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# Cat Righting Reflex

The cat righting reflex is a cat's innate ability to orient itself as it falls in order to land on its feet. The righting reflex begins to appear at 3-4 weeks of age, and is perfected at 7 weeks[citation needed]. They are able to do this as they have an unusually flexible backbone and no functional collarbone. The minimum height required for this to occur in most cats (safely) would be around 1 m (3ft). Cats without a tail also have this ability, since a cat mostly moves its hind legs and relies on conservation of angular momentum to set up for landing, and the tail is in fact little used for this feat.[1]

## Technique[]

After determining up from down visually or with their vestibular apparatus[citation needed] (in the inner ear), cats manage to twist themselves to face downward without ever changing their net angular momentum. They are able to accomplish this with these key steps:

Depending on the cat's flexibility and initial angular momentum, if any, the cat may need to repeat steps two and three one or more times in order to complete a full 180° rotation.[2][3][4]

## Terminal velocity[]

In addition to the righting reflex cats have a number of other features that will reduce damage from a fall. Their small size, light bone structure, and thick fur decrease their terminal velocity. Furthermore, once righted they may also spread out their body to increase drag and slow the fall to some extent.[5] A falling cat's terminal velocity is 100 km/h (60 mph) whereas that of a falling man in a "free fall position" is 210 km/h (130 mph). At terminal velocity they also relax as they fall which protects them to some extent on impact. However, it has been argued that, after having reached terminal velocity, cats would orient their limbs horizontally such that their body hits the ground first.[6]

## Injury[]

Using their righting reflex, cats can often land uninjured. This is, however, not always the case, and cats can still break bones or die from falls. In a 1987 study, published in the Journal of the American Veterinary Medical Association, of 132 cats that were brought into the New York Animal Medical Center after having fallen from buildings, it was found that the injuries per cat increased depending on the height fallen up to seven stories but decreased above seven stories.[7] The study authors speculated that after falling five stories the cats reached terminal velocity and thereafter relaxed and spread their bodies to increase drag. However, an alternative interpretation which came out of internet chat[7] of the study would be that upon an excess of seven stories the cats experience a higher fatality rate which precludes the owner from bringing them in for medical attention.

## References[]

## Further reading[]

* Arabyan A, Tsai D. 1998. A distributed control model for the air-righting reflex of a cat. Biol. Cybern. 79:393-401.Diamond, J. 1988. Why cats have nine lives. Nature, 332(6165):586-587.Why cats land on their feetNational Geographic video on the cat righting reflexThe miracle of the falling cat

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