The Nature of the Universe - Not Random, But Undirected?

Post by “Cassius” of December 2, 2019 at 11:29 AM

Today I saw the phrase "not random, but undirected" and think it is probably a good high-level summary of the Epicurean position in physics, given that the properties of the elemental particles give rise to their motions, while at the same time the concept of "the swerve" is also operational, but that none of this is "random" in the sense of "chaotic" or "subject to fortune." The key is in the definitions of these words, but the issue is that Epicurus was concerned to explain the observed regularity of the universe while still preserving a mechanism for free will, and it helps to have ways to capture this attack on both religion and radical skepticism in a single phrase.

This subforum and thread are set up to discuss that. I have googled for the phrase without finding this precise formulation very often (if at all) but here is a clip from an article that is very close - discussing animal behavior. The book is "Animal Behavior" by Michael D. Breed and Janice Moore; this context of animals is no doubt not a perfect analogy, but there are other examples relating to "undirected graphs" and other aspects of mathematics which are probably better, but I don't have those at hand.

I also think this is probably closely related to the matters discussed in "Chance and Natural Law in Epicureanism" by AA Long.

For the time being, this is more a placeholder than an assertion of a conclusion...

8.5 SEARCH

Movement often starts with a search, which may look random or only slightly systematic to the casual observer.[35] Searching behavior is critical to resource location and is an example of a behavior that uses some of the simple responses to environmental information that are discussed in Section 8.4. In a search for food, shelter, or a mate, an animal may initially have little or no information about the location of its goal. The first step for the animal is to employ a strategy that will bring it that information, such as an odor, a visual sighting, a sound, or another cue coming from its goal. Search may be undirected, but even undirected search is usually not random; undirected search should be structured to maximize the amount of environment sampled (Figure 8.18, strategy A). A carnivore in search of prey typically walks in a fairly straight route, allowing it to sample as much of the environment as possible. (Turning or looping movements would likely cause it to cover less ground.) If the search is for an odor, visual, or sonic cue that can travel a considerable distance, then movement in a straight line allows sampling of a large habitat area (Figure 8.18, strategies B and D). Looping or spiral movements (Figure 8.18, strategy C) concentrate search and are effective when the target may be found only if it lies directly in the searcher's pathway.

Once the animal finds a cue, kinetic or tactic orientation mechanisms can kick in (see Figure 8.19). In many cases the first cue is not from the target itself, but rather is information about the environment that helps in directing the search. Animals searching for odor cues, such as a moth searching for sex pheromone, typically fly at right angles to the direction of the wind so that they sample the greatest number of odor plumes possible. If a cue is detected, but its location is uncertain, the animal may then change its direction of travel, turning more frequently (klinokinesis), so that it makes random loops in a fairly well-defined area; this behavior is likely to bring it back into contact with the cue. Some animals use a layered, sequential search, employing a hierarchy of cues. A parasite seeking a specific snail host will follow salinity gradients

FIGURE 8.18
Examples of search patterns: (A) undirected search; (B) straight line search, covering large area; (C) spiral or looping search; (D) another type of straight line (large area) search.

FIGURE 8.19
This simple diagram illustrates the basics of an undirected search. The animal, traveling from left to right in the diagram, moves in a more or less straight line through unsuitable habitat. *Source: Bell, W.J., 1991. Search Behaviour, Chapman and Hall, London, Figure 6.1.*