cross-correlations between nonresponsive neurons were not altered (Fig. 4E, left), they were increased between photostimulated neurons and remained stable the next day (Fig. 4E, right). Thus, optogenetic activation of identified neurons enhanced their local functional connections for at least 1 day (Fig. 4F).

Recalled ensembles shared similar characteristics—such as number of neurons and spatial distribution—with ongoing ensembles (fig. S7), but the mean distance between active neurons was shorter (fig. S7D), which indicates that the effect of the photostimulation is local. Recalled ensembles often had neurons that did not belong to ongoing ensembles (fig. S7, D and E), demonstrating that recalled ensembles are indeed novel and not just dormant preexisting ensembles. However, given that cortical connections are likely not in a tabula rasa state, we expect that imprinted ensembles may recruit segments of physiologically relevant circuit motifs (Fig. 4F).

Previously, electrical or optogenetic stimulation (*25*) has been used to show that coactivation of neuronal groups can produce physiologically relevant behaviors (*13*, *26*). Here, we show the possibility of training individual neurons to build artificial neuronal ensembles (*13*), which then become spontaneously active (Fig. 4D, right). Our results are consistent with the finding that neurons responding to similar visual stimuli have a higher interconnectivity (*27*), as well as with the similarity between visually evoked and spontaneous ensembles (*9*). In both cases, recurrent coactivation of a neuronal group would enhance functional connectivity, imprinting ensembles into the circuit.

More than 60 years ago, Hebb proposed that repeated coactivation of a group of neurons might create a memory trace through enhancement of synaptic connections (*12*). Because of technical limitations, this hypothesis has been difficult to test with single-cell resolution in awake animals. By combining novel imaging and photostimulation techniques (*14*, *15*) and analytical tools (*19*), our work can be interpreted as a confirmation of the Hebbian postulate and as a demonstration that cortical microcircuits can perform pattern completion.

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SUPPLEMENTARY MATERIALS

www.sciencemag.org/content/353/6300/691/suppl/DC1
Materials and Methods
Figs. S1 to S7
References (*28*–*40*)

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ECONOMIC POLICY

The impact of homelessness prevention programs on homelessness

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Despite the prevalence of temporary financial assistance programs for those facing imminent homelessness, there is little evidence of their impact. Using data from Chicago from 2010 to 2012 (n = 4448), we demonstrate that the volatile nature of funding availability leads to good-as-random variation in the allocation of resources to individuals seeking assistance. To estimate impacts, we compare families that call when funds are available with those who call when they are not. We find that those calling when funding is available are 76% less likely to enter a homeless shelter. The per-person cost of averting homelessness through financial assistance is estimated as $10,300 and would be much less with better targeting of benefits to lower-income callers. The estimated benefits, not including many health benefits, exceed $20,000.

Over 2 million people experience homelessness each year in the United States (*1*). Historically, the primary approach to combating homelessness has been to provide emergency shelters or transitional housing services to those who are already homeless. More recently, policy-makers have increased their focus on homelessness prevention efforts. One of the most common prevention strategies is to provide temporary financial assistance to people facing eviction in order to keep them in their residences. In the United States, 93% of households live in an area that has such a program, and these programs receive over 15 million calls a year (*2*). Despite the prevalence of these efforts, there is little evidence about the extent to which they actually prevent homelessness (*3*, *4*).

Here we examine the effectiveness of temporary financial assistance by using data from the Homelessness Prevention Call Center (HPCC) in Chicago, which processes about 75,000 calls annually. Chicago residents at risk of becoming homeless can call 311 to request temporary financial assistance for rent, security deposits, or utility bills. These callers are routed to the HPCC, which is a centralized processing center that screens callers for eligibility and connects eligible callers with local funding agencies.

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