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PDF文档

海豚的神经系统是如何利用声波定方向的?

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海豚和蝙蝠等神经系统利用两耳效应来检测声音的方向，这为大家所熟知，海豚和蝙蝠要靠听觉代替视觉来捕食和躲避敌人，用双耳快速测定声源的方向，神经系统如何能达到这一目的？在数字技术中求两个波形相位差有一套复杂的算法。可是经这篇文章的分析，在神经系统中处理相位差却出奇地简单，它只需一个神经元就可完成计算。这为我们进一步认识神经系统信息处理机理提供了一个例证。经计算机仿真证明它具有很多特别的优点。也为信息处理技术提供了一个新的方法。

How Do The Dolphins Neurons System Echolocate

It is well known that the dolphin echolocate by two ears. But how the dolphins' neural system implements this mechanism? While dolphins hunt and avoid enemies, could the neural direction detecting process with a sufficiently speediness? In digital technology, the method used to calculate between two curves of wave phase difference is very complicated. However, in this article, the authors will show that the neural system's mechanism in processing signal of phase is very simple, in which only one neuron is needed. It's an interesting matter and provides an example for our advance comprehension in the mechanism in signal process that used by neural system. Moreover, the computer simulation indicates many special virtues in this method.

关键词

神经编码(Neural coding); 序空间(Ordered space); 回声定向(Echolocation); 圆映射(Circular mapping); 符号动力学(Symbolic dynamics)