

The contextual fear conditioning model is designed to train rodents to expect a negative sensation, such as a mild electric shock, when a specific cue occurs such as the ringing of a bell. Once the rodents have been trained to expect the negative sensation when the cue occurs, they will freeze when the cue occurs in anticipation of the negative sensation. In practice, this can be accomplished by placing a rodent in a cage in which the floor has been attached to a low power electric shock generator. The rodent is trained to associate a specific sound with a low electric shock in the first day, and then 24h later, the same procedure is repeated, but the shock is not delivered when the sound occurs. In the absence of memory and learning impairment, the rodent will remember the sound and freeze immediately, as they are expecting a shock. Memory and learning impairment is indicated by a decreased tendency to freeze upon cue, as the rodents are less likely to remember the cue from the previous day's training sessions. Novel compounds that have the potential to enhance or restore memory can be assessed for efficacy in this model by using rodents that experience cognitive decline, either as the result of a disease (e.g., Alzheimer's disease models rodents) or ischemic events (e.g., stroke). Alternatively, this model can be used to assess a compound's ability to cause memory and learning deficits. Compounds that impair memory and learning will also decrease a rodent's freezing response upon cue (Figure 7.4).

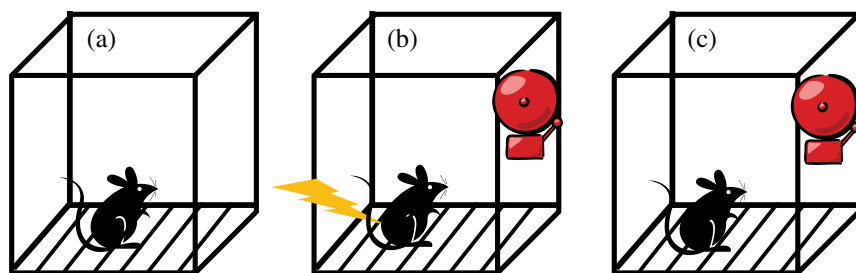


FIGURE 7.4 The contextual fear model can be used to assess the impact of candidate compounds on memory and learning. (a) A mouse is acclimated to a cage equipped with a low-power shock generator attached to the floor. (b) The mouse is then trained to associate an electric shock with the ringing of a bell. (c) Once trained, mice will freeze upon hearing the bell in anticipation of an electric shock. Candidate compounds can be assessed for their ability to impact learning and memory using this model.

The Morris Water Maze: A Model of Spatial Learning and Memory²¹

Although both of the previously described animal models of memory and learning are useful, neither are well suited to probing spatial learning