Pair-forming termites alternate search modes adaptively depending on the informational contexts.

Author(s): Nobuaki Mizumoto, Nobuaki Mizumoto , Shigeto Dobata

Institution(s): Graduate School of Agriculture, Kyoto University, Japan ; Graduate School of Agriculture, Kyoto University, Japan ; Graduate School of Agriculture, Kyoto University, Japan

How animals should move to search for partners whose exact location is unknown? Theory predicts that the answers must be condition-dependent, indicating that the question would not make sense until biological details are clarified. Therefore, more empirical studies are certainly required. Here we show that termite mate searchers adaptively alternate between sexually monomorphic and dimorphic movements depending on what they know about the potential distance to their partners. After leaving their nests in a synchronized manner, termites begin to search for a mating partner. The resulting pairs perform tandem running toward potential nest sites. We found that both females and males moved actively and straightly before finding, which is known to improve encounter rates in random search for completely unlocatable targets. In stark contrast, when they are accidentally separated during tandem running, they showed distinct sexually dimorphic movements, where females often paused and males moved actively. Simulations parameterized by empirical measurements demonstrated that such sexually dimorphic movements are advantageous when they know that the stray partner is at least nearby. These results emphasize the importance of biological details to evaluate the efficiency of random search in animals. By extending the concept of mutual search beyond the context of mating pair formation, the dimorphic movements between partners represent a remarkable convergence between termites and other social animals including ants and humans.