

Taylor R. Hayes | CV

✉ trhayes@ucdavis.edu • <https://trhayes.org>

Last Revision June 15, 2021

Education

University of California, Davis

Postdoctoral Scholar, Center for Mind and Brain

09/2015-Present

The Ohio State University

Ph.D., Cognitive Psychology

12/2014

The Ohio State University

M.A., Cognitive Psychology

03/2011

The Ohio State University

B.A., Philosophy

06/2006

Research Interests

Visual Cognition

Attentional control during scene perception and relational reasoning

Individual Differences

How individual differences modulate attentional control

Pupillometry

Using pupillometry as an index of neuromodulatory activity to understand visual cognition

Computational Cognitive Neuroscience

Biologically plausible neural network models of cognitive systems

Publications

Henderson, J. M., Hayes, T. R., Peacock, C. E., & Rehrig, G. (In Press). Meaning maps capture the density of local semantic features in scenes: A reply to Pedziwiatr, Kümmerer, Wallis, Bethge & Teufel (In Press). *Cognition*.

Pomaranski, K. I., Hayes, T. R., Kwon, M. K., Henderson, J. M., & Oakes, L. M. (In Press). Developmental changes in natural scene viewing in infancy. *Developmental Psychology*.

Hayes, T. R. & Henderson, J. M. (In Press). Looking for Semantic Similarity: What a Vector Space Model of Semantics Can Tell Us About Attention in Real-world Scenes. *Psychological Science*.

Rehrig, G., Peacock, C. E., Hayes, T. R., Henderson, J. M., & Ferreira, F. (2020). Where the Action Could Be: Speakers Look at Graspable Objects and Meaningful Scene Regions when Describing Potential Actions. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 46(9), 1659-1681.

Henderson, J. M., Goold, J. E., Choi W., & Hayes, T. R. (2020). Neural Correlates of Fixated Low- and High-level Scene Properties during Active Scene Viewing. *Journal of Cognitive Neuroscience*, 32(10), 2013-2023.

Rehrig, G., Hayes, T. R., Henderson, J. M., & Ferreira, F. (2020). When scenes speak louder than words: Verbal encoding does not mediate the relationship between scene meaning and visual attention. *Memory & Cognition*, 48(7), 1181-1195.

Cronin, D. A., Hall, E. H., Goold, J. E., Hayes, T. R., & Henderson, J. M. (2020). Eye Movements in

- Real-World Scene Photographs: General Characteristics and Effects of Viewing Task. *Frontiers in Psychology*, 10(2915), 1-12.
- Hayes, T. R. & Henderson, J. M. (2019). Center bias outperforms image salience but not semantics in accounting for attention during scene viewing. *Attention, Perception, & Psychophysics*, doi.org/10.3758/s13414-019-01849-7, 1-10.
- Hayes, T. R. & Henderson, J. M. (2019). Scene semantics involuntarily guide attention during visual search. *Psychonomic Bulletin and Review*, 26(5), 1683-1689.
- Peacock, C. E., Hayes, T. R., & Henderson, J. M. (2019). Meaning guides attention during scene viewing even when it is irrelevant. *Attention, Perception, & Psychophysics*, 81(1), 20-34.
- Henderson, J. M., Hayes, T. R., Rehrig, G. L., & Ferreira, F. (2018). Meaning Guides Attention during Real-World Scene Description. *Scientific Reports*, 8, 1-9.
- Henderson, J. M. & Hayes, T. R. (2018). Meaning guides attention in real-world scene images: Evidence from eye movements and meaning maps. *Journal of Vision*, 18(10), 1-18.
- Hayes, T. R. & Henderson, J. M. (2018). Scan patterns during real-world scene viewing predict individual differences in clinical traits in a normative sample. *PLoS ONE*, 13(5):e0196654.
- Henderson, J. M. & Hayes, T. R. (2017). Meaning-based guidance of attention in scenes as revealed by meaning maps. *Nature Human Behavior*, 1, 743-747.
- Hayes, T. R. & Henderson, J. M. (2017). Scan patterns during real-world scene viewing predict individual differences in cognitive capacity. *Journal of Vision*, 17(5):23, 1-17.
- Hayes, T. R. & Petrov, A. A. (2016). Pupil diameter tracks the exploration-exploitation trade-off during analogical reasoning and explains individual differences in fluid intelligence. *Journal of Cognitive Neuroscience*, 28(2), 308-318.
- Hayes, T. R. & Petrov, A. A. (2016). Mapping and correcting the influence of gaze position on pupil size measurements. *Behavior Research Methods*, 48(2), 1-18.
- Hayes, T. R., Petrov, A. A., & Sederberg, P. B. (2015). Do we really become smarter when our fluid-intelligence test scores improve? *Intelligence*, 48, 1-14.
- Hayes, T. R., Petrov, A. A., & Sederberg, P. B. (2011). A novel method for analyzing sequential eye movements reveals strategic influence on Raven's Advanced Progressive Matrices. *Journal of Vision*, 11(10):10, 1-11.
- Petrov, A. A. & Hayes, T. R. (2010). Asymmetric transfer of perceptual learning of luminance- and contrast-modulated motion. *Journal of Vision*, 10(14):11, 1-22.

Conference Presentations

- Hayes, T. R. & Henderson, J. M. (2021). Scene inversion interferes with meaning-based guidance in real-world scenes. In *Proceedings of the 21th Annual Meeting of the Vision Sciences Society*, .
- Hayes, T. R. & Henderson, J. M. (2020). Deep Saliency Models: Understanding the Contributions of High-, Mid-, and Low-level Features in Scenes. In *Proceedings of the 60th Annual Meeting of the Psychonomic Society*, .
- Hayes, T. R. & Henderson, J. M. (2020). Semantic knowledge guides attention in real-world scenes. In *Proceedings of the 20th Annual Meeting of the Vision Sciences Society*, .
- Hayes, T. R. & Henderson, J. M. (2019). Center bias outperforms image salience but not semantics during scene viewing. In *Proceedings of the 19th Annual Meeting of the Vision Sciences Society*, 36.442.
- Hayes, T. R. & Henderson, J. M. (2018). Scene meaning and salience are suppressed during arbitrary visual search. In *Proceedings of the 18th Annual Meeting of the Vision Sciences Society*, 21.15.
- Hayes, T. R. & Henderson, J. M. (2017). The Relationship Between Saliency and Meaning During

Real-World Scene Viewing. In *Proceedings of the 17th Annual Meeting of the Vision Sciences Society*, 26.4023.

Hayes, T. R. & Henderson, J. M. (2017). Eye Movement Patterns During Scene Viewing Predict Clinical Individual Differences. In *Proceedings of the 24th Cognitive Neuroscience Society*, F5.

Hayes, T. R. & Henderson, J. M. (2017). Eye Movement Patterns Among Salient Regions Predict Individual Differences. In *Proceedings of the 57th Annual Meeting of the Psychonomic Society*, 3178.

Hayes, T. R. & Henderson, J. M. (2016). Eye Movement Patterns Among Salient Regions Predict Individual Differences. In *Proceedings of the 57th Annual Meeting of the Psychonomic Society*, 3178.

Hayes, T. R. & Henderson, J. M. (2016). Scan Patterns Among Significant Scene Regions Predict Individual Differences. In *Proceedings of the 24th Annual Workshop on Object Perception, Attention, and Memory*, 33.

Hayes, T. R. & Henderson, J. M. (2016). Eye Movement Patterns During Scene Viewing Predict Individual Differences. In *Proceedings of the 16th Annual Meeting of the Vision Sciences Society*, 26.4071.

Hayes, T. R. & Petrov, A. A. (2015). Mapping and correcting the influence of gaze position on pupil size measurements. In *Proceedings of the 15th Annual Meeting of the Vision Sciences Society*, 43.3021.

Hayes, T. R. & Sederberg, P. B. & Siefke, B. & Petrov, A. A. (2014). Pupillometry reveals role for norepinephrine in the isolation effect. *Journal of Vision*, 14(10), 1142.

Hayes, T. R. & Petrov, A. A. (2013). Pupillometry as a method for tracking shifts in control state during visual relational reasoning. *Journal of Vision*, 13(9), 799.

Petrov, A. A. & Hayes, T. R. (2013). Phasic locus coeruleus activity changes with practice: A pupillometry study. In *Proceedings of the 10th Annual Meeting of Computational and Systems Neuroscience*, 1475.

Hayes, T. R. & Petrov, A. A. (2012). Pupil diameter changes systematically and non-monotonically with perceptual learning. In *Proceedings of the 53rd Annual Meeting of the Psychonomic Society*, 3004.

Hayes, T. R. & Petrov, A. A. (2012). Pupil diameter changes non-monotonically with perceptual learning. *Journal of Vision*, 12(9), 697.

Petrov, A. A. & Hayes, T. R. & Sederberg, P. B. (2011). Sequential eye-movement analysis reveals strategic processing on Raven's Advanced Progressive Matrices. In *Proceedings of the 51st Annual Meeting of the Psychonomic Society*, 237.

Petrov, A. A. & Hayes, T. R. & Sederberg, P. B. (2011). Sequential eye-movement analysis reveals strategic processing on Raven's Advanced Progressive Matrices. In *Proceedings of the 44th Annual Meeting of the Society for Mathematical Psychology*, 52.

Petrov, A. A. & Hayes, T. R. & Sederberg, P. B. (2011). Learning affects strategic processing on Raven's Advanced Progressive Matrices. In *Proceedings of the 44th Annual Conference of the Cognitive Science Society*, 3395.

Hayes, T. R. & Sederberg, P. B. & Petrov, A. A. (2011). A new technique for the analysis of sequential eye movements. *Journal of Vision*, 11(11), 501.

Hayes, T. R. & Petrov, A. A. (2009). Asymmetrical transfer of perceptual learning between Luminance- and Contrast-Defined motion: Evidence for shared and distinct processing. In *Proceedings of the 50th Annual Meeting of the Psychonomic Society*, 5095.

Hayes, T. R. & Petrov, A. A. (2009). Perceptual learning transfers from luminance- to contrast-defined motion. *Journal of Vision*, 9(8), 884.

Programming and Technical Experience

Programming, 13 years experience

Python, Matlab, R

Numerous experiments written in Matlab and the Psychophysics Toolbox and Python and PsychoPy. Extensive statistical analysis and data modeling in Python, Matlab, and R.

Eye Tracking, 13 years experience

EyeLink 1000 eye tracker, EyeLink Toolbox, Experiment Builder, Data Viewer

Extensive experience implementing and running eye tracking experiments in Matlab and Python.

fMRI

Siemens 3T Trio, Brain Voyager

Group seminar in fMRI that involved designing, implementing, and running an fMRI experiment and the subsequent analysis of the data within Brain Voyager.

OS

Linux, Mac OS, Microsoft

Publishing

T_EX, L^AT_EX, Omnigraffle

Research Awards

Vision Sciences Society National Eye Institute Postdoc Travel Grant

Award to cover travel, lodging and registration costs to present work at the VSS 2019 meeting 2019

Psychonomic Society Clifford T. Morgan Best Article Award: Behavior Research Methods

Mapping and correcting the influence of gaze position on pupil size measurements 2016

OSU Graduate Student Conference Presentation Award

Travel award to present research at the 13th annual meeting of the Vision Sciences Society 2014

Graduate Student Research Excellence Award

Summer research fellowship awarded to top 15 graduate students for outstanding research ability 2014

James Mosher Klein Award

Awarded to the most outstanding dissertation proposal within the Cognitive Psychology department 2013

Presidential Fellowship

The most prestigious award given by the Graduate School to recognize outstanding scholarship 2013

Herbert Toops Award

Award for the most outstanding article published by a graduate student in the Psychology department 2012

Graduate Student Research Excellence Award

Summer research fellowship awarded to top 15 graduate students for outstanding research ability 2012

OSU Graduate Student Conference Presentation Award

Travel award to present research at the 12th annual meeting of the Vision Sciences Society 2012

Graduate Student Research Excellence Award

Summer research fellowship awarded to top 15 graduate students for outstanding research ability 2011

Center for Cognitive Science Travel Award

Travel award to present research at the 34th annual meeting of the Cognitive Science Society 2011

OSU Graduate Student Conference Presentation Award

Travel award to present research at the 50th annual meeting of the Psychonomic Society 2010

OSU Graduate Student Conference Presentation Award

Travel award to present research at the 9th annual meeting of the Vision Sciences Society 2009

Professional Activities

Scientific Memberships

Vision Sciences Society, Psychonomic Society

Attended Conferences and Workshops:

Vision Sciences Society Proceedings (2021 Virtual)
Psychonomic Society Proceedings (2020 Virtual)
Vision Sciences Society Proceedings (2020 Virtual)
Vision Sciences Society Proceedings (2019)
Vision Sciences Society Proceedings (2018)
Vision Sciences Society Proceedings (2017)
Cognitive Neuroscience Society Proceedings (2017)
Psychonomic Society Proceedings (2016)
Object Perception, Attention, and Memory Proceedings (2016)
Vision Sciences Society Proceedings (2016)
Vision Sciences Society Proceedings (2015)
Vision Sciences Society Proceedings (2014)
Vision Sciences Society Proceedings (2013)
Mathematical Biosciences Institute Cognitive Neuroscience Workshop (2012)
Psychonomic Society Proceedings (2012)
Society for Mathematical Psychology Proceedings (2012)
Vision Sciences Society Proceedings (2012)
Psychonomic Society Proceedings (2011)
Cognitive Science Society Proceedings (2011)
Society for Mathematical Psychology Proceedings (2011)
Vision Sciences Society Proceedings (2011)
Psychonomic Society Proceedings (2010)
Vision Sciences Society Proceedings (2009)

Ad-hoc Reviewer:

Attention, Perception, & Psychophysics
Behavior Research Methods
Journal of Experimental Psychology: General
Journal of Vision
Nature
PLOS ONE
Psychonomic Bulletin & Review
Vision Research

Teaching Experience

University of California, Davis

Guest Lecturer

Psych 131: Perception

2016

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|---|-------------|
| The Ohio State University <i>Graduate Lecturer (3 sections)</i> Psych 100: Introduction to Psychology | 2013 |
| The Ohio State University <i>Guest Lecturer</i> Psych 312: Memory and Cognition | 2012 |
| The Ohio State University <i>Graduate Lecturer (3 sections)</i> Psych 100: Introduction to Psychology | 2011–2012 |
| The Ohio State University <i>Graduate Lecturer (3 sections)</i> Psych 100: Introduction to Psychology | 2009–2010 |
| The Ohio State University <i>Teaching Associate</i> Psych 313: Introduction to Behavioral Neuroscience | Summer 2009 |
| The Ohio State University <i>Teaching Associate</i> Psych 220: Introduction to Behavioral Statistics | 2008–2009 |