Quantal Memory Durations: Observations Not Reproduced

Neurons in the caudomedial neostriatum (NCM) of zebra finches (*Taeniopygia guttata*) respond with volleys of action potentials to playbacks of novel conspecific song. However, repeated playbacks of the same song ("training") result in a long-lasting, stimulus-specific decrement in responsiveness ("habituation"). In this protocol, "forgetting" is the reappearance of full responsiveness to the familiar stimulus (*1*). In a recent project in our laboratory (Reports, 13 Dec. 1996, p. 1909 (*2*), we studied factors that contribute to the duration of habituation by assessing its duration when stimulus class or interstimulus intervals were varied and by determining the sensitivity of habituation to drugs that inhibit protein and RNA synthesis. Our initial finding was that forgetting during the first few days after exposure to stimuli occurred only at fixed intervals after onset of training and cycloheximide, a protein synthesis inhibitor, blocked persistent habituation during these same times. These observations suggested that memory of the habituated stimulus lasted for successive quantal periods of time, each initiated by an episode of protein synthesis (*2*).

We have conducted new experiments to test these findings, using a revised paradigm that addressed various limits of the original methodology. Our new results confirm stimulus-specific neuronal habituation in NCM. Habituation to a conspecific song lasted for up to 48 hours and was lost relatively abruptly after between 44 and 48 hours, as originally described; it also lasted longer for conspecific than for heterospecific songs (*2*). In addition, long-lasting habituation was blocked by cycloheximide during an initial period immediately after stimulus presentation and during multiple subsequent periods, some many hours after initial training. However, habituation in the untreated birds showed a pattern of instability that had not been recognized earlier. When this was taken into account, we were not able to reproduce the sharp differences in memory duration that were observed earlier when different interstimulus intervals were used (*2*). Also, the times after training when habituation could be blocked by cyclobeximide were more variable between individuals than was previously seen. Although the differences between our present observations and our earlier results may be partly due to differences in methodology, we believe that our original claim for the existence of quantal memory durations was premature.

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References

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2. S. J. Chew, D. S. Vicario, F. Nottebohm, *Science* **274**, 1909 (1996).

Letters to the Editor

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