Mammals use hundreds of different olfactory receptors (ORs) to detect environmental odorants. However, each olfactory sensory neuron expresses only one allele of one OR gene. This combination, hundreds of receptors but only one type of receptor per cell, makes possible the remarkable breadth and specificity of our sense of smell, and contrasts with other senses, such as taste, where neurons co-express multiple receptors with the same valence (e.g. sweet, bitter). My work addresses the molecular mechanism that allows each olfactory sensory neuron to choose a single allele of one OR gene for expression. I show that OR gene expression depends on a suite of transcription factors that bind together on specialized OR gene enhancers. Binding of these factors allow multiple OR gene enhancers to come together in the nucleus of olfactory sensory neurons, coalescing into an interchromosomal enhancer hub that contacts and transcriptionally activates the single chosen OR gene.