https://doi.org/10.65166/bejrcw28

International Journal of Behavioral and Social Analytics
Volume I, Issue 3, August 2026
eISSN: 3116-4358
https://journal.ijhba.com/index.php/ijbesa
https://slsipress.com

Massed and Distributed Training in a Canine Match-to-Sample Task: A Single-Subject Exploratory Study

Jena Lorraine F. Foncardas and Felisse Marianne San Juan, PhD

Abstract

The scheduling of practice may influence learning performance, behavioral engagement, and response speed across species. This exploratory study compared massed and distributed training in a visual match-to-sample task involving a three-year-old male mixed-breed domestic dog. A single-subject within-subject design was employed in which the dog underwent both training conditions. The massed condition consisted of 15 planned trials conducted in one continuous 12-minute session, whereas the distributed condition comprised the same number of planned trials divided across three sessions separated by four- to six-hour intervals. Performance was assessed descriptively through task completion, accuracy among completed trials, response latency, behavioral engagement, and positional choice. The dog completed 11 trials during massed training and 12 during distributed training. Accuracy remained broadly comparable, increasing from 64% under the massed condition to 67% under the distributed condition. Average response latency decreased from 3.0 seconds to 1.5 seconds, while fewer nonresponses and greater behavioral engagement were observed during the distributed condition. However, a pronounced left-side preference emerged during distributed training, indicating that reinforcement placement or other unintended environmental cues may have influenced performance. The findings are descriptively consistent with the potential value of spaced practice for maintaining response speed and engagement, but they do not establish superior match-to-sample learning. The study underscores the importance of counterbalancing, neutral reinforcement delivery, repeated observations, and rigorous control of positional cues in future canine-cognition experiments.

Keywords: *canine cognition, distributed practice, massed practice, match-to-sample task, response latency, positional bias*

1. Introduction

The distribution of practice across time is an important consideration in the study of learning and memory. Distributed practice separates learning trials through rest intervals, whereas massed practice places trials in close temporal succession. Research across educational, psychological, and behavioral contexts generally indicates that appropriately spaced learning opportunities can promote more stable memory formation than uninterrupted repetition (Carpenter, 2020; Carpenter et al., 2022). Experimental animal studies further suggest that trial spacing may correspond with differences in neural activation, memory consolidation, and behavioral engagement (Centofante et al., 2023; Glas et al., 2021; Mastrorilli et al., 2022).

The benefits of distributed training have been observed across species and behavioral tasks. Spaced training has been associated with improved equine learning performance, greater stability of prefrontal neural ensembles in mice, and enhanced formation of contextual and spatial memory (Glas et al., 2021; Holcomb et al., 2022; Jiang et al., 2020; Tintorelli et al., 2020). These findings suggest that intervals between trials may support consolidation while reducing fatigue or disengagement. Nevertheless, the effects of spacing may vary according to the task, species, reinforcement procedure, and duration of training.

Domestic dogs offer a relevant context for examining these processes. Dogs learn through interactions with people and are trained to perform tasks involving discrimination, detection, recognition, and behavioral control. Their performance depends on attention, prior experience, cognitive flexibility, reinforcement, and sensitivity to human-generated cues. Variations in training conditions can therefore affect acquisition, engagement, and retention (Aviles-Rosa et al., 2022; Raviv et al., 2022).

One method used to investigate animal cognition is the match-to-sample task. A subject is presented with a sample stimulus and must select the corresponding item from alternatives. Dogs have demonstrated the capacity to perform matching-to-sample tasks, although reliable evidence of abstract-concept learning requires control of stimulus arrangements, reinforcement patterns, and alternative response strategies (Lazarowski et al., 2021). Comparable procedures have also been applied to other species (Santa et al., 2024).

Performance may be affected by factors other than recognition of the matching stimulus. A subject may develop a side preference, respond to the trainer's body position, follow the hand delivering reinforcement, or use other incidental cues. Choice bias is especially important in two-choice tasks because positional preference may produce apparently correct responses without demonstrating control by the intended stimuli (Do et al., 2023).

Although prior research provides substantial evidence concerning distributed practice and animal learning, relatively little is known about how massed and distributed schedules correspond with the performance of a domestic dog completing a visual match-to-sample task in a home-based arrangement. A small exploratory experiment cannot establish a general advantage for either schedule, but it can identify observable performance patterns and methodological factors requiring stronger control.

Accordingly, this study compared a single dog's performance under massed and distributed training conditions. It aimed to: (1) describe task completion and accuracy; (2) compare observed response latency; (3) examine engagement and nonresponse patterns; (4) identify positional-choice bias; and (5) determine methodological implications for future canine-cognition experiments.

2. Review of Related Literature

2.1 Distributed and Massed Practice in Learning

Distributed practice separates learning opportunities through temporal intervals, whereas massed practice concentrates them within a relatively continuous period. The advantage associated with distributed practice is commonly described as the spacing effect and is attributed to opportunities for consolidation, renewed attention, and repeated retrieval across separated occasions (Carpenter, 2020; Carpenter et al., 2022). Immediate gains under massed practice do not necessarily indicate stable learning or retention.

Animal research associates temporal distribution with behavioral and neurological differences. Spaced training has been linked to greater stability of prefrontal neuronal ensembles, distinct hippocampal activation patterns, and spatial-memory stabilization (Centofante et al., 2023; Glas et al., 2021; Mastrorilli et al., 2022). Proposed mechanisms include hippocampal receptor activation and molecular processes involved in memory formation (Jiang et al., 2020; Tintorelli et al., 2020). Improved learning in horses further suggests that possible benefits extend beyond laboratory rodents (Holcomb et al., 2022).

Evidence from adjacent human settings reinforces the need to distinguish directional change from demonstrated treatment superiority. A short pilot study of digital sleep-diary self-monitoring produced a larger numerical improvement in the intervention group without a statistically significant group-by-time advantage, while research on time attitude and delayed gratification indicates that temporal orientation and reward timing may be behaviorally consequential without constituting evidence of a spacing effect (San Juan et al., 2026; Wang, 2026).

Learning-related engagement may also depend on motivational conditions: among higher vocational students, professional values and craftsmanship-oriented dispositions were associated with learning motivation, illustrating that exposure schedules operate alongside the learner's motivational state (Yan, 2026).

2.2 Match-to-Sample Tasks and Abstract Rule Acquisition

Match-to-sample procedures investigate stimulus discrimination and concept learning. Under rigorous conditions involving novel stimuli, variable positions, and appropriate controls, they may contribute evidence of generalized matching or an abstract understanding of sameness. Dogs can acquire matching-to-sample performance, but interpretation requires methodological caution (Ambalam, 2025; Lazarowski et al., 2021).

Comparable procedures have been used with a killer whale, illustrating their cross-species adaptability (Santa et al., 2024). Successful performance during limited trials does not alone demonstrate an abstract identity rule. Stronger evidence requires repeated testing, novel stimulus sets, counterbalanced locations, performance above chance, and procedures that eliminate stimulus-specific learning and positional responding.

2.3 Canine Cognition, Training, and Behavioral Performance

Dogs are biological learners whose performance is shaped by sensory abilities, experience, motivation, reinforcement, attention, and interaction with handlers. Training conditions that create fatigue or reduce motivation may produce slower responses or more nonresponses even when an animal can perform the task (Aviles-Rosa et al., 2022).

Variability can affect whether learning remains tied to particular examples or generalizes to broader patterns (Raviv et al., 2022). Dogs are also sensitive to human-generated information, including familiar voices (Surányi et al., 2025). This sensitivity facilitates human-dog interaction but complicates controlled experiments because posture, gaze, hand placement, or reinforcement movement may guide behavior.

Adjacent behavioral research suggests that observable performance is shaped by regulatory capacity and task-relevant confidence as well as by opportunity to respond. Self-control has been associated with stronger self-efficacy, and task-specific efficacy and environmental support have shown closer relationships with productivity than generalized confidence alone (Espelita & Atento, 2026; Rui, 2026). Resilience and adversity-management capacity have likewise been associated with sustained professional effectiveness under demanding conditions (Adame, 2026).

Fatigue and engagement also require attention as contextual influences rather than as direct indicators of learning. Sleep, activity, and other lifestyle routines have been associated with distress and burnout profiles, while learning-oriented and supportive conditions have been strongly related to employee engagement in an adjacent organizational setting (Gonzales & Magnaye, 2026; Quinto et al., 2025).

2.4 Choice Bias, Stimulus Control, and Environmental Cues

In match-to-sample experiments, the intended response should be controlled by correspondence between sample and comparison stimuli. Interpretation is weakened when a subject responds to position, familiarity, reinforcement proximity, or another unintended feature. Do et al. (2023) demonstrated the importance of detecting and correcting persistent choice bias in a two-choice delayed match-to-sample task. In canine experiments, randomizing positions, delivering reinforcement centrally, separating handlers from stimulus presentation, and recording positional responses can help distinguish matching from handler-cue following.

The performance relevance of environmental arrangement is also evident outside animal cognition. In a within-subjects quasi-experiment, participants completed a cognitive puzzle faster under an organized than a disorganized desk condition, illustrating how seemingly peripheral spatial features can influence response speed (Manio et al., 2026). In organizational research, human factors and procedural arrangements have similarly been associated with operational efficiency, reinforcing the broader principle that performance emerges from both actor and setting (Gamasan & Atento, 2026).

Behavioral regulation and situational pressure provide further contextual parallels. Studies of late adolescents and senior high school students identify self-regulation, emotional control, performance anxiety, and difficulty managing demands as factors associated with behavioral responses, although these human findings cannot be transferred directly to canine cognition (Balut et al., 2026; Lolong et al., 2026).

2.5 Synthesis and Research Gap

The literature indicates that distributed practice can support learning and memory, while match-to-sample tasks can examine discrimination and possible abstract-concept learning (Carpenter et al., 2022; Lazarowski et al., 2021). Yet canine performance may also reflect fatigue, motivational changes, prior exposure, human cues, and positional preference (Aviles-Rosa et al., 2022; Do et al., 2023). A limited gap remains regarding how training schedules correspond with accuracy, latency, engagement, and positional choice in a home-based canine visual matching task. This study addresses that gap descriptively and identifies procedural considerations for more rigorous research.

Two additional lessons from adjacent behavioral studies concern interpretation. Growth-oriented dispositions may coexist with varied levels of observable engagement, and broad measures of exposure may conceal the effects of more specific forms of participation (Aguilar, 2026; Ruela et al., 2026). Accordingly, the present study treats accuracy, latency, engagement, and positional choice as distinct indicators rather than interchangeable evidence of learning.

3. Methodology

3.1 Research Design

The study employed an exploratory single-subject within-subject design. The same dog participated in massed and distributed training and served as its own point of comparison. Massed training was administered first, followed by a rest day and distributed training on the third day. Because the sequence was not counterbalanced and each condition was administered once, training schedule could not be isolated from order, practice, time-of-day, or carryover effects.

3.2 Subject and Setting

The subject was a three-year-old male domestic dog of mixed German Shepherd and Aspin ancestry. Testing occurred in the dog's usual home environment to reduce anxiety associated with an unfamiliar setting. The observations were not intended to represent the broader canine population.

3.3 Experimental Conditions

Fifteen trials were planned for each condition. Under massed training, all trials were presented in one continuous session lasting approximately 12 minutes. Under distributed training, the trials were divided into three blocks conducted during the morning, midday, and afternoon, with approximately four to six hours between blocks.

3.4 Apparatus, Stimuli, and Measures

A neutral-toned cardboard base held laterally positioned comparison objects. Two visual stimulus sets used differences in color and shape. A cellular-phone timer recorded response latency, and a recording sheet documented planned trials, completed responses, correct matches, nonresponses, and positional choices. Bread was used as positive reinforcement. Outcomes included task completion, nonresponse frequency, accuracy among completed trials, response latency, positional choice, and contextual observations of engagement.

3.5 Procedure

For each trial, sample and comparison stimuli were presented, and latency was measured until an observable choice occurred. Correct selections were reinforced immediately. The correct comparison position was changed across trials. Failure to choose was recorded as a nonresponse. Food was manually delivered using the researcher's right hand, a procedure later recognized as a possible positional cue.

3.6 Data Analysis

Frequencies summarized completed trials, correct selections, nonresponses, and positional choices. Accuracy was calculated using completed trials as the denominator, and latency was summarized using the reported average for each condition. No inferential test was applied because observations came from one subject and conditions were not independently replicated.

3.7 Ethical Considerations

The researcher used nonaversive procedures and positive reinforcement. The dog was monitored for fatigue, sleepiness, frustration, or disengagement and was not forced to respond. The procedures did not involve punishment, physical restraint, deprivation, or invasive intervention. The paper did not report formal review by an animal-research ethics committee; the ethical account is therefore limited to the documented welfare safeguards.

4. Results and Discussion

4.1 Task Completion and Accuracy

The dog completed 11 of 15 massed trials and 12 of 15 distributed trials. Seven massed responses and eight distributed responses were correct, yielding conditional accuracy rates of 64% and 67%, respectively. The three-percentage-point difference was small and does not establish improved matching accuracy.

Table 1. *Observed Performance Under Massed and Distributed Training Conditions*

Measure	Massed training	Distributed training
Planned trials	15	15

Completed trials	11	12
Nonresponses	4	3
Correct responses	7	8
Accuracy among completed trials	64%	67%
Correct responses across all planned trials	46.7%	53.3%
Reported average latency	3.0 seconds	1.5 seconds
Reported left-side choice	45%	85%*

Note. Accuracy used completed trials as the denominator. The distributed positional count requires verification because the narrative identifies 11 left and two right choices, totaling 13 despite only 12 completed trials.

4.2 Response Latency and Engagement

Reported average latency decreased from 3.0 seconds during massed training to 1.5 seconds during distributed training. Massed training included lying down, reduced attention, and four nonresponses. Distributed training showed somewhat greater engagement but still included sleepiness and three nonresponses. The lower latency is compatible with maintained alertness, but it may also reflect familiarity, practice, time of day, or reinforcement expectation. Faster choice does not independently demonstrate faster cognitive processing or stronger learning.

4.3 Positional Choice and Possible Cueing

Massed training produced a relatively balanced reported pattern of six right and five left selections. Distributed training produced a pronounced reported left preference. Because reinforcement was consistently delivered with the researcher's right hand, the movement may have directed attention toward the dog's left side. The trial-level record must be checked because the reported distributed positional counts are internally inconsistent. Regardless of the exact percentage, the observed side preference complicates interpretation of accuracy and latency.

4.4 Discussion

Accuracy remained broadly similar across schedules, while distributed training corresponded with one additional completed trial and lower reported latency. These patterns are generally compatible with spacing literature, which associates rest intervals with renewed attention and memory-related processes (Carpenter et al., 2022; Glas et al., 2021; Holcomb et al., 2022). However, the present study did not measure delayed retention or neural processes.

The strong positional preference limits the conclusion that the dog applied an abstract matching rule. Evidence of match-to-sample learning requires responses to be governed by the sample-comparison relationship rather than location or handler movement (Do et al., 2023; Lazarowski et al., 2021). Faster responding may therefore reflect greater alertness, familiarity, or an acquired shortcut.

The fixed condition sequence creates an additional limitation because distributed training was also the dog's second exposure to the apparatus and task. Improvements cannot be attributed exclusively to spacing. The findings consequently provide preliminary evidence of faster responding and slightly greater participation in one dog, not proof of superior match-to-sample learning. Their principal contribution is methodological: canine learning studies should integrate accuracy, latency, nonresponse, positional choice, neutral reinforcement, counterbalanced order, and transfer tests using novel stimuli.

5. Conclusions, Recommendations, and Implications

5.1 Conclusions

The dog completed 11 massed trials and 12 distributed trials, while accuracy among completed trials remained broadly comparable at 64% and 67%. Reported latency decreased from 3.0 to 1.5 seconds, and fewer nonresponses occurred during distributed training. These observations are consistent with the possibility that spacing helped maintain engagement, but fixed order, practice, time-of-day, and carryover effects prevent causal attribution. The pronounced side preference further suggests that reinforcement placement or another cue influenced responding. Distributed training corresponded with faster responding and slightly greater participation, but the experiment did not establish superior matching or abstract-rule acquisition.

5.2 Recommendations

Future studies should deliver reinforcement centrally or through an automated dispenser and use a predetermined randomized position schedule. Each trial should record the sample, correct position, selected position, accuracy, latency, and nonresponse. The original trial sheet should be checked to resolve the distributed positional-count discrepancy.

Condition order should be counterbalanced or reversed across repeated cycles. Multiple dogs and repeated sessions should be used when feasible. Delayed retention and transfer tests with novel colors, shapes, or objects should distinguish immediate task performance from durable or generalized learning.

Accuracy, latency, nonresponse, and positional preference should be analyzed separately. Video recording and independent behavioral coding would improve measurement reliability.

5.3 Implications of the Study

The study shows that response speed and accuracy may not change together and that apparent improvement can coexist with unintended stimulus control. Shorter sessions separated by rest may help maintain engagement in some dogs, but trainers and researchers must ensure that behavior is governed by the intended stimulus rather than reward position or handler movement. Single-subject designs can provide preliminary observations and identify procedural problems, but population-level conclusions require replication and stronger control.

6. References

Adame, J. K. M. (2026). Adversity quotient, resilience and professional effectiveness among helping professionals. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/gwh4j269

Aguilar, M. R. C. (2026). Presence and search for meaning in life and work and growth mindset in one higher education institution. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/22pcjn49

Ambalam, A. A. (2025). Exploring a framework for matching to sample with visual stimuli in dogs (Canis familiaris) [Master's thesis, University of Waikato]. Research Commons. https://hdl.handle.net/10289/17736

Aviles-Rosa, E. O., DeChant, M. T., & Hall, N. J. (2022). Training the sensor: Impacts of learning on canine detection and performance. In L. E. DeGreeff & C. A. Schultz (Eds.), Canines: The original biosensors (pp. 381–412). Jenny Stanford Publishing. https://doi.org/10.1201/9781003261131-13

Balut, I. M., Baltazar, R. K., Fronda, M., Siador, K., Tandog, P. J. B., & Atento, R. G. (2026). Peer influence experiences and personal-social competencies among late adolescents: Evidence from a private higher education institution in the Philippines. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/magr2j66

Carpenter, S. K. (2020). Distributed practice or spacing effect. Oxford Research Encyclopedia of Education. https://doi.org/10.1093/acrefore/9780190264093.013.859

Carpenter, S. K., Pan, S. C., & Butler, A. C. (2022). The science of effective learning with spacing and retrieval practice. Nature Reviews Psychology, 1(9), 496–511. https://doi.org/10.1038/s44159-022-00089-1

Centofante, E., Fralleoni, L., Lupascu, C. A., Migliore, M., Rinaldi, A., & Mele, A. (2023). Specific patterns of neural activity in the hippocampus after massed or distributed spatial training. Scientific Reports, 13, Article 13357. https://doi.org/10.1038/s41598-023-39882-0

Do, J., Jung, M. W., & Lee, D. (2023). Automating licking bias correction in a two-choice delayed match-to-sample task to accelerate learning. Scientific Reports, 13, Article 22768. https://doi.org/10.1038/s41598-023-49862-z

Espelita, C. A. M. H., & Atento, R. G. O. (2026). Self-efficacy, work environment support, and employee productivity in Philippine trading companies. Journal of Enterprise Strategy & Management Innovation, 1(1). https://doi.org/10.65166/nwv9wg88

Gamasan, R., & Atento, R. G. O. (2026). Localized quality management system implementation and operational performance in a Philippine maritime manning office: The roles of human factors and organizational practices. Journal of Enterprise Strategy & Management Innovation, 1(1). https://doi.org/10.65166/m4htka42

Glas, A., Hübener, M., Bonhoeffer, T., & Goltstein, P. M. (2021). Spaced training enhances memory and prefrontal ensemble stability in mice. Current Biology, 31(18), 4052–4061.e6. https://doi.org/10.1016/j.cub.2021.06.085

Gonzales, M. M., & Magnaye, R. P. (2026). Agile leadership and employee engagement among convenience stores. Journal of Enterprise Strategy & Management Innovation, 1(1). https://doi.org/10.65166/ctxrc884

Holcomb, F. R., Multhaup, K. S., Erwin, S. R., & Daniels, S. E. (2022). Spaced training enhances equine learning performance. Animal Cognition, 25(3), 683–690. https://doi.org/10.1007/s10071-021-01580-7

Jiang, L., Wang, L., Yin, Y., Huo, M., Liu, C., Zhou, Q., Yu, D., Xu, L., & Mao, R. (2020). Spaced training enhances contextual fear memory via activating hippocampal 5-HT2A receptors. Frontiers in Molecular Neuroscience, 12, Article 317. https://doi.org/10.3389/fnmol.2019.00317

Lazarowski, L., Davila, A., Krichbaum, S., Cox, E., Smith, J. G., Waggoner, L. P., & Katz, J. S. (2021). Matching-to-sample abstract-concept learning by dogs (Canis familiaris). Journal of Experimental Psychology: Animal Learning and Cognition, 47(3), 393–400. https://doi.org/10.1037/xan0000281

Lolong, J. R. V., Aparejado, A. S. S., Carino, S. Y. M., Valderama, M. L., & Atento, R. G. (2026). Dark triad personality traits and academic dishonesty-related tendencies among senior high school students: A correlational study. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/2xe1ga71

Manio, C. M. D., San Juan, F. M. Z., Atento, R. G., & Valderama, M. L. P. (2026). Desk organization and task efficiency: A within-subjects quasi-experiment on puzzle completion time among first-year civil engineering students. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/vt40ef74

Mastrorilli, V., Centofante, E., Antonelli, F., Rinaldi, A., & Mele, A. (2022). The neural substrate of spatial memory stabilization depends on the distribution of the training sessions. Proceedings of the National Academy of Sciences of the United States of America, 119(14), e2120717119. https://doi.org/10.1073/pnas.2120717119

Quinto, L., Agang-Ang, G., Kim, Y., Eustaquio, J. C., De Vera, R. K., Crisologo, J., ... & Lavalle, D. K. (2025). Gender differences in nutrition, lifestyle, and distress among dormitory medical students: A cross-sectional study. International Journal of Health & Business Analytics, 1(1). https://doi.org/10.65166/xngg1k50

Raviv, L., Lupyan, G., & Green, S. C. (2022). How variability shapes learning and generalization. Trends in Cognitive Sciences, 26(6), 462–483. https://doi.org/10.1016/j.tics.2022.03.007

Ruela, M., Calivo, E., Elizalde, J. M., Franco, J. R., Monteverde, D., & Atento, R. G. (2026). Social media use, self-esteem, and body image among psychology students in a college in Bulacan, Philippines. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/eyc5vq20

Rui, J. (2026). Perceived parenting style, self efficacy and self control among college students. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/p696ww65

San Juan, F. M. Z., Elardo, C. J., Atento, R. G., & Valderama, M. L. P. (2026). Digital sleep diary self-monitoring and perceived sleep quality in civil engineering students: A pilot pretest-posttest controlled study. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/cdq7k160

Santa, A., Kanda, K., Kako, T., Miyajima, M., & Adachi, I. (2024). Matching-to-sample task training of a killer whale (Orcinus orca). Animals, 14(6), Article 821. https://doi.org/10.3390/ani14060821

Surányi, K., Gábor, A., Somogyi, R., Gyenes, B., Morvai, B., Boros, M., Faragó, T., & Andics, A. (2025). Individual level recognition of familiar human speakers in dogs. Animal Behaviour, 219, Article 123016. https://doi.org/10.1016/j.anbehav.2024.10.030

Tintorelli, R., Budriesi, P., Villar, M. E., Marchal, P., Lopes da Cunha, P., Correa, J., Giurfa, M., & Viola, H. (2020). Spatial-memory formation after spaced learning involves ERKs1/2 activation through a behavioral-tagging process. Scientific Reports, 10, Article 98. https://doi.org/10.1038/s41598-019-57007-4

Wang, M. (2026). Time attitude, delayed gratification and job satisfaction of marine technical employees. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/baysv006

Yan, H. (2026). Craftsmanship spirit, professional values, and learning motivation among Chinese higher vocational college students. International Journal of Behavioral and Social Analytics, 1(1). https://doi.org/10.65166/wvm4ge89