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Applying Self-Processing Biases in Education: Improving Learning Through Ownership

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Accepting ownership of an item is an effective way of associating it with self, evoking self-processing biases that enhance memory. This memory advantage occurs even in ownership games, where items are arbitrarily divided between participants to temporarily "own." The current study tested the educational applications of ownership games across two experiments. In Experiment 1, 7- to 9-year-old children were asked to choose three novel, labeled shapes from an array of nine. The experimenter chose three shapes and three remained "un-owned." A subsequent free-recall test showed that children reliably learned more self-owned than other-owned or un-owned shapes. Experiment 2 replicated this finding for shapes that were assigned to owners rather than chosen, and showed that ownership enhanced memory more effectively than a control game with no ownership manipulation. Together, these experiments show that ownership games can evoke self-processing biases in children's memory, enhancing learning. Implications for education strategies are discussed.

Keywords: Self, Ownership, Choice, Learning, Memory, Education

General Audience Summary

Previous research suggests that when objects are owned by self (e.g., one's own coffee cup), they can trigger cognitive biases associated with self-processing such as increased attention and memory. For example, people will tend to pay more attention to self-owned items than similar items owned by other people. Surprisingly, these

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biases can be triggered even when ownership is temporarily assigned during a game (e.g., "*all the red items are yours, all the blue items are mine*"), resulting in better memory for the self-owned items. The current study tests whether ownership games can be used to improve the learning of new information in an educational context. In two experiments, 7–9 year old children either chose cards depicting novel shapes to own (Experiment 1) or were assigned their shape cards by the experimenter (Experiment 2). The experimenter also chose or was assigned shapes to own, while other shapes remained un-owned. When the children were asked to recall the shapes, they remembered significantly more of the self-owned shapes than those owned by the experimenter, or un-owned shapes. This suggests that when children are being taught new information, educators should take advantage of ownership games because the self-processing biases they trigger can produce better memory for to-be-learned information.

Research suggests that linking items with the self reliably improves memory for these items (Rogers, Kuiper, & Kirker, 1977; Symons & Johnson, 1997). For example, one's own possessions and experiences relating to oneself are better remembered than those associated with others. This *self-reference effect* (SRE) on memory is a culmination of multiple self-processing biases, from facilitated perception and attention, to higher-order elaboration and organization (Humphreys & Sui, 2016; Klein & Loftus, 1988). The prioritized processing of self-related information ensures that self-referencing is a robust and reliable memory enhancer, which could therefore be usefully applied in an educational context. The current inquiry investigates the efficacy of this approach through the development of a novel self-referent learning task.

The potential value of self-referencing in educational contexts has been demonstrated by a small number of extant studies which show that modifying educational materials to include self-referent cues can be effective. These studies have included first-person pronouns or students' own names in materials, facilitating processing by evoking the attentional and mnemonic benefits of self-referencing (D'Ailly, Simpson, & MacKinnon, 1997; Moreno & Mayer, 2000; Sinatra, Sims, & Sottilare, 2014; Turk et al., 2015). For example, Turk et al. (2015) tested 7- to 9-year-old children's ability to accurately learn the spelling of novel (Experiment 1) and familiar (Experiment 2) words by practising the spellings in a self-referent or other-referent task. In the self-referent task, the children were asked to write sentences about themselves using the to-be-learned word, whereas the other-referent task required another character to be the subject of the sentence. Spelling test performance showed that the children benefitted from a significant learning boost in the self-referent condition, with mean scores up to 20% higher than in the other-referent condition. They also wrote significantly longer sentences during the practice, showing an increase in sustained attention to the task. This study provides evidence that the SRE can be usefully applied in the classroom, supporting children's learning by increasing attention and memorial support.

Turk et al.'s (2015) study demonstrated that the self-referencing during the consolidation of new, to-be-remembered information can enhance children's memory. This manipulation shares features with the wider personalization literature, in which it has been robustly demonstrated that modifying materials to match children's interests can be a highly effective strategy for increasing learning and engagement (see Cordova & Lepper, 1996; Sadoski, Goetz, & Rodriguez, 2000). Including a child's own name may be an extreme form of personalization, hence its effectiveness. However, problematically for educational practice, personalization paradigms as a whole are limited because incorporating specific names or interests is an intervention that cannot be applied to the majority of classroom learning tasks such as non-verbal items or group learning. They are also typically dependent on the ability of the individual to generate self-referent associations (e.g., producing a sentence involving self and to-be-remembered stimuli), and therefore may be constrained by age or ability. In the current study, we sought to test the efficacy of an alternative, more adaptable method of creating self-item associations: ownership. Although rich in terms of the encoding conditions generated, ownership is also one of the simplest ways to create an association between self and to-be-remembered information (Beggan, 1992; Belk, 1988). From as early as 2 years, children use possessive pronouns in spontaneous conversations with their peers (Hay, 2006), and can differentiate between objects on the basis of ownership, even when the item-person association is novel (Fasig, 2000).

The memorial effects of ownership were first demonstrated by Cunningham, Turk, MacDonald, and Macrae (2008), who asked pairs of participants to sort cards depicting shopping items into "self-owned" and "other-owned" baskets, on the basis of a color cue. A recognition memory test revealed a consistent advantage for items owned by self, even though this ownership was purely hypothetical, temporary, and arbitrary. Importantly, this effect was not driven by acting on the objects (i.e., moving them into baskets), as action was independent of ownership and did not impact on item memory; rather, the sense of personal relevance of the object at encoding seemed sufficient to enhance memory. Using this simple sorting paradigm, the ownership effect on memory has since been shown to emerge early in childhood (Cunningham, Vergunst, Macrae, & Turk, 2013; Ross, Anderson, & Campbell, 2011) and be reliable across the lifespan (Hamami, Serbun, & Gutchess, 2011).

There are a number of cognitive mechanisms that underlie the enhanced encoding of self-referent stimuli such as self-owned items, part of a functional system that ensures information of potential importance to the self is not lost (Cunningham, 2016; Cunningham, Brady-Van den Bos, Gill, & Turk, 2013; Humphreys & Siu, 2016). One is the extensive and accessible

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