

ARTICLE

Actions versus Words: Exploring the contributions of working memory and motoric coding in children's instruction following using a dual-task paradigm

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Abstract

Previous research in adults has showed that physical performance (i.e., enactment) of instructions at recall leads to better memory compared to verbal recall and that this effect does not rely solely on Working Memory resources. The current study aimed to replicate this finding in children. A group of 32 children encoded simple instructions verbally while engaging in a series of distractor tasks (articulatory suppression, backwards counting and a motor suppression task). Participants recalled information verbally or physically through enactment. The findings showed that although distractors impaired performance compared to a control condition (no distractor task), the enactment advantage remained intact in all conditions. These findings show that children's memory is superior when they perform, rather than when they verbally repeat instructions and crucially it is suggested that this effect does not rely solely on Working Memory resources.

KEYWORDS

action advantage, action memory, enactment recall, executive function, instruction following, working memory

INTRODUCTION

The ability to follow instructions is a fundamental skill that is essential to much of everyday life, enabling us to achieve goals, complete tasks and learn new skills. Previous research has established that the ability to follow instructions is linked to Working Memory (WM) abilities in adults (Yang et al., 2014, 2016) and in children (Gathercole et al., 2006; Jaroslawska et al., 2016). Working Memory refers to a limited capacity cognitive system that underlies complex thinking (Baddeley, 2007) and has been linked

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Statement of Contribution

What is already known on this subject?

- Enactment at recall leads to better memory performance compared to verbal recall within a WM context in children (Jaroslawska et al., 2016) and in Adults (Allen & Waterman, 2015).
- WM distractors (dual task paradigm) at encoding impairs both enactment and verbal recall compared to control, but the enactment advantage remains intact in all conditions in adults (Yang et al., 2016).
- A motor suppression task at encoding can diminish the enactment recall advantage in adults if both instructions and distractor involve “gross” motor movements (Jaroslawska et al., 2018).

What the present study adds?

- This is the first study to employ a dual task paradigm at encoding while manipulating enactment at recall in children.
- First study to show that successful enactment performance in children does not depend on WM resources (as the enactment advantage remained intact in all conditions). This is a finding that could have profound implications in education.
- Findings indicate that successful disruption of enactment performance at recall may be conditional upon the type of motor processing involved at encoding. This conclusion echoes findings demonstrated in adults (see Jaroslawska et al., 2018; Li et al., 2022), but it is the first study to find evidence of differential motor processing effects in enactment recall children.

to a range of higher order cognitive skills such as fluid intelligence, educational achievement, reading and mathematical abilities (Conway et al., 2003).

From a developmental perspective, Gathercole et al. (2004), who investigated the structure of WM in children, demonstrated that while capacity increases across development (from 4 to 15 years), relationships between sub-systems remain stable from around the age of 6. These data fit the WM model proposed by Baddeley and Hitch (1974) and provide evidence for structural stability of the system across development, suggesting that the structure of WM, but not the capacity, is consistent in adults and children alike (from the age of 6). Although WM skills often do not reach maturity until adolescence (Luna et al., 2004), childhood forms an important developmental period marked by rapid improvements in WM skills (Best et al., 2009; Best & Miller, 2010; Gathercole et al., 2004), and it is during this period that the ability to follow instructions is especially important for learning in the classroom. The most frequently observed consequence of poor WM in the classroom is the incapacity to carry out the teacher's instructions (Gathercole et al., 2006). As a result, children with WM deficits are susceptible to several adverse classroom outcomes, including overload and task failure (Gathercole et al., 2006), which can often result in poor academic achievement (Bull & Scerif, 2001). It is therefore imperative to fully understand the ways in which instructions, such as those verbally presented by a teacher in the classroom, are encoded and recalled to ensure the best outcomes for all children, especially those with poorer WM.

One aspect of instruction following that has received great attention in the last few years is physical execution. This is commonly referred to as *enactment* and has been shown to facilitate immediate recall performance when recruited during the presentation phase of instructions (enactment *encoding*), but also when it is employed during recall (enactment *recall*). While in studies of enactment *encoding*, physical performance takes place during the presentation phase of the to-be-remembered material (and subsequent recall is in verbal or written form), in studies of enactment *recall*, encoding is usually in auditory or verbal form while physical performance takes place during the recall phase. Although

both enactment at encoding and enactment at recall have shown better memory performance compared to verbal memory (Allen & Waterman, 2015; Waterman et al., 2017), it is worth noting that within a WM framework, it is enactment at recall that produces the most robust effects on memory performance. This phenomenon, known as the ‘enactment effect’ has been repeatedly demonstrated in both adults (Makri & Jarrold, 2021; Yang et al., 2014) and children (Jaroslawska et al., 2016; Waterman et al., 2017).

For instance, when investigating children's WM abilities using everyday classroom activities, Gathercole et al. (2008) asked children to encode instructions verbally and to recall them either verbally or through enactment. The instructions used in this study were designed to reflect those used by teachers in the classroom and so a series of instructions such as “touch the red pencil, then put the yellow ruler in the black folder, then touch the blue eraser” were derived from the following stimuli: two actions (*touch* and *pick up*) and a series of objects (e.g. eraser, pencil, ruler) each in two different colours (e.g. yellow ruler, blue ruler). They found that children's immediate memory performance was dramatically improved when instructions were recalled by enactment, rather than verbal recall, and that performance in the enactment condition was associated with children's WM skills on a range of laboratory-style tasks. These findings mirror results of studies with adult samples (Nyberg et al., 2002).

Although it is still unclear which mechanisms underline this enactment effect, the most dominant view proposes that enhanced effects of enactment at recall are thought to rely on the formation of a motor plan, triggered during the encoding of instructions (Koriat et al., 1990; Waterman et al., 2017). This view suggests that when participants encode verbal instructions knowing they will have to physically perform them at recall, they activate the formation of motor plans that subsequently lead to superior performance compared to equivalent verbal recall conditions. However, the exact role played by these motor representations in aiding memory, and whether performance in such tasks relies on WM resources, is not fully explained under one unified cognitive framework.

Previous research suggests that, at least in adults, the enactment effect does not solely depend on WM resources (Yang et al., 2014). In order to study whether WM contributes to the enactment effect in adults, Yang et al. (2016) utilised a dual-task approach whereby participants engaged in a series of concurrent tasks during the encoding phase that aimed to tax the different WM sub-components. Participants were required to encode instructions verbally for later implementation (enactment or verbal recall) while engaging in articulatory suppression and backwards counting (Experiment 1) or spatial tapping (Experiment 2). The results showed that although the concurrent tasks impaired overall performance for both enactment and verbal recall, the enactment advantage over verbal recall remained stable across conditions. These results suggest that motor planning for future implementation can successfully increase memory performance and this effect does not rely purely on WM resources. If similar results were observed in children, this could have profound implications, especially for children that may exhibit WM deficits. Thus, it is crucial to understand the underlying mechanisms of enactment and how it is linked to WM from a developmental standpoint.

A candidate theoretical framework that could potentially account for this enactment advantage is the *one-component hypothesis* or *motor store hypothesis* (Jaroslawska et al., 2016, 2018). This view argues that action memory relies on a motor store system that temporarily holds and manipulates temporal, spatial, and motoric action information (Jaroslawska et al., 2018). To directly assess this in adults, Jaroslawska et al. (2018) followed a similar paradigm to Yang et al. (2014) while the type of instructions and materials used in their study were taken from Gathercole et al. (2008). Participants were asked to encode written instructions while simultaneously engaging in a series of concurrent tasks aimed to disrupt the phonological loop, the central executive, and the proposed temporary motor store. The latter task involved participants making three consecutive hand movements (Experiment 1), also known as “fine” motor movements, and a series of three consecutive arm movements (Experiments 2 and 3) known as “gross” motor movements. At the recall phase, participants were asked to either enact or verbally recall the instructions. Articulatory suppression and backwards counting disrupted performance in both enactment and verbal recall but the enactment advantage remained intact, suggesting that these two sub-components of WM do not facilitate the enactment advantage. Crucially, the results showed that

the motor concurrent task diminished the enactment advantage, but this effect was dependent on the type of concurrent task; while hand (fine motor) movements did not disrupt the enactment advantage in Experiment 1, the arm (gross motor) movements in Experiments 2 and 3 significantly reduced the enactment advantage, leading to comparable performance in enactment and verbal recall. Thus, the results are somewhat inconclusive, suggesting that the disruption of motor plans may be dependent on the type of motor concurrent task at encoding, with gross motor movements showing a more profound detrimental effect on enactment performance during the recall phase. Further research by Li et al. (2022) extended these findings showing that familiarity and complexity of the motor concurrent task may also affect enactment performance, with more complex and unfamiliar movements during encoding, reducing the enactment advantage. Taken together, the results from these recent studies provide suggestive evidence for a motoric system within a WM context. These findings also highlight that successful enactment performance may depend on a number of factors, such as the nature and complexity of motor tasks involved in such paradigms.

However, these findings are yet to be replicated in children. Examining how concurrent WM and motor tasks affect enactment performance, and whether this is subject to developmental changes, is a crucial step in understanding the proposed motor store system and how it operates. Based on past research (Gathercole et al., 2004; Waterman et al., 2017; Yang et al., 2014), it could be expected that from mid-childhood, the mechanisms by which instruction following is facilitated by WM sub-components is likely to be similar in children and adults. Furthermore, examining how concurrent WM and motor tasks affect enactment performance in children, is a crucial step in further understanding how to maximise children's instruction following ability in the classroom.

The current study

This study aimed to examine the involvement of WM and motor planning in the manifestation of the enactment effect in a sample of 7–8-year-old children. Following a similar dual-task procedure to that of Jaroslawska et al. (2018), children were asked to complete WM and motor concurrent tasks during the encoding of verbal instructions, and to then recall instructions either verbally or through enacted performance. The articulatory suppression task aimed to tax the phonological loop, and hence inhibit sub-vocal rehearsal, the backwards counting aimed to disrupt central executive processes, and the motor suppression task aimed to inhibit motor planning. To our knowledge, this is the first study to examine the enactment at recall effect in WM in children using a dual-task paradigm. Based on the findings of Jaroslawska et al. (2018; also see, Waterman et al., 2017), it was hypothesised that enactment at recall will lead to an overall advantage compared to verbal recall for all concurrent task conditions, except the motor concurrent task. If indeed the motor store is a system that universally processes motor related information within WM aiding the enactment effect, then we would expect this process to be disrupted by the presence of a motor concurrent task, leading to comparable enactment and verbal recall performance.

MATERIALS AND METHODS

Participants

Participants were thirty-two children (13 male) from a primary school in the East of England ($M = 8.4$ years, $SD = 0.58$ months). The age group was chosen after previous pilot work by the authors showed this is the earliest age at which children could understand the instructions and perform all dual tasks accurately. Sample size was estimated using the software G*power, where it was determined that a minimum sample of $N = 24$ participants was needed to detect a medium effect ($f = 0.25$) with acceptable statistical power (0.80). Each participant took part in two testing sessions, spaced approximately one

week apart and lasting for 30 minutes each. Full written consent was obtained from the head teacher and the child's parent/guardian. Additionally, participants gave their verbal and written assent before each testing session. The study was approved by the University of [Nottingham] Ethics Committee (Ref: S1164) and conducted in accordance with the *Research in Schools: Code of Conduct*, as outlined by the University of [Nottingham].

Materials

Instruction following task

This task was adapted from the work of Gathercole et al. (2008). Six different stationary items (box, bag, folder, rubber, ruler, pencil) each in two different colours were used (see Figure 1). Before each testing session, the items were randomly positioned by the experimenter and so may have been differently located each time. The stationary items remained visible and within the child's reach throughout the session. During the sessions, the items may have been moved slightly by the participant due to the nature of the task.

Five action verbs (Yang et al., 2014, 2016) were used in the instructions given in this experiment: *shake*, *spin*, *touch*, *pick up*, *push*. Following the action verb, the word 'the' prefaced the colour and object in each instruction. One trial was comprised of two verbal instructions, for example, "Touch the white rubber, spin the pink ruler". The task consisted of two practice trials followed by ten experimental trials for each condition (the number of trials was determined following pilot work). Three parallel sets of instructions (consisting of 80 instruction sequences and eight practice instruction sequences, randomly ordered in three different ways) were created and were counterbalanced between subjects. The instruction sets were composed so that the action-colour-object sequences were not repeated within trials, and so that each action (e.g., *pick up*), colour (e.g., *yellow*) and item (e.g., *rubber*) occurred at an approximately equal frequency within the instruction set.

Concurrent tasks

Three concurrent tasks (motor suppression, articulatory suppression, and backward counting) were each performed concurrently alongside the primary instruction following task. Additionally, a baseline condition was included whereby no concurrent task was performed alongside the encoding of instructions. For each task, the participant completed two blocks (one under enactment and one

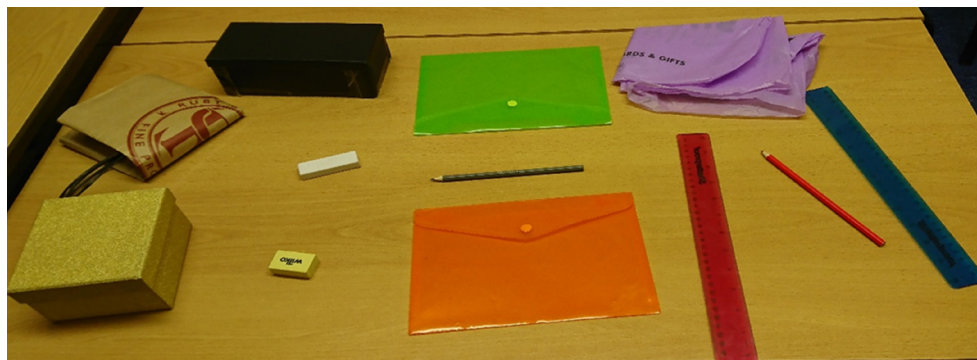


FIGURE 1 The experimental set up of the 'Instruction Following' task. The 12 stationary items consisted of: a black box, a gold box, a brown bag, a purple bag, a green folder, an orange folder, a white rubber, a yellow rubber, a blue ruler, a pink ruler, a grey pencil, and a red pencil.

under verbal recall) of ten experimental trials and two practice trials. The order of concurrent tasks was counterbalanced between participants, and the order of recall modality was counterbalanced within participants.

Motor suppression task

This task was adapted from Jaroslawska et al. (2018) and required the participant to repeat a sequence of three gross motor movements during the encoding of verbal instructions. The three arm positions were combined to make a motor sequence that enabled the participant to easily repeat the movements without interruption (see Figure 2). The sequence begun with the participant's dominant arm held horizontally across their chest, their fingers closed together, and palm outstretched. This finger and palm position remain unchanged throughout the sequence. Next, the participant would externally rotate their arm 90°, so that it is now extended straight out in front of them. Then, the participant would bend their arm up at the elbow, lifting their forearm so that their hand was pointing upwards. Following this, the participant would reverse the sequence – still with their forearm and hand pointing upwards, their arm would then be outstretched in front of them before finishing by rotating the arm inwards to return to the original position. The movement sequence was self-paced by the child, although unusual speeds were moderated by the experimenter.

Articulatory suppression task

Based on the 'articulatory suppression task' used by Yang et al. (2014), participants were required to repeat aloud 'seven, eight, nine' while also listening to the verbal instructions. The verbal repetition of these numbers was self-paced by the child, although the experimenter intervened if the child's speed was extremely fast or slow.

Backwards counting task

Also adapted from Yang et al. (2014), this task required participants to count backwards from a given two-digit number (self-paced), while also listening to the verbal instructions. Participants were given a different two-digit number to begin counting from in each trial. Two different lists of twelve two-digit numbers (ten experimental trials, two practice trials) were generated – one for each recall condition (verbal and enactment). The two-digit numbers ranged from 10 to 30 and were randomly selected using an online random number generator.

Procedure

Testing sessions were conducted within a quiet room in the school and participants were tested individually while seated at a table opposite the experimenter. A video camera was used to record each block of trials



FIGURE 2 An exemplification of the sequence of gross motor movements utilised in the 'motor suppression task' in this study.

for scoring purposes. The video camera did not capture the child's face and was positioned directly at the stationary items on the table to record the child's motoric and verbal responses. A total of eight blocks (eight practice trials, 80 experimental trials) were administered to each participant across both testing sessions. In each session, participants completed four blocks of ten trials, separated by a short rest interval.

Before commencing, the experimenter ensured that the participant was able to correctly name the six stationary items and their colours, and then demonstrated the five actions (touch, spin, shake, pick up, push). The experimenter explained the procedure for the current task to the participant, before verbally presenting the two practice instruction sequences and giving feedback on any procedural errors made on the concurrent task (e.g., counting too fast, starting to recall before the experimenter had finished). Each instruction sequence (e.g., "Pick up the white rubber, spin the blue ruler") was presented in a paced and controlled way, taking approximately 3.5 s. Participants immediately recalled the instructions in a self-paced manner. For each concurrent task, the experimenter waited for the participant to complete the task twice before reading the instruction sequence. Participants were told in advance to stop completing the concurrent task and begin recall as soon as the experimenter had finished giving their instructions.

RESULTS

Responses were scored as correct when all the correct items (action, object, object's colour) were retrieved in the correct position in the list. The proportion correct for each condition was calculated by averaging responses across trials. The resultant descriptive statistics can be seen in Table 1.

To examine how the different concurrent tasks impacted type of recall, a 2 (recall type: enactment, verbal) by 4 (concurrent task: articulatory suppression, backwards counting, baseline, motor suppression) within-subjects ANOVA was performed. There was a significant main effect of recall: $F(1, 31) = 48.265$, $p < .001$, $\eta^2 = .609$, showing that enactment led to superior memory performance compared to verbal recall.

There was also a significant main effect of concurrent task: $F(1, 31) = 20.400$, $p < .001$, $\eta^2 = .397$ (see Figure 3). Further Bonferroni-corrected post-hoc comparisons showed that overall performance in the baseline condition was significantly better than articulatory suppression ($p = .001$), backwards counting ($p < .001$) and motor suppression ($p = .011$). Furthermore, backwards counting disrupted performance significantly more compared to both articulatory suppression ($p < .001$) and motor suppression ($p = .002$). The difference between articulatory and motor suppression was not significant ($p = .999$). Finally, there was no significant interaction between recall type and concurrent task $F(1, 31) = 1.056$, $p = .372$, $\eta^2 = .033$.

Action type – A secondary analysis

The finding that motor suppression did not significantly reduce the enactment advantage is not consistent with the previous findings by Jaroslawska et al. (2018). The main difference between the present experiment and Jaroslawska et al.'s (2018) study is that they only used two action phrases in their primary task (*touch, pick up*) while the present instructions used five different actions. To test the possibility

TABLE 1 Mean (standard deviations) proportion of action-object pairs correctly recalled in enactment and verbal recall under all concurrent tasks and the baseline condition.

Concurrent task	Enactment recall	Verbal recall
	Mean (SD)	Mean (SD)
Articulatory suppression	0.75 (0.18)	0.61 (0.22)
Backwards counting	0.60 (0.23)	0.50 (0.22)
Baseline	0.87 (0.11)	0.74 (0.18)
Motor suppression	0.77 (0.20)	0.68 (0.20)

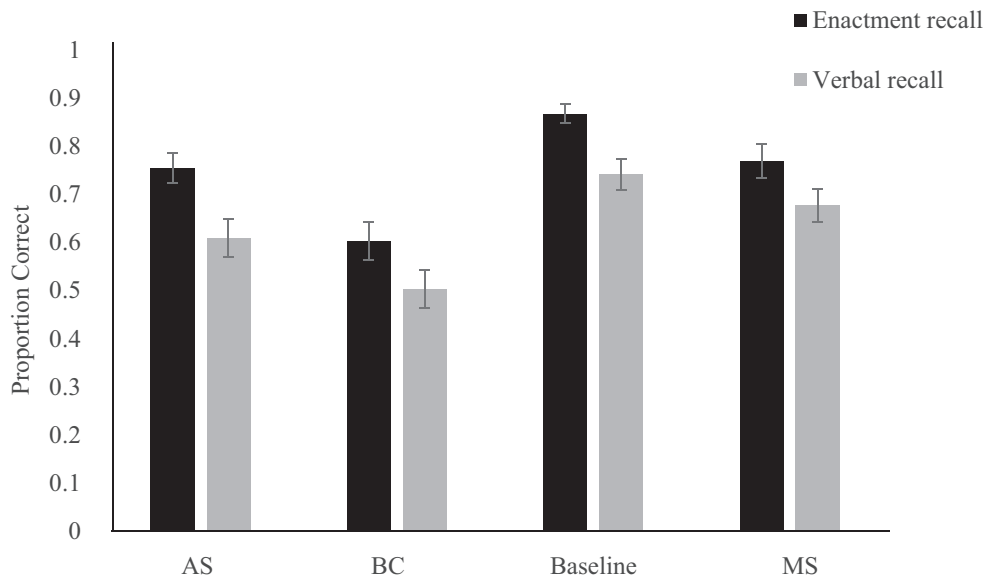


FIGURE 3 The effects of concurrent task (AS, articulatory suppression; BC, backwards counting, baseline; MS, motor suppression) on enacted and verbal recall. Error bars represent standard error.

TABLE 2 Mean (standard deviations) proportion of action-object pairs containing the actions *pick up* and *touch* correctly recalled in enactment and verbal recall under all concurrent tasks and the baseline condition.

Concurrent task	Enactment recall	Verbal recall
	Mean (<i>SD</i>)	Mean (<i>SD</i>)
Articulatory suppression	0.78 (0.18)	0.68 (0.21)
Backwards counting	0.65 (0.22)	0.56 (0.23)
Baseline	0.89 (0.12)	0.80 (0.16)
Motor suppression	0.78 (0.20)	0.78 (0.16)

that the difference in the findings between the current study and Jaroslawska et al. (2018) was due to the instructions used, a secondary analysis was performed on a subset of instructions including only the movements used in Jaroslawska et al. (2018): *touch* and *pick up*. These actions accounted on average for 70 out of the total 160 instruction phrases per participant. Means and standard deviations (*SD*) are displayed in Table 2 below.

For this analysis, a 2 (recall type: enactment, verbal) \times 4 (concurrent task: articulatory suppression, backwards counting, baseline, motor suppression) within-subjects ANOVA was performed. Given that assumptions of sphericity were violated $\chi^2(5) = 12.35, p = .03$, degrees of freedom and probability value were adjusted using Greenhouse–Geisser sphericity estimates ($\epsilon = .78$). There was a significant main effect of recall: $F(1, 31) = 13.070, p = .001, \eta^2 = .297$, suggesting that enactment led to superior memory performance compared to verbal recall. There was also a significant main effect of concurrent task: $F(1, 31) = 18.137, p = .001, \eta^2 = .369$. Further Bonferroni-corrected post-hoc comparisons showed that overall performance in the baseline condition was significantly better than articulatory suppression ($p = .01$) and backwards counting ($p < .001$), but not motor suppression ($p = .11$). Furthermore, backwards counting disrupted performance significantly more compared to both articulatory suppression ($p < .001$) and motor suppression ($p = .011$). The difference between articulatory and motor suppression was not significant ($p = .999$). Finally, the interaction between recall type and concurrent task was not significant: $F(1, 31) = 2.293, p = .100, \eta^2 = .069$ (Figure 4).

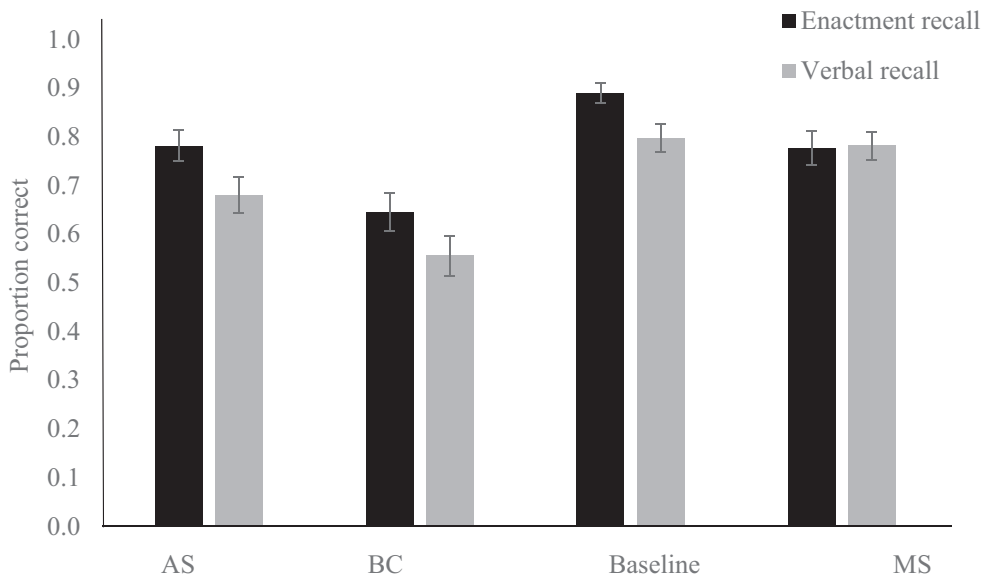


FIGURE 4 The effects of concurrent task (AS, articulatory suppression; BC, backwards counting; baseline; MS, motor suppression) on enacted and verbal recall for instructions including only *actions pick up* and *touch*. Error bars represent the standard error of the mean.

DISCUSSION

To our knowledge, this is the first study to investigate the association between motor planning and WM contributions in facilitating the enactment effect in children by following a dual-task paradigm. Previous research (Koriat et al., 1990) has suggested that the benefits of enactment at recall rely on the formation of motor plans recruited during the encoding phase of instructions for future physical implementation. To test this assumption, the current study asked participants to engage in a series of concurrent tasks during encoding aiming to disrupt memory performance by tapping on different subsystems of WM. Based on previous findings (Jaroslawska et al., 2018), it was expected that an enactment advantage will be evident in all concurrent task conditions, but this enactment advantage would disappear in the motor suppression condition showing the involvement of motor planning in enactment performance. The main findings of the current study showed that, although all concurrent tasks impaired performance compared to baseline in both enactment and verbal recall conditions, a clear enactment advantage remained evident under all concurrent task conditions. This finding provides initial direct evidence that the enactment advantage does not rely solely on WM resources in children, yet there was no conclusive evidence to suggest the involvement of a temporary motor store.

The present results extend previous findings by showing that in children, as in adults, articulatory suppression and backwards counting impair both enactment and verbal recall, but do not diminish the enactment advantage (Jaroslawska et al., 2018; Yang et al., 2014, 2016). Furthermore, although the results are consistent with Jaroslawska et al. (2018; Experiment 1) who found that motor suppression did not eliminate the enactment advantage, the results are not consistent with Experiments 2 & 3 (Jaroslawska et al., 2018), which indicated that motor suppression significantly reduced the enactment advantage. Instead, the current findings showed that the enactment advantage persisted during a concurrent motor suppression task in 8-year-old children. This discrepancy between the current results and Jaroslawska et al.'s (2018) findings could be related to the different motor movements included in the instruction set. To investigate this, a secondary post hoc analysis examined performance only for the subset of instructions that were identical to those used in Jaroslawska

et al. (2018). The results showed that although both enactment and verbal recall led to similar levels of performance following the motor suppression task, demonstrating an elimination of the enactment advantage, this pattern was not significantly different to the pattern observed in the rest of the conditions. Therefore, although a trend was observed suggesting an effect of the motor suppression task for these two actions (*touch, pick up*), no firm conclusions can be drawn from the secondary post-hoc analysis.

Overall, these findings are largely in agreement with Li et al. (2022) who, as in the current paradigm, also used a wider pool of actions in the instruction sequence and found that motor suppression reduced, but did not eliminate, the enactment advantage in adults. However, they did show that the enactment effect was diminished when an unfamiliar distractor was employed as the motor suppression task. In turn, this suggests that task difficulty plays a key role in showing the detrimental effects of motor disruption in motor planning within a working memory context. Taken together, the findings from Jaroslawska et al. (2018), Li et al. (2022) and the current study suggest that reducing the enactment advantage at recall may be dependent on a number of factors associated with task complexity, materials used, and the general paradigm employed. Hence, further investigation is needed in order to examine how motor processing mechanisms interact with higher cognitive systems within a WM context.

The findings of the current study, showing an enactment memory advantage beyond key WM resources, may have potential implications for many areas, but particularly for education, where WM difficulties can have many long-term consequences for children's academic success. This is especially important for children with neurodevelopmental disorders such as ADHD, in which WM difficulties are common, and have been shown to have a direct influence on academic achievement (Simone et al., 2018). While the results of this study demonstrated the benefits of enactment for improved instruction following, further research is needed to better understand the important but nuanced role of instruction following for learning, and the complex interplay with WM and motor planning.

CONCLUSION

The current study was the first to investigate the involvement of WM resources in enactment at recall in children using a dual-task paradigm. The main results showed that all concurrent tasks significantly impaired enactment and verbal recall, yet a clear enactment advantage across all concurrent WM and motor concurrent tasks was observed. These findings extend previous research (i.e., Jaroslawska et al., 2018; Li et al., 2022) which suggests that successful disruption of enactment performance at recall may be conditional upon the type of motor processing involved at encoding, by showing similar effects in children. Crucially, the results of this study clearly showed that enactment at recall benefits in this age group of children do not rely purely on WM resources; a finding that has important implications for children's instruction following ability, especially children with memory deficits, in education and beyond.

AUTHOR CONTRIBUTIONS

Angie Makri: Study design; Data curation; formal analysis; investigation; methodology; supervision; writing – original draft; writing – review and editing. **Abigail Fiske:** Data curation; formal analysis; project administration; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

Authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

Data will be made available upon request.

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