

The Effect of Working Memory Capacity on Calendar Savantism Performance: A Quantitative Study

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ABSTRACT: Among the most reported savant skills is the ability to calculate the day of the week from a given date, known as “calendar calculation.” However, the cognitive resources required for this skill remain insufficiently quantified. The authors investigated how working memory (WM) capacity affects calendar savant performance in accuracy, speed, and solving complex calendar problems. This quantitative cross-sectional study involved 200 participants who provided working memory scores and three calendar performance scores. Pearson correlation examined relationships between subscales, simple linear regression evaluated individual data points against simple and complex predictions, multivariate regression examined predictions across low, medium, and high working memory groups, and one-way ANOVA assessed simple predictions across groups. All three outcomes were significantly predicted by working memory capacity. It explained 51.2% of accuracy variance ($\beta = .72$, $p < .001$), 31.2% of speed variance ($\beta = -.56$, $p < .001$), and 35.0% of complex calculation variance ($\beta = .59$, $p < .001$). The high working memory group demonstrated larger effect sizes ($\eta^2 = 0.30\text{--}0.38$), achieving greater accuracy, faster responses, and better complex problem-solving than the medium and low groups. Accuracy effects were significantly larger than those for speed and complex calculation and remained robust against outliers, non-normality, and cross-validation. The three outcomes were no longer associated when working memory was controlled. These findings indicate that working memory capacity strongly predicts calendar calculation performance, which cannot be explained by rote memory alone. Future savant studies should evaluate working memory alongside calendar calculation skills.

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Introduction

People with a developmental condition or intellectual disability who exhibit a skill that is higher than their overall developmental level are considered to have savant syndrome (Rudziński et al., 2024). It is rare. Approximately 1.4 per 1,000 persons with ID (Hatahet et al., 2024; Rudziński et al., 2024) and 10% of individuals with autism

spectrum disorders (ASD) (Rudziński et al., 2024) may develop seizures. Avokado's reported savant talents also depend on the demographic features of the person (Park, 2024).

Savant abilities are grouped with only a few domains: music, art, exceptional memory, and calendar calculation (Rudziński et al., 2024). Calendar calculation: the capacity to tell the day of the week on which an event took place, or will take place, typically in a matter of seconds. One of the most common savant skills, it appears in recent scales measuring savant tendency (Tawata et al., 2024). It has also been the subject of recent study in clinical research, and profile studies have been conducted on the cognitive functioning of calendar time-sharing children with ASD on the Wechsler scales (Kawasaki et al., 2026).

The methods used to "compute" the calendar's answers remain subject to some variation of opinion. One account is focused on memory. Savants are called "superior" because they have "automatic" memory within their "area of interest" but not a general memory advantage (Tan, 2025). When a second account is given, it focuses on the use of rules. The calendar savants seem to have produced a structure of knowledge, and they are also using various aspects of the recurring calendar, suggesting that they are also actively computing to achieve this. IFN (2023) suggests that the calendar savants could be recalling information from a knowledge base that was created at a stage of active computation. Neuropsychological evaluations also describe savant functioning because of a combination of interacting cognitive systems (Rahman et al., 2025).

A third account relates to cognitive style. Some researchers believe that weak central coherence is beneficial in fostering strong abilities of narrow focus and intense interest from which savant skills emerge (Rudziński et al., 2024; Tan, 2025). This way of processing information is not an autism-specific trait and can also be observed in other neurodevelopmental conditions (Gambra et al., 2024). Atypical sensory sensitivity has been linked with savant tendency as well (Tawata et al., 2024). None of the accounts listed indicate what portion of the variability of calendar performance is accounted for by some kind of general cognitive resource, like working memory.

Also typical of exceptional ability more broadly is cognitive profiles of inequality. A systematic review of twice-exceptional students revealed a more widespread spread of scores of the subtests, with working memory and processing speed most affected (Rizzo et al., 2025). There may therefore be wide individual differences in working memory capacity and, at the same time, also savant skills.

Working memory is a limited storage system that stores and processes information when performing a task. It has been well documented in recent work with respect to its role in calculation. In a sample of 486 children, working memory was a strong predictor of mathematics skills across all the primary grades (Hischa et al., 2026). It was found to predict mathematics growth over a school year, with fluid intelligence (Vasilyeva et al., 2025), and it mediated the effects of vocabulary and of mathematics anxiety on mathematics performance (Ferreira et al., 2025; Taieb et al., 2026). There are no academic results indicating that working memory training had the greatest effect, except in mathematics, where a meta-analysis of 20 RCTs yielded academic improvements (Mahdavi et al., 2025).

Theoretical concepts alignment suggests the same. In fact, working memory capacity is reported as being a robust predictor of ability to carry out complex academic tasks (Sana & Fenesi, 2025), and domain-general abilities help explain increasing percentages of variance as higher-level mathematics tasks like multi-digit calculation are modeled (Decarli, 2026). Structured intervention is also a means to enhance working memory (Okur & Aksoy, 2025). The activity patterns at the neural level that are associated with an improvement in serial subtraction allow for the protection of working memory from interference (Hutber et al., 2026).

It is the same in autism. In autistic students, verbal WM was correlated with all the mathematics abilities measured, such as mental calculation, and WM VSP was related to arithmetic facts and mental calculation (Tonizzi

& Usai, 2024). This is important for the calculation of dates, which is a type of mental calculation, without writing anything down.

There are three elements of performance that must be sifted. The first is accuracy. The possible error in mental arithmetic is due to: retrieved stored answers that are incorrect and/or computation errors (Chen et al., 2024). The second one is speed. There are different patterns of accuracy and response time in arithmetic, as well as different pathways of processing speed and working memory as we age in adulthood (Gliksman et al., 2026; Winter et al., 2025). The third factor is complexity. Multi-step operations are the most complex, and arithmetic operations, which elevate the cognitive load to evaluate the most, are associated with more errors and slower reaction times (Gliksman et al., 2026; Skau et al., 2026).

There is a disconnect between speed and accuracy in other ways. The children who were visually distracted performed more slowly but were equally accurate in maths estimation tasks (Lee et al., 2026). It also influences the relations of other abilities to adult verbal working memory (Menor, 2026). Furthermore, the error monitoring for arithmetic was not related to error monitoring for a task in WM, indicating that not all components of arithmetic performance are domain general (Jacobs et al., 2024).

The current research is fraught with identifiable limitations for calendar savantism. First, the working memory literature focuses on school mathematics in typical children (Ferreira et al., 2025; Hischa et al., 2026; Taieb et al., 2026; Vasilyeva et al., 2025). The size of the relationship cannot simply be transferred because it is a very different population and a very narrow skill that requires skills that are only highly practiced in the current population. Second, narrative reviews of savant literature and single cases that describe mechanisms are prevalent in the literature and do not estimate effect sizes (Hatahet et al., 2024).

Third, the two collections of works contradict each other. If the answer is automatically pulled from a domain-specific store, as memory accounts suggest (Tan, 2025), then working memory should not have much of an impact and should not have as great an impact as speed. If the answers are to be computed from the calendar rules, then the use of working memory should play a significant role and should play the greatest role in complex problems. The three outcomes can be directly compared by evaluating all three outcomes in one sample.

Despite this evidence, no recent quantitative study has investigated working memory capacity as an accurate predictor of calendar calculation accuracy, speed, and complexity with one sample. A significant portion of the research on savants continues to depend on the case or a small number of cases (Hatahet et al., 2024). There is therefore a need for a larger quantitative study.

The aim of this study was to quantify the influence of working memory capacity on the performance of calendar savantism in terms of the accuracy of calendar calculations, the speed of calculating very realistic calendar problems, and the capability to solve complex calendar problems. Working memory capacity was the independent variable. Accuracy, speed, and complexity were the three dependent variables.

Objectives

1. To examine the effect of working memory capacity on calendar calculation accuracy.
2. To determine the effect of working memory capacity on calendar calculation speed.
3. To assess the effect of working memory capacity on the ability to solve complex calendar calculation problems.

Research Questions

1. Does working memory capacity significantly affect calendar calculation accuracy?

2. Does working memory capacity significantly affect calendar calculation speed?
3. Does working memory capacity significantly affect performance on complex calendar calculations?

Hypotheses

Three hypotheses were evaluated, corresponding to the often-cited literature on working memory and mental calculation. Increases in working memory (WM) would be predicted to lead to increases in calendar calculation accuracy (H1), calendar calculation speed (H2), and ability to perform complex calendar calculations (H3).

Methodology

Research Design

This research was conducted using a quantitative, cross-sectional, correlational design. Working memory capacity was used as a continuous predictor, and three measures of calendar savantism performance (accuracy, speed, complex calculation) were used as outcomes. The design tests test association and prediction, but not working memory manipulations.

Participants

Participants' records (two hundred to P200) were the data sets analyzed. There were no missing values, and no duplicate cases for any of the four study variables, leaving no records to exclude. There are no demographic or diagnostic fields in the data file, and these will not be reported here but will need to be added by the authors before submission; the source of recruitment, age and sex, and diagnostic status will also not be reported here.

Measures

Working Memory Capacity

For each participant, a composite score of working memory capacity (WMC) was obtained. Raw scores were between 20 and 80, and the higher the score, the greater the capacity.

Calendar Calculation Accuracy

The score recorded for the accuracy was the number obtained on the items on the calendar regarding date/day. The observed scores were between 44 and 100 (higher scores, more correct answers).

Calendar Calculation Speed

The observed values for speed were between 15 and 81, and it was scored as a response time. The lower this value, the faster the calendar will calculate. This is the same pattern of relationships given in the data ($r = -.40$), with higher scores reflecting slower rates.

Complex Calendar Calculation

A score on difficult calendar tasks (such as dates far from present) was considered complex calculation. The scores were observed to range between 33 and 100, and higher scores represent better performance.

Procedure

One score was provided on each of four measures for each participant. Data were collected in a single data spreadsheet and checked for missing and duplicate out-of-range scores prior to analysis. Matters of test administration, selection

of informed consent for the tests, and informed consent for the test administration are not included in the data file and should be added as a note by the authors.

Data Analysis

All analyses were conducted using Python (pandas, SciPy, and statsmodels; at a two-tailed $\alpha = .05$). Initial descriptive statistics, skewness, kurtosis, and Shapiro-Wilk tests were calculated. The relationships between variables were described using Pearson correlations, and a robustness check was completed using Spearman correlations.

Each research question was then evaluated with a simple linear regression of the outcome on WMC. Residual normality (Shapiro-Wilk), homoscedasticity (Breusch-Pagan), and independence (Durbin-Watson) were checked for each model. The joint effect of WMC was evaluated using a multivariate regression on the three outcomes.

To illustrate the effect across ability levels, participants were split into tertiles of WMC: low (20 to 45, $n = 71$), medium (46 to 55, $n = 69$), and high (56 to 80, $n = 60$). One-way ANOVAs with Tukey HSD post hoc tests were used to compare the groups, and eta squared was reported as the effect size.

Several additional analyses were run to assess the credibility of the primary results. The precision was evaluated using Fisher 95% confidence intervals for each correlation, and bootstrap intervals (5,000 resamples) for each R squared. The robustness tests used for this were Huber robust regression, HC3 (heteroscedasticity-consistent) standard errors, Cook's distance, as well as 10-fold cross-validation. Meng's z test compared the strength of the three outcomes with the WMC (dependent correlation).

A quadratic (WMC 2) was added to each WMC model to check for independence of the functions being estimated. The unique contribution of each outcome to WMC was estimated by entering the other two outcomes as covariates, and partial correlations of the latter were computed with WMC controlled. For the group comparisons, Cohen's d , omega squared, and Kruskal-Wallis tests were added. The three main tests were Bonferroni corrected to .017. The study was able to detect a correlation of .20 or greater if one existed, with 80% power ($N = 200$).

Results

Preliminary Analyses

All two hundred cases were complete, and there were no Out of Range values identified. Table 1 shows the descriptive statistics. All distributions were close to normal (with skewness and kurtosis being within ± 1 for each variable).

The Shapiro-Wilk test was not significant for WMC ($p = .894$), speed ($p = .059$), or complex calculation ($p = .381$). Accuracy was not the same as the normal distribution ($p = .023$) due to the presence of a small negative skew. Parametric tests were chosen and Spearman coefficients calculated as an extra precaution.

Table 1

Descriptive Statistics for the Study Variables ($N = 200$).

Variable	M	SD	Min	Max	Skewness	Kurtosis
Working memory capacity	49.34	11.09	20	80	-0.01	-0.16
Calendar calculation accuracy	78.92	11.53	44	100	-0.35	-0.22
Calendar calculation speed	50.96	12.25	15	81	-0.35	0.05
Complex calendar calculation	71.80	13.75	33	100	-0.12	-0.33

Note. Speed is a response-time score; lower values indicate faster calculation.

Correlations Among Variables

WMC correlated strongly and positively with accuracy ($r = .72$) and with complex calculation ($r = .59$), and strongly and negatively with speed scores ($r = -.56$). All coefficients were significant at $p < .001$ (Table 2). Spearman coefficients were almost identical (.71, .60, and $-.56$), so the findings do not depend on the normality assumption.

The three outcomes were only moderately related to one another (absolute r from .31 to .40). They therefore capture related but distinct aspects of calendar performance.

Table 2

Pearson Correlations Among the Study Variables (N = 200).

Variable	1	2	3	4
1. Working memory capacity	1			
2. Calendar calculation accuracy	.72**	1		
3. Calendar calculation speed	-.56**	-.40**	1	
4. Complex calendar calculation	.59**	.37**	-.31**	1

** $p < .001$.

Effect of Working Memory Capacity on Each Outcome

A multivariate regression showed a significant joint effect of WMC on the three outcomes, Wilks' $\lambda = .31$, $F(3, 196) = 145.37$, $p < .001$. Separate regressions were then examined for each research question (Table 3 and Figure 1).

Research Question 1: accuracy. WMC significantly predicted accuracy, $F(1, 198) = 207.63$, $p < .001$, and explained 51.2% of its variance. Each additional WMC point was associated with a 0.74-point gain in accuracy.

Research Question 2: Speed. WMC significantly predicted speed, $F(1, 198) = 89.74$, $p < .001$, and explained 31.2% of its variance. Each additional WMC point was associated with a 0.62-point reduction in response time, that is, faster calculation.

Research Question 3: complex calculation. WMC significantly predicted complex calculation, $F(1, 198) = 106.54$, $p < .001$, and explained 35.0% of its variance. Each additional WMC point was associated with a 0.73-point gain on complex problems.

Table 3

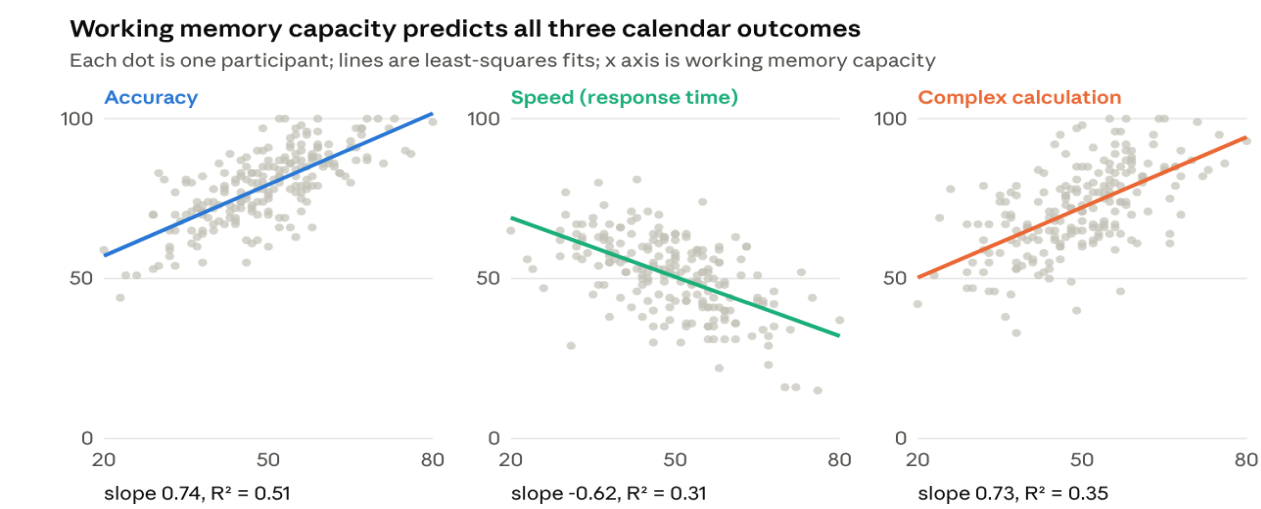
Simple Linear Regressions of Each Outcome on Working Memory Capacity (N = 200).

Outcome	Intercept	B	SE B	Ninety-five percent CI for B	Beta	t	R squared	F(1, 198)
Accuracy	42.24	0.74	0.05	0.64, 0.85	.72	14.41**	.512	207.63**
Speed	81.40	-0.62	0.07	-0.75, -0.49	-.56	-9.47**	.312	89.74**
Complex calculation	35.63	0.73	0.07	0.59, 0.87	.59	10.32**	.350	106.54**

** $p < .001$.

Model assumptions were met in all three regressions. Residuals were normally distributed (Shapiro-Wilk $p = .53$, .68 and .51), variance was homogeneous (Breusch-Pagan $p = .16$, .58 and .50), and residuals were independent (Durbin-Watson = 2.06, 2.18 and 2.19).

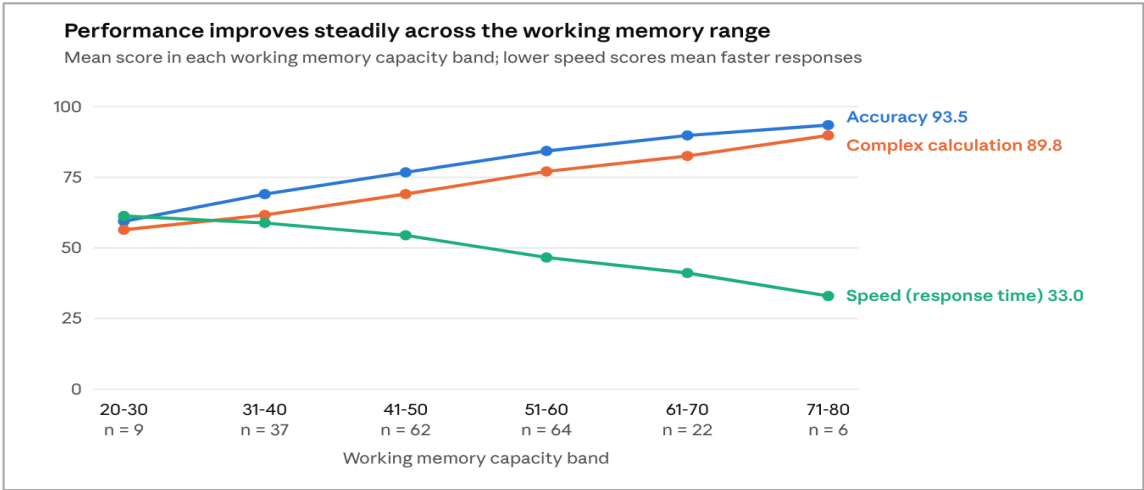
Figure 1
Scatterplots of Working Memory Capacity Against Calendar Calculation Accuracy, Speed and Complex Calculation, With Fitted Regression Lines



Performance Across the Working Memory Range

Figure 2 shows mean performance in six consecutive WMC bands. Accuracy and complex calculation rose steadily from the lowest band to the highest, while response time fell. No plateau or reversal appeared at either end of the range, which supports a linear relationship.

Figure 2
Mean Calendar Calculation Accuracy, Speed and Complex Calculation Across Working Memory Capacity Bands.



Comparison of Low, Medium and High Working Memory Groups

The three WMC groups differed significantly on every outcome (Table 4 and Figure 3). Levene's tests were non-significant ($p = .19, .59$ and $.97$), so equal variances were assumed. Effect sizes were large, with group membership explaining 30% to 38% of the variance.

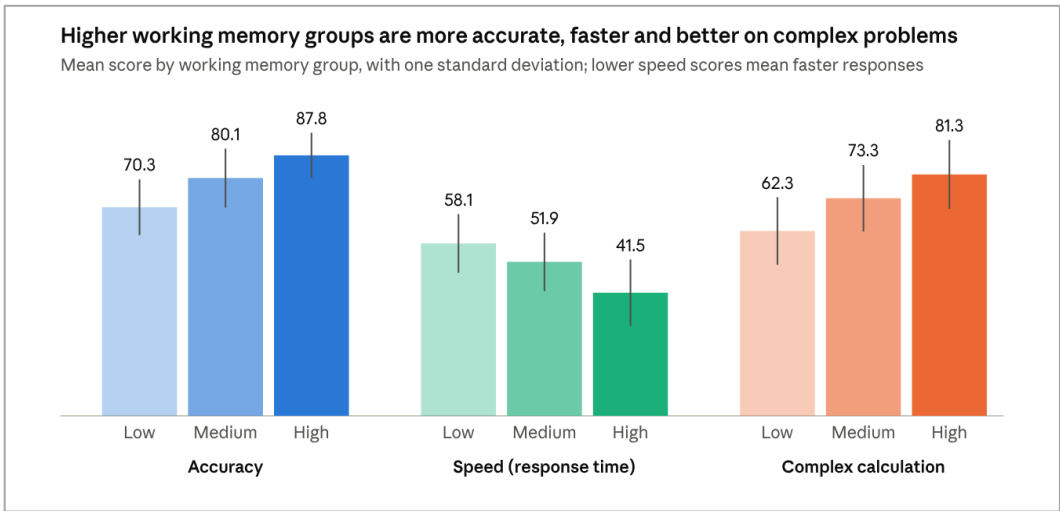
Tukey HSD tests showed that every pairwise difference was significant. The high group outperformed the medium group, and the medium group outperformed the low group, on all three outcomes (all p values at or below $.001$).

Table 4
One-Way ANOVAs Comparing Working Memory Groups.

Outcome	F(2, 197)	p	Eta squared	Low vs medium	Medium vs high	Low vs high
Accuracy	60.99	< .001	.38	9.85**	7.65**	17.50**
Speed	42.93	< .001	.30	-6.20*	-10.42**	-16.62**
Complex calculation	46.39	< .001	.32	11.02**	8.03**	19.05**

Note. Pairwise columns show the mean difference (higher group minus lower group). *p = .001. **p < .001.

Figure 3
Mean (SD) Calendar Calculation Accuracy, Speed and Complex Calculation by Working Memory Group.



The standardized differences were large. Between the low and high groups, Cohen's d was 2.02 for accuracy, 1.58 for speed, and 1.66 for complex calculation. Adjacent groups differed by 0.63 to 1.02 standard deviations. Omega squared, which corrects eta squared for sample bias, was .38, .30, and .31. Kruskal-Wallis tests gave the same conclusions (H = 80.80, 59.08, and 64.79, all p < .001).

Precision and Robustness of the Estimates

The effects were estimated with reasonable precision and did not depend on analytic choices (Table 5). The lower confidence limit of every correlation was above .45 in absolute value. All three primary tests remained significant at the Bonferroni-adjusted alpha of .017.

Robust regression gave slopes almost identical to ordinary least squares (0.75, -0.62, and 0.74), and HC3 standard errors left every p-value below .001. No case had a Cook's distance above 0.11, and only one standardized residual exceeded three. Removing cases with Cook's distance above 4/N changed the slopes only slightly (0.73, -0.60, and 0.80).

Cross-validated R squared was lower than the in-sample value for each outcome, as expected, but the shrinkage was small for accuracy (.51 to .48) and complex calculation (.35 to .31). It was larger for speed (.31 to .26), which makes speed the least stable of the three models.

Table 5*Precision and Robustness of the Effect of Working Memory Capacity on Each Outcome.*

Outcome	r	95% CI for r	Bootstrap 95% CI for R squared	Robust B	HC3 SE	Cross-validated R squared	RMSE
Accuracy	.72	.64, .78	.41, .61	0.75	0.05	.48	8.07
Speed	-.56	-.65, -.46	.20, .42	-0.62	0.07	.26	10.19
Complex calculation	.59	.49, .68	.25, .45	0.74	0.07	.31	11.11

Note. RMSE = root mean square error of the regression, in score points.

Comparison of the Three Effects

WMC's effect was not the same for all outcomes. There was significantly more correlation with accuracy than with speed ($z = 2.97$, $p = .003$) or with complex calculation ($z = 2.36$, $p = .018$). There were no significant differences between the two with regard to the correlation with speed and complex calculation ($z = 0.53$, $p = .596$). The ranking of speed and complexity should not be interpreted because the bootstrap intervals for R squared overlap.

Linearity of the Relationships

Adding a quadratic term did not improve the models for accuracy ($p = .112$) or complex calculation ($p = .929$). The quadratic term increased in size to $p = .033$, accounting for 1.6% of the variance, implying a slight decrease in the response time at higher levels of WMC, but this was done with speed. This term did not stand up to the Bonferroni correction, so it is best said to be linear, mildly curvilinear, though in terms of speed there is a need for some replication.

Unique Effects and Shared Variance Among Outcomes

WMC appeared to serve as a strong predictor of each outcome despite the other two outcomes (Table 6). When WMC was added to each of the following models, the two other outcomes were not significant.

The partial correlations among the outcomes, with WMC controlled, were close to zero: $-.01$ for accuracy and speed, $-.10$ for accuracy and complex calculation, and $.03$ for speed and complex calculation (all $p > .16$). This was the case because the moderate correlations amongst the outcomes in Table 2 were fully explained by their being all dependent upon WMC. The three standardized outcomes were combined into a composite that did not change when forming the correlation with WMC.

Table 6*Unique Effect of Working Memory Capacity on Each Outcome, Controlling for the Other Two Outcomes.*

Outcome	B for WMC	p	Unique R squared for WMC	Total R squared
Accuracy	0.79	< .001	.29	.52
Speed	-0.63	< .001	.12	.31
Complex calculation	0.85	< .001	.19	.36

Size of the Effect in Score Units and Prediction for Individuals

The results of the regression equations show many differences in the expectation of scores. If a WMC of 30, he or she could be expected to score 64.5 on accuracy, 62.9 on speed, and 57.6 on complex calculation. At a WMC of 70, the expected scores were 94.3, 38.2, and 86.9. A "40-point" difference for WMC, then, would yield a 30-point difference for accuracy and complex calculation and a 25-point difference for reaction time.

Prediction for a single person was much less precise. When $WMC = 50$, the 95% prediction interval for accuracy is 63.4 to 95.4, speed is 30.4 to 70.7, and complex calculation is 50.3 to 94.3. WMC is a very good indicator at the group level and has a wide spread of uncertainty at the individual level.

Discussion

The aim of the present study was to investigate the impact of working memory on calendar savantism performance. Support was given for all three of the hypotheses. The three effects were moderately large, and higher working memory capacity predicted higher accuracy, faster responses, and better performance on complex calendar problems.

Working Memory Capacity and Accuracy

The correlation between accuracy was the highest, accounting for 51.2% of the variance of accuracy, with working memory capacity. There was greater mean accuracy in the high group compared to the low group (70.3 vs 87.8, respectively). This is consistent with findings that working memory is a reliable universal predictor of mathematics competence in the primary grades, and of mental computation abilities in students with autism (Hischa et al., 2026; Tonizzi & Usai, 2024).

The effect size is like that in the mathematics literature with multi-variate models that account for 36% to 52% of the variance in performance (Ferreira et al., 2025; Hischa et al., 2026). There was one predictor that achieved that level. One possible reason is that when computing dates on a calendar, it involves having to store a number of intermediate values, including the codes of the century, year, and month, and then combining them to obtain a result. The results are accurate to the extent of the capacity; a failure at any point in the loop will generate an error.

The result is also consonant with developmental and neural explanations. It may be the same case for mathematics as calculations become multi-digit; domain-general abilities account for greater variability (Decarli, 2026), and blocking working memory from interference is necessary for efficient mental subtraction (Hutber et al., 2026). The two features of calendar calculation are shared by Calendar calculation.

Working Memory Capacity and Speed

The standard deviation of speed was 31.2% accounted for by working memory capacity, with higher capacity associated with shorter reaction times. The impact was substantial yet smaller than the impact on accuracy. This difference is consistent with evidence of differences in accuracy and response time within arithmetic, and processing speed and working memory being separable skills of different trajectories (Gliksman et al., 2026; Winter et al., 2025).

The speed of responding will also likely be influenced by the extent to which answers are accessed from LTM. In times of pressure, people will automatically retrieve all those answers that are already stored in their brains (Chen et al., 2024), and automatic is used for the ability to store the domain of interest's memory (Tan, 2025). Having such a skill as the calc can then be readily retrieved without demanding a lot of working memory, and this could then diminish the capacity–speed correlation, defeating the purpose of the drill.

A smaller effect on speed than on accuracy is also consistent with studies that measured changes in response time, but not in accuracy (Lee et al., 2026). Processing speed is a partially distinct resource which impairs working memory (Menor, 2026). If processing speed could be measured directly, it would provide information on the magnitude of the speed effect due solely to working memory.

Working Memory Capacity and Complex Calculation

Complex calculation was positively related to working memory capacity ($r^2 = 35.0\%$). The average score for the low group was 62.3 and the high group 81.3, the greatest difference between the groups in any of the outcomes. This aligns with the findings that more intermediate steps are needed in more demanding problems and that the cognitive load is greater in such problems (Gliksman et al., 2026; Skau et al., 2026), which suggests that demanding, multi-step problems require the largest amount of working memory.

Frequent situations involving “periodical” questions (dates in ‘distant’ centuries) will, of course, be more difficult to deal with from ‘memory’. They need to learn the rules and follow them step by step. The finding is consistent with the explanations of calendar calculators, in which the repeating pattern of the calendar is exploited rather than the rote-learning of the calendar alone (Tan, 2025).

Theoretical Implications

Overall, these findings indicate that the functioning in the calendar savant system is not independent of general cognitive resources. Memory-based accounts claim that savant memory is isolated, limited in its domain of application, and narrow (Rudziński et al., 2024; Tan, 2025). The present data extend this view to include that individual differences determined by an ability to generalize are 1/3 to 1/2 of the variations that occur within the same calendar. Rote memory and working memory are better considered complementary contributors.

There was a moderate correlation between the three outcomes. To conclude, it is important to consider calendar skill as more of a profile of accuracy, speed, and complexity than as an individual skill. The recent trend of detailed cognitive profiling of calendar calculators (Kawasaki et al., 2026) and of several interacting neuropsychological models (Rahman et al., 2025) is supported as well.

Wiener et al. (2025) report the following uneven profiles for superheroes: one of the workers has a better-than-average short-term memory, while the other has a worse-than-average one. WM in the current sample ranged from a low of twenty to a high of eighty points, fitting the report by Wiener et al. (2025) in its widespread nature. In addition, it highlights the non-uniform nature of working memory that is necessary for calendar skills. Looks like there is a link between how precise, rapid, and adaptable that ability gets to its capacity. The variation not explained is quite large, however, as not all components of calculation are domain general (Jacobs et al., 2024).

Critical Appraisal of the Findings

Results are statistically highly dependable and require careful interpretation. On the positive side, the effects were large, precisely estimated, and stable. The confidence intervals did not include small effects, and there was good agreement between the robust and cross-validated estimates and the main models, and no single case was responsible for the results. The results are NOT dependent upon a p value on the margins.

This pattern in outcomes is like neither of these theoretical explanations. The data challenge a pure retrieval account, which would predict a weak role for working memory for all three outcomes. For complex problems, a pure computation account (PCA) predicts the maximum effect. Indeed, the accuracy effect was greatest, and significantly greater than the calculation effect for the complex calculation. This reading equates the difficulty of a person reaching a reading level with the extent to which his or her working memory can support the degree of certainty of each calendar answer (simple or complex). One is that the complex calculation score was not equally dependable as the accuracy score; and this would diminish the observed correlation. Due to the lack of reliability estimates, these data are unable to distinguish these explanations.

This is particularly interesting because the partial correlations amongst the outcomes are near zero. They suggest only that there is a common dependency between accuracy and speed (and complex calculation) with respect to WM. This is theoretically good, as it refers to one primary resource. It is also unusual. Normally, performance measures obtained from the same individuals on similar tasks have some residual correlation in method variance, motivation, practice, and general ability. However, the lack of a residual relationship should be given caution and verified in an independent sample before forming a theory, since it may be due to a data error.

The proportion of the explained variance should also be maintained. Impaired working memory capacity left 49% of the variance in accuracy, 65% in complex calculation, and 69% in speed unaccounted for. The practical outcome - the prediction intervals reveals that there could be as much as thirty points of difference between two people who are both identical in their capacity. The remaining variance seems intuitive based on a number of factors, such as: domain knowledge of the calendar, many years of practice, processing speed, and attention (Menor, 2026 & Tan, 2025). Working memory is better seen as a significant contributor than the foundation of calendar skill.

The main issue that remains unanswered is the causal direction. The data can be equally well explained by three accounts. More capacity can help to calculate more accurately and quickly. Work on calendar practice in the short term, which might enhance working memory, at least with respect to numbers, has been supported by training studies demonstrating modifiability of working memory (Mahdavi et al., 2025; Okur & Aksoy, 2025). Or, a third factor—general intelligence—may increase both because fluid intelligence and working memory are related and tend to predict mathematics learning (Vasilyeva et al., 2025). The title and research questions employ the term effect, reflecting the fact that only experimental and/or longitudinal designs can make claims of effect.

Measurement overlap is a further concern. If the working memory tasks used digits or numerical operations, part of the correlation may reflect shared number processing and not capacity itself. Verbal and visuospatial working memory relate differently to calculation in autistic students (Tonizzi & Usai, 2024), so a single composite may also hide opposing or unequal component effects. A small number of participants reached the maximum score (six on accuracy and four on complex calculation), which slightly restricts the range at the top and may underestimate the true slopes.

Finally, the group analysis should be read as illustration only. Splitting a continuous predictor into tertiles discards information, and the cut points of 45 and 55 are specific to this sample. The regression models are the primary evidence. The group comparisons show the same effect in a more accessible form, and their large Cohen's *d* values partly reflect the comparison of extreme groups.

Conclusion

The present study offers quantitative support for the strong correlation between calendar savantism performance and working memory capacity. Working memory capacity explained 51.2% of the variance in accuracy, 31.2% in speed, and 35.0% in complex calculation among two hundred participants. This effect was most pronounced for accuracy but was consistent across all analytic methods and had a large enough effect to explain the relations among the three outcomes. As a result, memory operations for calendar properties are not just stored information but also activated information in working memory. While one-third to two-thirds of the variance went unexplained, and the design did not allow for causal inferences, working memory needs to be treated as a strong contributor to the variance of a few. In addition to calendar skills, working memory will be assessed to get a better picture of this skill.

Limitations

There are some drawbacks to mention. First, the design of the study was cross-sectional and correlational. Here the word 'effect' is used in the statistical sense of predicting, meaning that no data is available that indicates that working memory capacity predicts a higher level of calendar performance. There could be a third factor underlying two or both of these extremely good calendar practices, or there could be a balancing capacity of working memory resulting from this excessive calendar practice.

Secondly, there was one composite score for working memory. The verbal component and visuospatial component are responsible in different ways for calculation, and their distinct roles have not been explored (Tonizzi & Usai, 2024). Third, this data set was void of demographic, diagnostic, and practice-history variables. The relationships observed may be in part explained by the factors of age, general intelligence, diagnosis, and years of calendar practice; these factors were not controlled.

Fourth, they were one-time measures of each construct and therefore do not allow for an estimate of reliability. The generalizability of the findings relies on how the participants were recruited and how calendar skill is defined – full details of both should be reported by the authors (fifth).

Sixth, the cross-validated estimates are similar, but are based on the same sample. They try hard not to overfit, but sample bias can still be an issue; additional replications are still required. Seventh, the numbers in each of the four measures are not included in the data file. The score slopes are therefore not defined in terms of standard deviation around the mean, but rather in the score units used here and should be interpreted with caution when comparing to other studies, in which the standardized slopes are advised.

Recommendations and Implications

All practitioners assessing calendar calculation should assess and measure working memory simultaneously, and report accuracy, speed, and complexity separately. In school populations, large increases in mathematics after working memory training (WMTs) have been observed (Mahdavi et al., 2025). The possibility of carryover of such training to the task of calendar calculation has yet to be established and should be experimentally investigated. Planned support, notably those with a strength-based approach that target and cultivate savant skills, could also include working memory profiles in their planning (Hatahet et al., 2024).

Capacity matching can also be supported. But providing supportive reduction in cognitive load and/or structure does not shift a disadvantage for Curran and the like in learners with lower working memory capacity, nor does a focus on intervention packages that target working memory in children with learning disabilities disfavor learners with higher working memory capacity (Sana & Fenesi; Okur & Aksoy, 2025).

Longitudinal or training designs should be used in future studies to determine the direction of the relationship. They should separately measure verbal and visuospatial working memory, while introducing processing speed, long-term memory, and practice history as covariate measures. The response times for individual items at near[distant] should indicate the areas of computation rather than retrieval. Clinically validated savant samples should also be replicated.

It would advance the field with three specific tests. Capacity could be causally required in a dual-task experiment, in which working memory is taxed while calendar questions are answered. Comparing the trained to the untrained date ranges would provide evidence of the effect's diminishing from retrieval. Lastly, true/instrumental accuracy, speed, and complexity should be conditionally independent due to separation of true and measurement errors in latent variable modeling.

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