

Survival Relies on Speed

In the animal kingdom, speed is not a luxury — predators and prey alike depend on it for their survival. The hunted animal literally runs for its life and can only escape death if it is faster than its hunter.



1 The cheetah's tail serves as a stabilizing yaw rudder when it is hunting.

Usain Bolt set a new world record on August 16, 2009, in Berlin, Germany, by sprinting 100 m in just 9.58 seconds. He did this in the spirit of competition and for the tidy sum of prize money. The Jamaican athlete's performance was not a matter of life or death. In the animal kingdom, things are different. When a peregrine falcon dives from the skies at a speed of over 200 km/h or a cheetah darts across the grasslands clocking in at 120 km/h, these velocities are part of hunting strategies that aid the survival of these predators. In the course of evolution, prey animals like crows and gazelles have adapted their speeds to be able to flee from their predators.

[An anatomy made for hunting](#)

The case of the cheetah and gazelle (Fig. 1) demonstrates how close the race between eating and being eaten may be. The feline manages to accelerate from zero to 70 km/h in just two seconds, which it does by bringing its hind legs well ahead of its front legs — much as a hare does. A highly flexible spine supports this motion like a tight spring, while the cat's tail acts as a stabilizing yaw rudder. The downside to such a speed-maximized build is that the cheetah runs out of energy at no more than 400 m, at which point it needs to give up the chase. That's why the only way for it to succeed is to sneak up to the gazelle until it is no further than 50 m away.



2 The group behavior of a swarm of fish can be very confusing to a shark.

Exhaustion after the hunt

Even then, only around 40% of the cheetah's attacks end up in a kill. And, should the prey indeed end up dead, this is by no means a guaranteed meal for the cheetah. There may be lions or hyenas nearby who are stronger than the worn-out cheetah and who can chase it away from its bounty. Consequently, the cheetah really needs to eat its prey as quickly as it can. However, after such an extreme sprint, the exhausted animal first needs to rest for at least a quarter of an hour. Once it has regained its breath, of course, it tears the gazelle to shreds and eats the best of its meat.

Confusing swarm behaviors

Speed is an essential survival tactic for prey animals as well. In many cases, they complement this with elaborate group strategies. Huge swarms of birds or fish, for example, are fascinating to watch as they race across the sky or ocean like a big living cloud. The pursuing falcon or shark is usually unable to focus on any one target in particular (Fig. 2).

Complex escape methods

Sometimes, the best way for a pursued animal to make its escape is to combine a range of different movement strategies. The field hare, for example, is a very vulnerable animal. When it senses danger, it ducks into the nearest dell or pocket and holds still. In order to betray as little motion as possible, it reduces its usual pulse of 120 beats per minute (bpm) by half.



3 When sprinting, the field hare brings its hind legs well ahead of its front legs.

If the predator continues to advance regardless, the hare will shoot out of its hiding place like a cannonball, attempting an escape at the very last minute (Fig. 3). In order to accelerate to 70 km/h as quickly as possible, the hare triples its heart rate from the resting level of 60 bpm to 180 bpm just before it makes its dash.

Also, instead of running away in a straight line, this escapee is known to follow a zigzag path. Thanks to a special leg technique it has evolved over time, the hare is able to push its body sideways while in full stride, and thereby suddenly change direction. Because this makes for an entirely unpredictable flight path, even the fastest fox or dog may not be able to catch this elusive prey.

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