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Research in Cognitive Science

Role of Reminding in Incidental Schema Learning

Schemas are mental structures that organize information and guide behavior by linking new situations to past experiences (Cockcroft et al., 2022; Greve et al., 2019). These long-term memory (LTM) representations serve as blueprints that support the retention of whole classes of events. For instance, a restaurant-visit schema includes typical actions such as calling the waiter, ordering food, and paying the bill, along with their usual temporal sequence. Most cognitive psychology studies investigate the use of schemas already established in LTM. Much less is known about how schemas are formed, particularly when they emerge incidentally as a by-product of repeating similar actions—a likely predominant way of schema development.

A well-established method for studying incidental learning of organized and complex LTM representations is the Hebb repetition paradigm (Hebb, 1961). In this task participants are asked to perform a series of immediate recall tests of item-sequences. While most of these sequences are random, among them- unannounced to participants- one sequence is being repeatedly presented throughout the study. Research using this paradigm shows that repeating the same list of items in short-term memory tasks can lead to the formation of LTM representations called chunks (Cumming et al., 2003; Oberauer et al., 2015; Sukegawa et al., 2019). Chunks facilitate maintenance of arrays that exceed raw working-memory limits by recoding groups of individual items into a single, more easily retrievable representation (Norris, Kalm, Hall, 2020; Thalmann, Souza, Oberauer, 2019). However, chunks support only highly specific item groupings and thus do not generalize well to new situations. Recent research demonstrates that when repetition in the Hebb paradigm applies not to specific items but to structural patterns—for example, an order of categories such as ANIMALS–FRUITS–TOOLS—schema learning can occur (Piątkowski et al., 2025).

This thesis examines task conditions that influence **schema formation**. It builds on recent findings showing that incidental learning through repetition is not a continuous, fully implicit process; instead, it requires explicit awareness of repetitions (Musfeld et al., 2023). The central goal is to test the hypothesis that incidental learning results from reminding, that is, spontaneous retrieval of earlier learning episodes (Musfeld et al., 2023; Piątkowski et al., 2025; Souza, Oberauer, 2022). The project employs experimental methods known to increase the likelihood of reminding to assess whether they modulate the extent of schema learning in the Hebb task.

In particular, we plan to use context reinstatement, a manipulation shown to enhance reminding (Zawadzka et al., 2023). Consistent contextual cues should help participants recall earlier lists, enabling them to integrate current and past information into a shared schema. We predict that lists repeatedly presented with identical background pictures will be learned more effectively

than lists repeated with varying backgrounds. This prediction will be tested by comparing learning slopes: lists shown on repeated backgrounds are expected to produce steeper slopes.

Furthermore, we hypothesize that context reinstatement will increase the likelihood of gaining awareness of repetitions. Therefore, participants exposed to lists repeated on the same backgrounds should report awareness of repetitions more frequently than participants in the control condition.

Key words: Hebb effect; incidental learning; schema; reminding; context reinstatement; long-term memory, working memory

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