of the telecommunications wire in the accident. Instead, the analysis suggested that a simple misstep on the unevenly spaced steps was the most likely cause of the fall.

*Case Study 2* – The plaintiff in another matter was injured when she slipped and fell down a short stairway as she exited a trailer. The lawsuit claimed that the door of the trailer was hard to open and when she pushed on it with her shoulder, she stumbled forward when it opened. This then caused her to slip on ice/snow that had accumulated on stairs resulting in a backwards fall (typical of a slip). The contribution of the allegedly sticking door was questioned by considering the physics of a slip-fall. As described previously, a heel slip and backwards fall (to strike the back of her head) occurs when a person's center of gravity is behind the lead foot as weight is placed on it. But, in the scenario as described by the plaintiff, the suddenly opening door caused her to fall forwards and then slip on the ice. The result, if this were true, would be for the ice/snow to prevent her from stopping her forward momentum. The plaintiff would have most likely fallen face first (or perhaps sideways since she was using her shoulder to open the door) down the stairs. From this physics-based analysis, the role of the sticking door in the incident was determined to be insignificant. The plaintiff simply slipped while descending the icy/snowy stairs and predictably fell backwards.

Many trip/slip and fall cases focus on issues such as lighting, visibility, and attentiveness (trips) or surface friction and premise maintenance (slips), but a careful review of the reported facts and physics of



the scenario to determine if the injured party tripped or slipped should always be the first step in any slip/trip and fall investigation. If you are investigating a slip, trip and fall event and are interested in engaging an expert witness to support your case, please contact us at Aither Forensic Engineering.

Aither Forensic Engineering  
PO Box 158  
Gambrills, MD 21054

(443) 302-9994  
jkiddy@aitherforensics.com  
www.aitherforensics.com