# Fingerprints do not improve grip friction

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Image credit: Wikimedia.

Fingerprints mark us out as individuals and leave telltale signs of our presence on every object that we touch, but what are fingerprints really for? According to Roland Ennos, from the University of Manchester, other primates and tree-climbing koalas have fingerprints and some South American monkeys have ridged pads on their tree-gripping tails, so everyone presumed that fingerprints are there to help us hang onto objects that we grasp.

This theory that fingerprints increase friction between the skin and whatever we grab onto has been around for over 100 years, but no one had directly tested the idea. Having already figured out why we have

fingernails, Ennos was keen to find out whether fingerprints improve our grip, so he recruited Manchester undergraduate Peter Warman to test out fingerprint friction and publishes his results in the *Journal of Experimental Biology*.

Because the friction between two solid materials is usually related to the force of one of the materials pressing against the other, Ennos and Warman had to find a way of pushing a piece of acrylic glass (Perspex) against Warman's finger before pulling the Perspex along the student's finger to measure the amount of friction between the two. Ennos designed a system that could produce forces ranging from a gentle touch to a tight grip, and then Warman strapped his index finger into the machine to begin measuring his fingerprint's friction.

But after days of dragging the Perspex along Warman's fingers and thumbs, it was clear that something wasn't quite right. Instead of the friction between each finger and the Perspex increasing in proportion to the amount that the Perspex® pushed against Warman's fingers, it increased by a smaller fraction than Ennos had expected. Ennos realised that instead of behaving like a normal solid, the skin was behaving like rubber, where the friction is proportional to the contact area between the two surfaces.

To check that skin behaves more like rubber than a normal solid, the duo varied the area of each fingerpad that came into contact with the surface by dragging narrow and wide strips of Perspex along Warman's fingerpads. They found that the friction did increase as more of the fingerprint came in contact with the surface, so the skin was behaving just like rubber.

Finally, the friction issue was clinched when Warman measured his fingerprints' surface area. The area of skin in contact with the Perspex was always 33% less than if the fingerpads were smooth resulting in the

maximum contact area. Fingerprints definitely don't improve a grip's friction because they reduce our skin's contact with objects that we hold, and even seem to loosen our grip in some circumstances.

So if fingerprints don't tighten our grasp on smooth surfaces, what are they for? Ennos explains that our fingerprints may function in other ways. They might have evolved to grip onto rough surfaces, like tree bark; the ridges may allow our skin to stretch and deform more easily, protecting it from damage; or they may allow water trapped between our finger pads and the surface to drain away and improve surface contact in wet conditions. Other researchers have suggested that the ridges could increase our fingerpads' touch sensitivity. Whatever our fingerprints are for, it seems that the idea that they provide friction for grip is just another urban myth.

Source: The Company of Biologists (news : web)