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RESEARCH ARTICLE

Changes in Scores Throughout the Day in Wordle, a Word-Puzzle Played by Millions of People: Is Morphic Resonance at Work?

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ABSTRACT

The current study is an extension of two previous studies using the five-letter word puzzle Wordle to test whether there was an improvement in player performance throughout the day that might be suggestive of morphic resonance. Players have six attempts to solve the puzzle. The previous studies, which used WordleBot to obtain continuously updated performance statistics for millions of players, found inconsistent results. In the first study, the percentage of players solving in one to three attempts increased throughout the day. In the second study, success rates declined across all six attempts. To increase sensitivity in the current study, we sampled over a much longer time span, starting with samples at 4:00 a.m. New Zealand Daylight Time (NZDT), near the International Date Line, where each new day's puzzle is launched, followed by samples around midday GMT, and ending with samples near midnight Hawaii Standard Time (HST), close to the end of the international day (giving a total span of 43 hours). The results showed that there is a repeatable pattern whereby there is an increase throughout the day in the percentage of players solving the puzzle in one or two attempts, and a decrease in players solving it in four to six attempts. We discuss possible explanations for this pattern, including time-of-day effects, cheating, precognition, and morphic resonance.

KEYWORDS

Wordle, morphic resonance, time-of-day effects, puzzle solving, psi, precognition.

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The current study is an extension of two previous studies we carried out using the five-letter word puzzle, Wordle, to test whether there was any consistent pattern in player performance throughout the day that might be consistent with morphic resonance (MR) (Black et al., 2026). The hypothesis of MR proposes the existence of a new type of field, morphic fields, which have an inherent memory (e.g., Sheldrake, 1988). Once an organism learns a particular skill, that pattern of learning becomes embedded within a morphic field to which similar organisms can tune in. The embedded patterns act like blueprints, facilitating faster learning for subsequent organisms practicing the same skill.

Wordle is a free online game published by the New York Times (NYT) that is played by millions of people every day (NYT employee, personal communication, June 10, 2025). Wordle gives players six chances to guess a particular five-letter word. Each guess provides clues: specifically, different colors indicate whether any of the letters in the guessed word are in the target word, and whether they are in the correct place. For example, if the target word is *FORUM* and a player guesses *ROUND*, the *O* in the guess turns green, the *R* and *U* turn orange, and the *N* and *D* turn grey. The goal is to guess the word in as few attempts as possible. Table 1 illustrates two example guess sequences for the target word *FORUM*. Player 1's first guess is *ADIEU* (a word commonly used by Wordle players as an initial guess). Player 1 makes five additional guesses, filling the six available guess slots and correctly identifying the target word on their sixth attempt. The color-coding used by Wordle—signified by the feedback column in Table 1—allowed the player to determine which letters were in the target word and incorporate these clues into subsequent guesses. Player 2, by contrast, begins with *ROUTE* (a more effective guess for this particular target word) and solves the puzzle in three attempts. Accordingly, Player 2 was more successful at solving this particular puzzle because they guessed the target word in fewer attempts.

As well as publishing a new Wordle puzzle every day, the NYT also makes available an online tool called WordleBot, which enables players to find out how their performance compares with other players who have done Wordle on the same day. Players can see an analysis of their responses only after they have completed the puzzle, which grades them on a scale of 0 to 99 in categories including skill and luck, compared with the average at that time in the day. It also provides statistics on other players' performances. This makes it possible to study how millions of people are performing on Wordle throughout the day. The new Wordle is published at midnight in each time zone, starting at the International Date Line, which means that apart from a few Oceanic islands, the first populous country in which it is published is New Zealand.

Table 1. Illustrative Example of a Wordle Guess Sequence.

Attempt	Player 1 Guess	Player 1 Feedback	Player 2 Guess	Player 2 Feedback
1	ADIEU	XXXXO	ROUTE	OGOXX
2	CRUST	XOOXX	RUMOR	OOOOO
3	MOURN	XGOOX	FORUM	GGGGG
4	ROUND	OGOXX		
5	RUMOR	OOOOO		
6	FORUM	GGGGG		

Note. This table illustrates two different solving trajectories for a Wordle puzzle with the target word *FORUM*. The feedback columns indicate the color-coding used by Wordle for each letter in a guess: X = letter not in the target word (grey in Wordle); O = letter in the target word but in the incorrect position (orange in Wordle); G = letter in the target word and in the correct position (green in Wordle).

If MR is at play and is a linear effect, we would expect players to guess the target word in fewer attempts as the day progresses, owing to progressively increasing resonance from players who have already completed the puzzle (see Black et al., 2026, for an in-depth literature review supporting this idea). MR is a speculative interpretation. Consequently, there could, of course, be alternative reasons for this type of finding, which we will also discuss in this article. That said, our primary aim in the present study was to explore whether either of the patterns observed in our preliminary WordleBot-based studies could be replicated, and whether this type of finding might be reasonably attributed to MR.

In an initial study, we sampled WordleBot data in the morning and at night, based on the British time zone, over a 12-day period, and found an increase in the percentage of players solving the puzzle in one or two attempts from morning to evening. However, when we repeated the study over a 30-day period, there were decreases across all six attempts (Black et al., 2026). In the current study, we repeated our initial study with a longer time span between samples to find out which, if either, of the previous results was repeatable. In our previous studies, the morning samples were collected at 6:00-8:00 a.m. GMT, and the evening samples were collected at 10:30-11:59 p.m. GMT, covering a time span of around 14.5 to 18 hours. The data provided by WordleBot is based on a random sample of all Wordles that have been completed so far that day (NYT employee, personal communication, June 10, 2025). Consequently, there was probably some overlap in the morning and evening samples across time zones that might have made it more difficult to tease out any changes throughout the day. Accordingly, the current study has refined the experiment by taking an earlier morning sample, a sample around noon, and a later evening sample to make the test more sensitive, enabling us to compare changes in the earlier and later parts of the international day, and to extend the total time span to around 43 hours.

METHOD

Research Design

The current study used WordleBot to assess the Wordle scores of randomly selected groups of Wordle players at different times of the day. WordleBot allows players to compare their score to the average performance of other players around the world. For instance, WordleBot provides the percentage of players who solved the puzzle on each of the six attempts, allowing for an assessment of whether there is a change in average player performance throughout the day. These percentages are based on a random sample of all Wordle players, not only of those who are using WordleBot (NYT employee, personal communication, June 10, 2025).

For 30 distinct Wordle puzzles released between February 20 and April 7, 2025, Georgia Black (GB) completed Wordle and subsequently collected the accompanying WordleBot data (i.e., the percentage of players solving the puzzle on each of the six attempts) at three different times throughout the day (morning, midday, and evening). Our previous study design was refined by using a VPN (Virtual Private Network) to collect the morning and evening WordleBot data from the early morning in one of the earliest time zones, in New Zealand, and from the late evening in one of the latest time zones, Hawaii, to maximize the time between data collection periods. This allowed us to obtain a much smaller morning sample size and, consequently, to reduce the overlap between the samples. A midday sample was also taken, based on the British time zone, to allow further identification of any time-of-day effects. As a result, for each of the 30 Wordle puzzles, GB collected the morning sample at 3:00 p.m. GMT (4:00 a.m. in New Zealand), the midday sample at 12:30 p.m. GMT the following day, and the evening sample at 9:50 a.m. GMT the day after (11:50 p.m. in Hawaii). Consequently, each day of data collection spanned over three days. Ethical approval was not required for the present study, as WordleBot data is publicly available and does not necessitate informed consent.

Participants

Across the 30 days tested, WordleBot randomly selected an average of 17,309 morning players, 1,792,447 midday players, and 1,785,679 evening players (morning range: 14,306 to 21,380; midday range: 1,787,041 to 1,800,998; evening range: 1,780,499 to 1,790,390). WordleBot does not provide demographic information for its players. Given that Wordle resets at midnight for each time zone, the geographic distribution of Wordle players changes throughout the day (NYT employee, personal communication, June 10, 2025).

Materials

Wordle

The study required GB to complete the NYT Wordle puzzle, which is freely available online. The solution to the puzzle is a five-letter word that changes daily.

WordleBot

WordleBot is a tool published by the NYT that provides comparative data of other Wordle players' performance around the globe. The tool uses the official NYT Wordle to produce its data, and the comparative data is based on a random sample of all players who have completed that day's puzzle so far (NYT employee, personal communication, June 10, 2025). The specific data that was collected from WordleBot was: a) the sample size, b) the target word, and c) the percentage of players solving the puzzle on each of the six attempts. The percentages given by WordleBot are cumulative: for instance, if 38% of players solved Wordle within three attempts, this includes players who solved Wordle in one, two, or three attempts.

VPN

To complete Wordle and collect the accompanying WordleBot data in different time zones, a Private Internet Access VPN (Virtual Private Network) subscription was purchased. We selected this specific VPN because it had servers in both New Zealand and Hawaii—in two of the earliest and latest time zones, respectively. The VPN allowed GB to complete Wordle as if she were located in these countries.

Procedure

On each of the 30 days tested, GB completed Wordle and subsequently collected the accompanying WordleBot data at three different times (morning, midday, and evening). Wordle resets at midnight for each time zone. Consequently, for the morning data, GB changed the time zone of her device and used the VPN to connect to a server in New Zealand to access the new Wordle puzzle before it had been released to the rest of the world, and collect the accompanying WordleBot data, at approximately 4:00 a.m. New Zealand Daylight Time (NZDT). This time was chosen to ensure that the WordleBot sample size was sufficiently large, whilst minimizing the overlap with the later samples. On a separate device which was connected to GB's local time zone in

England, she checked that the solution to Wordle was different to ensure that the VPN was working correctly.

The midday WordleBot data was collected at approximately 12:30 p.m. GMT and therefore did not require the VPN, as GB is located in the United Kingdom. For the evening sample, the VPN was used to connect to a server in Hawaii to collect the WordleBot data when most people around the globe had completed that day's Wordle. The evening data was collected at approximately 11:50 p.m. Hawaii Standard Time (HST). These specific times were selected to ensure that they were spread apart evenly. In total, GB solved Wordle 30 times and collected the accompanying WordleBot data 90 times (three for each day). Owing to the differing time zones, the data collection spanned a three-day period for each day collected. Consequently, data was collected for 30 Wordle days, but the actual data collection process took 32 days in total. Most days were collected in February and March, 2025, at 4:00 a.m. NZDT (3:00 p.m. GMT), 12:30 p.m. GMT the following day, and 11:50 p.m. HST (9:50 a.m. GMT the day after). There was therefore a gap of approximately 21.5 hours between each data collection period (morning to midday and midday to evening).

Data Preparation

Prior to analysis, the relevant WordleBot data was input into an Excel spreadsheet. The average morning, midday, and evening sample sizes were calculated across the 30 days tested. The average percentage of players guessing correctly on each of the six attempts was also calculated across the 30 days tested for each time (morning, midday, and evening). This resulted in three percentages for each of the six Wordle attempts (18 in total).

To prepare for a non-parametric analysis using a sign test, the change in success rate between each data collection time was marked as either an increase (+), decrease (-), or no change (=). There were therefore three comparisons: morning to midday, midday to evening, and morning to evening. This was done for each day and for each of the six Wordle attempts (resulting in 90 symbols for each of the six attempts; 540 in total). For each attempt and each time period, the number of increases, decreases and no changes was calculated. For example, for attempt one, for the period morning to evening, there were 24 increases (+), no decreases (-), and six instances of no change (=).

Statistical Analysis

To determine whether the changes in the percentage of players solving the puzzle on each of the six Wordle attempts differed significantly from chance, a sign test was performed for each time period and attempt (three for each Wordle attempt; 18 in total). Days showing no change were excluded from the analysis. We used the binomial test with the null hypothesis that the number of days on which the score increased or decreased should be approximately the same.

To determine whether there was a change in player performance as the day progressed, 18 two-sample *z* tests for proportions were carried out. For each of the six Wordle attempts, three tests were performed (18 in total): one test analyzing the change between morning and midday, one between midday and evening, and one between morning and evening. The effect sizes were calculated using Cohen's *h*. Given the exploratory nature of the study, statistical significance was determined as $p < .05$ for all analyses, with a focus on pattern detection rather than emphasizing statistical significance.

RESULTS

While the current findings are descriptive and exploratory, the results revealed a clear pattern of change throughout the day. The percentage of players solving the puzzle in one or two attempts significantly increased, and the percentage solving in four to six attempts significantly decreased. There was little change on the third attempt. The same pattern was shown in the periods morning to midday, midday to evening, and morning to evening, and was statistically significant using two different procedures.

For the non-parametric method using a sign test, the data from each attempt on each day were scored plus (+), minus (-), or equal (=) depending on whether the proportion of people solving the puzzle in that number of attempts increased, decreased, or stayed the same (Table 2). By chance, the number of days with an increase should have been about the same as those with a decrease, but on the first two attempts, there were significantly more increases than decreases, and on the last three attempts, significantly more decreases than increases (Figure 1). Attempt three showed little difference, aside from the period midday to evening, which showed significantly more decreases.

The second statistical procedure employed a two-sample *z* test for proportions. As the day progressed, the increased percentages of players solving the puzzle in one or two attempts were most significant for the periods midday to evening and morning to evening (Table 3). The *z* test revealed a decrease in the percentage of players solving the puzzle in the latter four attempts as the day

Table 2. Number of Days on Which Players Solving the Puzzle in One to Six Attempts Increased or Decreased at Later Times.

Attempt	Time period	*n*	Increases	Decreases	Percentage effect	*p* value
1	Morning to Midday	21	21	0	100%	< .0001
	Midday to Evening	19	19	0	100%	< .0001
	Morning to Evening	24	24	0	100%	< .0001
2	Morning to Midday	26	23	3	88.5%	< .0001
	Midday to Evening	24	18	6	75%	.01
	Morning to Evening	28	23	5	82.1%	.0005
3	Morning to Midday	29	15	14	51.7%	.5
	Midday to Evening	28	9	19	32.1%	.04
	Morning to Evening	28	13	15	46.4%	.42
4	Morning to Midday	28	6	22	21.4%	.002
	Midday to Evening	29	5	24	17.2%	.0003
	Morning to Evening	29	7	22	24.1%	.004
5	Morning to Midday	26	2	24	7.7%	< .0001
	Midday to Evening	30	6	24	20%	0.0007
	Morning to Evening	30	2	28	6.7%	< .0001
6	Morning to Midday	26	5	21	19.2%	.001
	Midday to Evening	28	6	22	21.4%	.002
	Morning to Evening	27	4	23	14.8%	.0002

Note. *n* refers to the total number of days analyzed after no-change days were excluded. The Increases column indicates the number of days showing an increase in the percentage of players solving the puzzle on that attempt during the relevant time period, and the Decreases column indicates the number of days showing a decrease. The Percentage effect column represents the proportion of *n* showing an increase. The *p*-value refers to the one-tailed *p-value of* the binomial test.

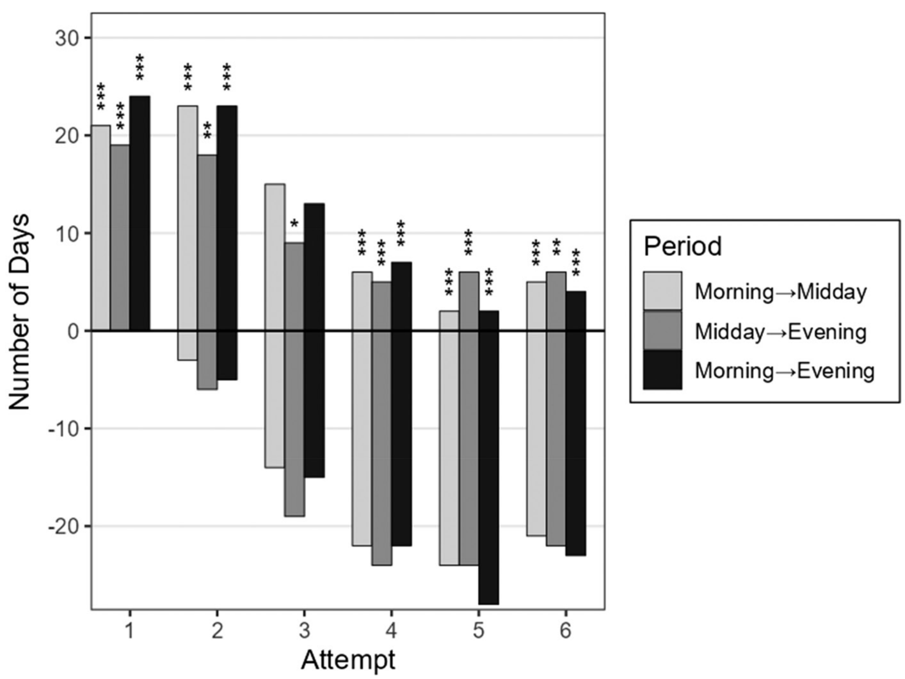

Figure 1. Direction of Success Rates on Each Wordle Attempt.
Note. This figure shows the number of days on which there was an increase or decrease in the percentage of players solving Wordle at each of the six attempts for each time period. Asterisks indicate significance by the binomial test: * = $p < .05$; ** = $p < .01$; *** = $p < .001$.

Table 3. Two-Sample z Test for Proportions.

Statistic	Attempt 1	Attempt 2	Attempt 3	Attempt 4	Attempt 5	Attempt 6
Morning to Midday						
Morning (%)	0.3	4.91	27.83	62.26	85.75	96.01
Raw number	52	850	4,817	10,777	14,842	16,618
Midday (%)	0.39	5.16	27.81	61.7	84.99	95.65
Raw number	6,991	92,490	498,480	1,105,939	1,523,401	1,714,476
Percentage effect (%)	+0.09	+0.25	-0.02	-0.56	-0.76	-0.36
Direction of trend	Increase	Increase	Decrease	Decrease	Decrease	Decrease
z score	1.96	1.44	0.039	1.5	2.79	2.31
p value	.050	.150	.969	.134	.005	.021
Effect size	0.016	0.011	0.0003	0.011	0.022	0.018
Midday to Evening						
Midday (%)	0.39	5.16	27.81	61.7	84.99	95.65
Raw number	6,991	92,490	498,480	1,105,939	1,523,401	1,714,476
Evening (%)	0.48	5.26	27.51	60.99	84.31	95.35
Raw number	8,571	93,927	491,240	1,089,086	1,505,506	1,702,645
Percentage effect (%)	+0.09	+0.1	-0.3	-0.71	-0.68	-0.3
Direction of trend	Increase	Increase	Decrease	Decrease	Decrease	Decrease
z score	12.94	4.4	6.48	13.79	17.93	13.68
p value	< .001	< .001	< .001	< .001	< .001	< .001
Effect size	0.014	0.0047	0.0069	0.015	0.019	0.014
Morning to Evening						
Morning (%)	0.3	4.91	27.83	62.26	85.75	96.01
Raw number	52	850	4,817	10,777	14,842	16,618
Evening (%)	0.48	5.26	27.51	60.99	84.31	95.35
Raw number	8,571	93,927	491,240	1,089,086	1,505,506	1,702,645
Percentage effect (%)	+0.18	+0.35	-0.32	-1.27	-1.44	-0.66
Direction of trend	Increase	Increase	Decrease	Decrease	Decrease	Decrease
z score	3.48	2.03	0.94	3.4	5.2	4.11
p value	< .001	.042	.348	< .001	< .001	< .001
Effect size	0.03	0.016	0.0072	0.026	0.04	0.032

Note. This table includes success rates based on the average morning, midday, and evening sample sizes of 17,309, 1,792,447, and 1,785,679, respectively, which were calculated across the 30 days tested. The Raw number row indicates the estimated number of players based on the average sample size and percentage guessing correctly provided by WordleBot (the latter was also averaged over the 30 days tested). The effect size was calculated using Cohen's *h*.

progressed. The decreases were again most significant for the periods midday to evening and morning to evening, and were generally most prominent for attempts four to six. All results had very small effect sizes.

DISCUSSION

The results showed a clear and consistent pattern of change throughout the day. There was an increase in players solving the puzzle in one or two attempts as the day went on, and a decrease in players solving the puzzle in four to six attempts. This pattern is very similar to that observed in our initial WordleBot-based study by Black et al. (2026). Our second study in Black et al. (2026) did not show this pattern, which is one reason that we undertook the present investigation, using a wider span of times to find out if the initial results were repeatable. We regard the present study as stronger evidence for this effect than the earlier results because the wider time span gave more opportunity to see any daily patterns. Additionally, our three sampling times enabled us to make morning to midday comparisons as well as from midday to evening, and both time periods showed the same trends (Tables 2 and 3), providing additional evidence for a systematic effect throughout the day. In the previous study there were only two sampling times spaced at 14.5-18 hours apart, whereas in the current study, the three sampling times were about 21.5 hours apart from each other, giving a total time span of around 43 hours. This was made possible by sampling in the early morning from New Zealand, near the International Date Line, where the new day begins, and from late night in Hawaii, near the end of the day.

Although the effect sizes in the present study are small, we suggest that the observed pattern is worthy of further investigation. Small effect sizes are common in several areas of research, such as social psychology and parapsychology (e.g., Richard et al., 2003; Cardeña, 2018), and can nevertheless be practically meaningful. For example, as noted by Cardeña (2018) in the context of psi research, small aggregate effect sizes may reflect the averaging of larger effects manifested by a select subset of participants and smaller or null effects among others. This illustrates that certain effects cannot be expected to manifest uniformly across individuals, resulting in small effect sizes even when a genuine underlying effect is likely present. Moreover, the replication of the same directional pattern observed in our initial WordleBot-based study suggests that this effect might not be attributable to random variation alone. Accordingly, we will start by discussing conventional factors that could have influenced changes in Wordle scores throughout the day, such as time-of-day effects and cheating, and then turn to alternative explanations, including possible MR effects.

Conventional Explanations

First, there is the possibility that the increases in players succeeding on the first two attempts were responsible for the decreases on later attempts. This is because increases in earlier attempts leave fewer players available to solve the puzzle on later attempts, meaning that some level of decrease at later attempts is expected. Assume for the purposes of argument that there is a fixed total for the number of players, say 100, and that the number of players solving the puzzle on the first two attempts increased by 10, then the number of players solving the puzzle on the later attempts would have to decrease by the same amount so that the total remained 100. However, this does not seem to have been the case here. The cumulative total at attempt six was not fixed at 100% (some players failed to solve the puzzle in the allocated six attempts), but decreased during the day from an average of 96.01% to 95.35% (Table 3). When we look at the increments at each successive attempt (Table 4) rather than the cumulative percentages in Table 3, the total increase from morning to evening in the first two attempts was 0.35%, whereas in the next three attempts, there was a total decrease of 1.79%. On the final attempt, there was a positive increment of 0.78%, with an overall decrement of -0.66% for all six attempts. We can conclude that the decrease in attempts three, four, and five is not a result of the increase in attempts one and two, but a real decrease. The decrease on attempt three of -0.67% was partially masked by the cumulative percentages as shown in Table 3, but shows clearly when we look at the increments in Table 4. The net decrease indicates that the portion of the decline in later attempts not accounted for by the initial increases is balanced out by a small increase in the proportion of players who failed to solve the puzzle within six attempts.

Second, the pattern of results could have been due to time-of-day sampling effects. The morning samples taken at 4:00 a.m. NZDT would have included answers given by people in New Zealand, which contains the first significant settlements west of the International Date Line, where the new day's Wordle puzzle is first launched, together with answers from eastern and central Australia, where it was 2:00 a.m. and 1:30 a.m., respectively. Thus, the sample at 4:00 a.m. NZDT would have included only the results from people who did the puzzle in the early hours of the morning. Presumably, most responses in this time slot would be

Table 4. Incremental Changes in the Percentage of Players Solving Wordle in Successive Attempts.

Sample	Attempt 1	Attempt 2	Attempt 3	Attempt 4	Attempt 5	Attempt 6	Total
Morning (%)	0.3	4.61	22.92	34.43	23.49	10.26	96.01
Midday (%)	0.39	4.77	22.65	33.89	23.29	10.66	95.65
Evening (%)	0.48	4.78	22.25	33.48	23.32	11.04	95.35
Change (Morning–Evening)	0.18	0.17	-0.67	-0.95	-0.17	0.78	-0.66

Note. Percentages represent incremental proportions of players solving the puzzle at each specific attempt, derived from cumulative WordleBot percentages (which were averaged over the 30 days tested). The Change (Morning–Evening) row reflects the difference between morning and evening incremental percentages for each attempt.

from people who stay up very late or are insomniacs. Thus, some of the differences between the morning sample at 4:00 a.m. NZDT and the later samples might be attributed to time-of-day effects, where people may respond differently when doing the puzzle in the early hours of the morning, compared with those doing it later in the day. Indeed, effects of circadian rhythms on cognitive performance have been found with respect to attention, working memory, and executive functions—processes crucial to the performance of tasks involving problem solving (Valdez et al., 2012). Changes in performance throughout the day are also driven by sleep inertia and homeostatic sleep drive (Wright et al., 2012). Wright and colleagues (2012) suggest that sustaining wakefulness at night past the habitual sleep time results in a vulnerable period of cognitive impairment. This might help explain the lower proportion of players solving the puzzle in fewer attempts in the morning sample.

The samples throughout the day are cumulative, hence the midday sample taken at 12:30 p.m. GMT would have included results not only from people in the United Kingdom (and Europe more generally) who did the puzzles in the morning, but from the entire day in New Zealand and in parts of the afternoon and evening in other time zones east of the United Kingdom. By contrast, the evening sample at 11:50 p.m. HST contains cumulative data spanning almost all hours of the day in all time zones and thus would have a full range of results from people who did the puzzle in the morning, afternoon, and evening. It is therefore possible that some of the effects we observed could depend on the fact that the midday and evening samples included people later in the day, who might have responded differently than people in the early morning (Tables 2 and 4; Figure 1). Valdez and colleagues (2012) suggest that for a healthy individual who sleeps from 11:00 p.m. to 7:00 a.m., performance reaches its highest level between 4:00 p.m. and 10:00 p.m., and decreases from 10:00 p.m. to 4:00 a.m. Such circadian cycles may help explain the increased proportion of players solving the puzzle in one or two attempts in the midday and particularly evening samples, given that a large percentage of players might have completed the puzzle during peak performance hours. The morning sample, by contrast, includes players solving the puzzle between midnight and 4:00 a.m. NZDT (when performance in healthy individuals decreases). Additionally, if success on the first two attempts depends more on leaps of intuition, or "luck", as described by WordleBot, and later attempts on "skill", then perhaps in the morning, people use their intuition less and logical reasoning more, whereas later in the day, there may be the opposite tendency.

It should be noted that the time-course of cognitive performance throughout the day can vary due to an individual's chronotype (individual differences in the sleep wake cycle), as well as sleep deprivation and various sleep disorders, making it difficult to determine the exact impact of circadian rhythms on this dataset, particularly for the morning sample which could include both healthy people staying up late and individuals with sleep disorders (Valdez et al., 2012). Furthermore, the above-chance percentage of players guessing the correct word in one or two attempts in the morning sample is difficult to reconcile with the reduced cognitive performance that is associated with the circadian cycle during these hours.

It is also possible that the pattern of results is due to people cheating by looking up the Wordle solution in social media groups or elsewhere. As the day goes on, there will be more online reports of the answer, making it easier to cheat. A study by Taparia (2023) conducted in 2022 on Wordle players' habits in the United States found that about 10% of 1,087 admitted to cheating. However, the observed pattern of an increase throughout the day in players solving the puzzle in one or two attempts, and a decrease in players solving the puzzle on the later attempts would suggest that cheating, if it occurs, happens primarily on the first two guesses. If cheating is to explain the increased proportion of players getting the puzzle right throughout the day on the first attempt, and to a lesser degree on the second attempt, this would mean that people were cheating before they even started the puzzle.

Wordle is a single-player game: aside from wanting to beat a fellow player's score, there are minimal external incentives to cheat (particularly on the initial guess, as this effectively eliminates the purpose of the game). As Dilger (2023) admitted—despite arguing that correct guesses on the first attempt can only be explained by rampant cheating—it would make more sense for players to cheat as they use up their guesses and become increasingly frustrated. This is in line with the findings of Passmore et al. (2020): in a mixed-methods analysis of 188 U.S. players' cheating beliefs and experiences, they found that cheating is endorsed in single-player contexts to facilitate mood repair and satisfy psychological needs as they play the game. Specifically, they found that 43% of participants used cheating for self-regulation purposes such as stress relief, and that most players only cheat under specific circumstances as opposed to all the time. These factors point towards a higher likelihood of cheating on the later

Wordle attempts when most guesses are used up, and there is a clear purpose to cheating if they had failed to find the answer by attempts four, five, and six. We would therefore expect to see cheating increase, and the percentage of players solving the problem on the later attempts go up, but in fact they went down. Furthermore, 78% of participants reported using cheating to boost the enjoyment of a game (Passmore et al., 2020). Cheating on the first Wordle attempt would directly contradict this goal because it would eliminate the entire purpose of the game. It is also worth noting that 36% of Wordle players use the same starting word each day (Taparia, 2023). This suggests that at least a third of players are unlikely to cheat on their initial guess. With these considerations in mind, the cheating hypothesis does not seem easily compatible with the increases seen on attempts one and two. Hence, the results cannot easily be accounted for on the cheating hypothesis without speculations to explain why people would cheat more later in the day on the first two attempts, rather than on the third, fourth, fifth, and sixth. The increase in failure rates throughout the day (i.e., players failing to solve the puzzle in the allocated six attempts) is also not easily compatible with the cheating hypothesis.

An additional explanation for the increased guess proficiency throughout the day is that changes in the geographic distribution of the player samples as the day progresses could affect Wordle performance due to population-level variables. For example, differences in cognitive or educational indicators, such as national IQ estimates, could in principle influence Wordle scores as different nations become more represented throughout the day. However, the relevance of such factors is difficult to observe in the current dataset as specific country-level participation is not known, and measures such as IQ are highly contested. Moreover, some populous countries often cited as having higher average IQ scores (e.g., China and Japan; World Population Review, 2026) may have reduced access to or lower engagement with the official Wordle (for instance, due to access restrictions or language and character differences). Additionally, if such countries did contribute substantially to official Wordle data, they would be expected to inflate the average scores of earlier samples, rather than provide an explanation for the increasing percentage of players guessing the target word in one or two attempts as the day progresses.

In addition, country-level differences in Wordle performance reported elsewhere do not align straightforwardly with the present findings (e.g., Gardner, 2022; Iancu, 2025). Several countries reported to have above-average Wordle performance (such as Sweden, Switzerland, and Australia) would be expected to contribute to success rates in the morning or midday samples but would not explain an increase in more efficient solve rates in the evening sample. By contrast, later samples are likely to have a higher proportion of U.S. players who have been reported to use a higher number of guesses than the world average (Gardner, 2022; Iancu, 2025). Taken together, these considerations indicate that population-level variables such as estimated IQ or average Wordle performance are unlikely to provide a sufficient explanation for the increase in guess efficiency seen throughout the day (though they may help explain the above-average success rates on attempts one and two in the morning sample, and the increase in players failing to solve the puzzle within six attempts in the evening sample). Perhaps the explanation lies at the individual level instead: midday and evening samples may increase the likelihood of sampling highly skilled players due to the substantial increase in sample size from morning to midday and evening. However, without more detailed statistical modeling, it is difficult to determine whether this represents a sufficient explanation for the observed pattern.

Linguistic differences across various English-speaking nations might also affect the accuracy of player guesses across time zones (e.g., *MUMMY* vs. *MOMMY*). If *MOMMY* was the target word, players in the United States are likely to have fewer erroneous guesses than players in the United Kingdom, perhaps leading to a higher proportion of players guessing the correct word in fewer attempts later in the day due to the time zone of the United States being behind that of the United Kingdom. Though, as mentioned, U.S. players may take a higher-than-average number of guesses, despite the puzzle being in American English (Gardner, 2022).

Alternative Explanations

It is possible, although speculative, that the pattern of results could be partly due to morphic resonance. The MR hypothesis suggests that as more and more people solve the puzzle, it should become easier for others to solve it, and scores should improve as the day goes on. The increments analysis outlined above shows that while some decrease on later attempts is expected (even with improved scores), the observed decreases exceed what can be explained by the increases on attempts one and two, and overall failure rates increase slightly. These increased failure rates are not easily reconciled with MR. However, MR might be worth considering as an interpretation for the observed increases in the proportion of players solving the puzzle on the first two attempts. Possibly, MR from previous players who had completed the puzzle earlier in the day helped subsequent players select the right word more successfully on the first and second attempts. If MR were the only factor, however, increases could theoretically appear on any attempt, as long as overall, more players solved the puzzle in fewer attempts. This raises the question of why improvements in both our initial WordleBot-based study (Black et al., 2026) and the current study were concentrated on the first two guesses.

Assuming that MR did contribute to our results, one possible explanation for the observed trend could be that conscious cognitive processes reduce susceptibility to MR (Black et al., 2026). Players have more clues to work from as the game progresses, resulting in an increase in conscious problem-solving strategies on later attempts. As suggested by Vernon et al. (2021), cognitive processes might inhibit MR. Vernon and colleagues designed an experiment to test this hypothesis: specifically, they tested whether non-Chinese speaking participants implicitly preferred real or decoy Chinese characters, based on the notion that implicit tasks need not engage conscious cognitive processes. While the predicted preference for real characters was not found, the authors noted that half of the participants had completed an explicit task first, which might have introduced unwanted explicit processes and undermined the experiment's ability to test the original premise. Indeed, when Schwartz (described in Sheldrake, 2012) conducted an MR experiment by asking participants to guess the meaning of Hebrew words and to rate their confidence in their guesses, he found that when participants guessed wrongly, they rated themselves more confident when viewing real Hebrew words instead of scrambled words. However, when Schwartz informed participants of the purpose of the experiment, the results were no better than chance. This suggests that they were unable to do consciously what they had done unconsciously.

The idea that MR operates unconsciously mirrors literature suggesting that psi phenomena—which are similarly subtle—might be best categorized as unconscious processes. In Carpenter's (2004) First Sight Model, for instance, it is suggested that psi processes *precede* and *initiate* preconscious psychological processes, and as such, they serve as bridges toward the development of conscious awareness. Carpenter suggests that this psychic activity can only be glimpsed by suspending cognitive work. Similarly, in a meta-analysis of 90 precognition experiments, Bem et al. (2016) suggest that fast-thinking protocols are likely better suited for detecting psi because they minimize conscious cognitive strategies that may interfere with the unconscious nature of psi functioning. Indeed, several studies have demonstrated similarities between psi and unconscious psychological processes (e.g., Schmeidler, 1986; Roney-Dougal, 1987). Perhaps MR is best understood under a similar model. If MR exists and operates similarly to other unconscious psychological processes, this might explain why MR would be most prominent for the initial two Wordle attempts (rather than attempts three to six): perhaps in the absence of intense cognition (such as problem-solving strategies) on the first Wordle attempt in particular, the player is open unconsciously to tune into the answer through MR. On the later Wordle guesses, increased cognition might drown out MR (which would presumably still be present in the background by virtue of the player engaging in the particular pattern of activity).

One remarkable feature of all Wordle data, not just the 30-day sample described here, is the surprisingly high proportion of players getting the word right on the first attempt (e.g., Dilger, 2023). There are around 9,000 five-letter words in the official Scrabble dictionary, and Wordle has a pool of about 13,000 five-letter words that are valid guesses, of which more than 3,000 have already been used. Therefore, on any given day, the possible number of correct solutions is in the thousands. We will take a conservative figure of 5,000 for the purpose of argument, meaning that on any given day, there would be a 1 in 5,000 chance of guessing the word on the first attempt by chance, or in other words, a probability of 0.0002, or 0.02%. But in the current study, the percentage of players getting the word right on the first attempt in the early morning was 0.3, and in the evening, 0.48, respectively, which is 15 to 24 times more than would be expected by random guessing. Moreover, about a third of the people who play Wordle do not randomly guess the first word but start with a standard five-letter word like *ADIEU* or *SLATE* (Taparia, 2023), so the pool of people guessing the first word is smaller than the number of players, further reducing the chances of getting it right by guessing.

At first sight, this surprisingly high success rate on the first attempt seems to support the cheating hypothesis, but an analysis by two staff members of the NYT suggested several other explanations: some people might be using a new window to make additional guesses after failing to solve the problem in six attempts, and some might be re-entering a solution they found on a different device to maintain a winning streak, or to test a technical issue (Katz & Bhatia, 2023). Katz and Bhatia did not explore the possibility that this effect might also depend on MR or on psi phenomena like telepathy with others who had already played the game, or even a kind of precognition or presentiment that could have enhanced their success rate in guessing (e.g., Bem et al., 2016). However, MR or telepathy seems unlikely to account for the above-chance success rate at 4:00 a.m. NZDT, because the number of people who had already solved the puzzle was very small, and yet almost as many got it right the first time as those included in the midday sample taken at 12:30 p.m. GMT, 0.3% compared with 0.39%.

Perhaps precognition or presentiment is worth considering here: in several studies, free-response conscious precognition tasks have shown that participants are able to describe the contents of a target that is randomly selected only after the participant has submitted their impressions (Mossbridge & Radin, 2018). For instance, May (2014) found that three previously high-scoring participants had a statistically significant hit rate when describing target images that were subsequently selected by software. It might be worth exploring whether a similar precognitive effect could explain the above-chance percentage of players solving Wordle in one attempt, before any social or environmental cues could provide information.

Limitations and Prospects for Future Research

One problem with all these interpretations is that they depend on data derived from WordleBot. The processes by which WordleBot samples data from the millions of players who have done Wordle on any given day are opaque, and the owners of Wordle and WordleBot, the NYT, will not disclose how their procedures work. We cannot rule out the possibility that the patterns we have detected are an artifact of the sampling algorithms. This makes further research on the subject difficult unless the NYT were to do the research themselves, using their large database, or supply the data to others to make a detailed analysis. For the time being, the results can only be tentative. We can find no clear explanation for the pattern whereby the percentage of players solving Wordle in one or two attempts increases significantly during the day, while the percentage failing to solve the puzzle within six attempts also increases.

Another limitation of using Wordle and WordleBot to investigate performance changes throughout the day is that the samples only include Wordle players, and consequently, predominantly individuals who particularly enjoy word puzzles. Many players are likely repeat players who may have developed a greater aptitude for word-based problem-solving than the general population. It would be interesting for future research to investigate whether such time-of-day effects are observed with non-Wordle players solving the same puzzles. Such research would be particularly pertinent for testing the MR hypothesis, given that MR should theoretically apply to anyone engaging in the puzzle.

An additional limitation of the present study is that the large number of statistical tests that were conducted could increase the possibility of Type I error rates (i.e., finding a statistically significant result simply due to running multiple tests). Future studies might consider conducting fewer tests and/or using statistical techniques that take into account very large sample sizes.

A further limitation worth considering is whether Wordle is an ideal task for testing the MR hypothesis specifically. In theory, engaging in the puzzle itself may tune players into resonance from all previous Wordle players, regardless of the target word or day. For instance, many players use a strategic starting word such as *ADIEU*. Repeated use of such starting words may cause the player to resonate with themselves and other players who started with this word in the past, as well as with the associated solution pathways that followed. This accumulated resonance may mask any resonance specifically associated with the current target word. Moreover, MR proposes that morphic fields are associated with and facilitate the perception of words more generally (Sheldrake, 2012). Consequently, resonance from the historical use of English words could add to the noise, making it even more difficult to isolate any day-specific MR effects. Despite this noise, we did observe an increase throughout the day in players solving the puzzle in one or two attempts. However, as discussed, the relatively high proportion of players solving the puzzle on the first attempt in the morning sample, and the increase in the proportion of players failing to solve the puzzle within six attempts from morning to evening, are difficult to reconcile with a straightforward MR interpretation. With these considerations in mind, Wordle and WordleBot may be better suited for investigating psi phenomena, such as presentiment, precognition, and telepathy, for which accumulated past resonance would be less problematic. MR may be better investigated using genuinely novel tasks in which no prior resonance is associated with the task being tested.

Implications and Methodological Applications

Although our findings are tentative, this study illustrates the potential of working with large data sets sampled in real time and repeated every day. Methodologically, our findings highlight the benefits of repeated sampling in detecting temporal patterns, whilst also cautioning that opaque algorithms can complicate analysis and interpretation. Our findings also suggest that future research in the field of parapsychology might benefit from further exploring the high Wordle success rates on the first two attempts, and highlight the potential of integrating digital platforms into parapsychological and cognitive research. Such approaches offer a low-cost, alternative avenue for investigating these phenomena outside of the laboratory.

CONFLICT OF INTEREST

We have no known conflict of interest to disclose.

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