PSYCH1140 - Paragraph organization

Tuesday, 21 February 2022

Group X

Members:

For each of the following examples, drawn from Writing Science in Plain English (Greene, 2013), identify the organizational strategy that the writer used to convey the information. Then, underline the transition words used.

Paragraph 1

Males of *O. acuminatus* employed two very different tactics to encounter and mate with females: they either attempted to monopolize access to females by guarding the entrance to her tunnel (guarding), or they attempted to bypass guarding males (sneaking). Guarding behavior entailed remaining inside a tunnel with a female, and fighting intruding males over possession of the tunnel. Guarding males blocked tunnel entrances and periodically "patrolled" the length of the tunnel. Rival males could gain possession of a tunnel only by forcibly evicting the resident male, and both fights and turnovers were frequent. Fights over tunnel occupancy entailed repeated butting, wrestling, and pushing of opponents, and fights continued until one of the contestants left the tunnel.

Sneaking involved bypassing the guarding male. The primary method of sneaking into tunnels was to dig side-tunnels that intercepted guarded tunnels below ground. New tunnels were dug immediately adjacent (< 2 cm) to a guarded tunnel. These tunnels then turned horizontally 1-2 cm below ground, and often intercepted primary tunnels beneath the guarding male (16/24 side tunnels). In this fashion, sneaking males sometimes bypassed the guarding male and mated with the female undetected (observed in four instances).

Organization:

Paragraph 2

In total, our results show that the introduction of foxes to the Aleutian archipelago transformed the islands from grasslands to maritime tundra. Fox predation reduced seabird abundance and distribution, in turn reducing nutrient transport from sea to land. The more nutrient-impoverished ecosystem that resulted favored less productive forbs and shrubs over more productive grasses and sedges.

These findings have several broad implications. First, they show that strong direct effects of introduced predators on their naïve prey can ultimately have dramatic indirect effects on entire ecosystems and that these effects may occur over large areas – in this case across an entire archipelago. Second, they bolster growing evidence that the flow of nutrients, energy, and material from one ecosystem to another can subsidize populations and importantly, influence the structure of food webs. Finally, they showed that the mechanisms by which predators exert ecosystem-level effects extend beyond both the original conceptual model provided by Hairston et al. and its more recent elaborations.

Organization:

Paragraph 3

When applied to ciliary propulsion, Lighthill's efficiency has some drawbacks. For one, it is not a direct criterion for the hydrodynamic efficiency of cilia, as it also depends on the size and shape of the whole swimmer. Besides that, it is naturally applicable only for swimmers and not for other systems involving ciliary fluid transport with a variety of functions, like left-right asymmetry determination. We therefore propose a different criterion for efficiency at the level of a single cilium or carpet of cilia. A first thought might be to define it as the volume flow rate of the transported fluid, divided by the dissipated power. However, as the flow rate scales linearly with the velocity, but the dissipation quadratically, this criterion would yield the highest efficiency for infinitesimally slow cilia, just like optimizing the fuel consumption of a road vehicle alone might lead to fitting it with an infinitesimally weak engine. Instead, like engineers trying to optimize the fuel consumption at a given speed, the well-posed question is which beating pattern of a cilium will achieve a certain flow rate with the smallest possible dissipation.

The problem of finding the optimal strokes of hypothetical microswimmers has drawn a lot of attention in recent years. Problems that have been solved include the optimal stroke pattern of Purcell's three-link swimmer, an ideal elastic flagellum, a shape-changing body, a two- and a three-sphere swimmer, and a spherical squirmer. Most recently, Tam and Hosoi optimized the stroke patterns of *Clamydomonas* flagella. However, all these studies are still far from the complexity of a ciliary beat with an arbitrary 3D shape, let alone from an infinite field of interacting cilia. In addition, they were all performed for the swimming efficiency of the whole microorganism, whereas our goal is to optimize the pumping efficiency at the level of a single cilium, which can be applicable to a much greater variety of ciliary systems.

Organization: