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The alien fighting machine, as envisioned by painter Michael Trim for the album "Jeff Wayne's Musical Version of the War of the Worlds," is of the three-legged variety that, though true to H.G. Wells' book, is baffling in Steven Spielberg's "War of the Worlds," set in the 21st century.

Attack of the alien robot tripods

BY ROGER EBERT FILM CRITIC / July 10, 2005

Q. *You may be on the wrong track with your objection to the three-legged aliens in "War of the Worlds," when you write, "Three legs are inherently not stable."*

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Amateur carpenters are advised to build three-legged stools rather than four-legged stools. Why? Because, even if the seat is not level, all three legs will be in contact with the surface.

The real problem with the machines in the movie is that they have a very high center of gravity, so high that any rapid locomotion is likely to tip them over, especially when they stop or change direction.

Mike Barnas, Chicago

A. Seeking an expert opinion, I contacted Jessica Banks, a Ph.D. candidate at the MIT Computer Science and Artificial Intelligence Lab, whose thesis involves a robot with one point of contact. She consulted her colleague Dan Paluska, a Ph.D candidate at the MIT Media Lab, an expert on robot-legged locomotion, who was featured on the cover of Wired magazine.

They began by pointing out, "Your comment, 'If evolution has taught us anything, it is that the limbs of living things, from men to dinosaurs to spiders to centipedes, tend to come in numbers divisible by four' is wrong and misleading. Numbers of limbs are divisible by two, due to the principle of bilateral symmetry to which nature adheres."

I meant of course to write "two" instead of "four" but was attacked by a brain cloud. My online review has been corrected. Banks and Paluska continue with a fascinating discussion of the functions of three legs among both living and mechanical creatures, which I am printing in full on rogerebert.com. Here are some bullet points:

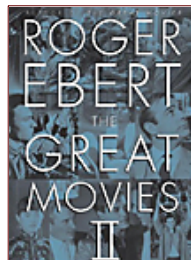
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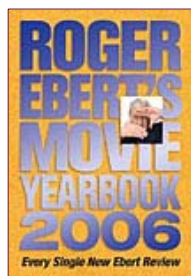
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- "A three-legged chair or table is very stable when it is still. However, the answer isn't so easy when one considers three-legged locomotion. Things have a right and a left, a front and a back. This has to do with the fact that animals tend to travel in a certain direction, facing forward when doing so. Having an even number of legs allows animals to be balanced as they travel forward."
- "There is a rhythm to walking and running that may be difficult to achieve with a three-legged machine. A kangaroo is the closest thing to a three-legged animal because it uses its tail. However, its tail is not the same as its legs and the tail does not touch the ground when the kangaroo is hopping."
- "The argument that nature didn't 'come up' with such a creature doesn't hold much water. Nature didn't come up with the wheel for locomotion, either. We could, for instance, imagine a three-legged creature that stood still and upright for the vast majority of its life. However, it would be hard to imagine such a robot being efficient at locomoting over any significant distances."
- "The height of the tripods and the fact that they are top-heavy makes it plausible that one would fall if one of its legs was damaged, especially if the alien was in motion at the time of injury. This doesn't really say that much, though; considering the fact that if you were to kick one of my legs while I was running or even give it a forceful unexpected blow when I was just loitering about, I would most likely fall to earth as well."
- "So who knows if it is *practical* or not for a robot to walk on three legs? Ultimately, it would all depend on the system as a whole (speed, passive stability, simplicity, energy consumption, navigability, human-exterminating-ability, etc.), the available technologies (sensors, computation, actuators, etc.), the environment in which the robot was supposed to perform, and, well, who was funding it."

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