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► **COVER:** 'Spring to mind' by Kirsten Lee, inspired by the Perspectives on p373 and p383.



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Since 1921, when Otto Loewi discovered the first neurotransmitter, which was later identified as acetylcholine (ACh), a vast number of studies have investigated the mechanisms of neurotransmitter release and those of the propagation of chemical signals, as well as their network-wide implications.

The cortical mantle is innervated by cholinergic neurons located in the basal forebrain, which are thought to modulate different arousal states and have more recently been implicated in mediating aspects of attentional information processing. In an Opinion article on page 383, Sarter and colleagues discuss evidence for different modes of ACh transmission. They argue that specific cognitive operations, such as cue detection, are better explained by phasic release of ACh on the scale of seconds than by volume transmission (fluctuations of ambient extracellular levels of ACh that stimulate extrasynaptic ACh receptors). Understanding the mode of cortical cholinergic transmission might help us to develop effective treatments for a range of cognitive disorders.

The probability of neurotransmitter release is thought to be regulated at individual synapses; this is considered to be crucial for the regulation of signal transmission and adds to the complexity of information transfer in neuronal networks. On page 373, Branco and Staras discuss local feedback control as a mechanism for regulating the probability of release and consider its possible implications for information processing in synapses and at the network level.

Neuroscience has made great strides since the 1920s. Nevertheless, these articles show that even the most basic aspects of information transfer in the CNS — neurotransmitter release and transmission — continue to be an active area of investigation.

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Printed in Wales by Cambrian Printers

on acid-free paper