

Get a grip! Blistering new evidence on why we have fingerprints

May 29 2009



Image credit: Wikimedia.

(PhysOrg.com) -- Fingerprints do not help primates grip, as previously thought, scientists have discovered. They actually reduce the friction needed to hold onto flat surfaces. Now Dr Roland Ennos and his team at The University of Manchester are trying to find out: why do we have them?

Dr Ennos, at the University's Faculty of Life Sciences, said: "I have been thinking about this for years and, having played around with it for a bit, realised that skin is rubbery so the ridges in fingerprints might actually

reduce grip.

“Our experiments - using a plastic cup, weights and strips of Perspex (acrylic glass) to develop a simple machine in the lab - proved me right.”

He added: “What is interesting is that not only primates have fingerprints. Koalas, which are marsupials, have fingerprints too, while there are [monkeys](#) in South America that have them on their tails.

“So what are these prints for? My preferred theory is that they allow the skin to deform and thus stop blistering. That is why we get blisters on the smooth parts of our hands and feet and not the ridged areas: our fingerpads, palms and soles.

“We are now testing that theory and two others, that fingerprints improve grip on rough surfaces and that they increase sensitivity.”

Dr Ennos disproved the long-held assumption that fingerprints help primates to grip with a simple machine, three strips of perspex and the right hand of Masters student Peter Warman. They tested Peter’s grip on each finger and thumb on three different widths of perspex as the machine pulled the perspex strips down via a weight in a plastic cup. They also tested grip at three different angles by bending the fingers and thumb. This wide range of testing conditions allowed them to separate pressing force from the contact area and overcome any confounding variables.

The team, whose results are published and discussed in the *Journal of Experimental Biology* (June 2009), found friction increased with [surface area](#), against the normal law of physics which states that friction does not change with surface area. This is because skin is rubbery and not a normal solid.

The team also measured the contact area by covering the fingers and thumb with ink and taking prints at different forces, aligning them with the results. This showed that fingerprints reduced contact area by one third compared with flat skin, which would have reduced friction.

The results showed that fingertips behaved more like rubbers than hard solids; their coefficients of friction fell at higher normal forces and friction was higher when fingers were held flatter against wider sheets and hence when contact area was greater. The shear stress was greater at higher pressures, suggesting the presence of a biofilm between the skin and the surface. Fingerprints reduced contact area by a factor of one third compared with flat skin, however, which would have reduced the friction. This casts severe doubt on their supposed frictional function.

Dr Ennos said: “The experiment was so simple, this discovery could have been made 100 years ago; but scientists make assumptions and tend to look at complicated things instead.

“I like to think differently, I am interested in the ‘why’ questions and look at things that affect people in their daily life. Everyone thinks science is all about the impossible but it’s not - it helps us understand the world around us.”

He added: “There are potential spin-offs for this work. For example some people who suffer nerve damage that prevents sweating have slippery fingers and cannot grip: we could develop something to treat that.”

He and the team will now test how fingerprints affect grip on rough surfaces and on wet surfaces, to see if their function is to channel water away via their grooves. They will also test if and how fingerprints prevent blisters.

More information: ‘[Fingerprints](#) are Unlikely to Increase the [Friction](#) of Primate Finger Pads,’ [Journal of Experimental Biology](#) (June 2009)

Provided by University of Manchester ([news](#) : [web](#))

Citation: Get a grip! Blistering new evidence on why we have fingerprints (2009, May 29)
retrieved 26 April 2024 from
<https://phys.org/news/2009-05-blistering-evidence-fingerprints.html>

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