# Edward K. Vogel

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http://scholar.google.com/citations?user=K24Hke0AAAAJ&hl

**Education**

University of Puget Sound
B.A. (Psychology) May, 1994

University of Iowa
Ph.D. (Psychology [Cognition & Perception]) July, 2000
Dissertation Advisor: Steven J. Luck

**Research Interests**

My research examines the limits of human memory and how attention and other encoding factors determine both what information from the environment will reach awareness as well as how clearly it will be recalled. A central question we examine regards how individuals differ in the ability to control attention and how periodic lapses of attention impact their task performance and safety. My primary approach to examining these processes is with both behavioral testing and neurophysiological measurements in my laboratory, with specific expertise in human electroencephalography (EEG) and functional neuroimaging (fMRI). This combination of approaches helps to provide both anatomical and temporal constraints for cognitive theories of visual memory and attention.

**Academic and Professional Experience**

*Positions*

2000-2002 Post-doctoral Fellow
University of California, San Diego –Institute for Neural Computation

2001-2006 Assistant Professor
University of Oregon –Department of Psychology

2006-2010 Associate Professor (with Tenure)
University of Oregon –Department of Psychology

2009 Visiting Scientist
Massachusetts Institute of Technology -Picower Institute for Learning & Memory

2010-2015 Professor
University of Oregon –Department of Psychology; Institute of Neuroscience

2011-2014 Co-Director
Cognitive and Systems Neuroscience Training Program; University of Oregon

2015- Professor
University of Chicago -Department of Psychology

2015- Associate Editor - Psychophysiology

2017-2020 Standing Member - National Institutes of Health Grants Review Panel (CP Study Section)

*Awards and Distinctions*

1994 **Outstanding Psychology Graduate** - University of Puget Sound

2008 **Posner-Boies Young investigator Award** -University of Oregon

2013 **Honorary Professor of Psychology** -Southwest University, Chongqing, China

2014 **Faculty Excellence Award** -University of Oregon

2014 **Elected Fellow** -Society of Experimental Psychologists

*Ad Hoc Reviewer*

Journals
Behavioural Brain Research; Biological Psychiatry; Cognition; Cognitive Brain Research; Current Biology; Current Opinion in Neurobiology; Developmental Science; Journal of Cognitive Neuroscience; JEP: General; JEP:HPP; JEP: LMC; Journal of Neuroscience; Nature; Nature Neuroscience; NeuroImage; Neuron; Neuropsychologia; Perception; Perception & Psychophysics; Proceedings of the National Academy of Sciences; Psychological Research; Psychological Science; Psychonomic Bulletin & Review **(member of Editorial Board)**; Psychophysiology; Quarterly Journal of Experimental Psychology; Science; Trends in Cognitive Sciences; Visual Cognition; Visual Neuroscience

Research Grant Funding Agencies
National Institute of Mental Health; B-start; Special emphasis panel; Challenge Grant panel; SPC study section
National Science Foundation
Office of Naval Research
Oregon Medical Research Foundation
Unilever Research
Wellcome Trust
Canada Foundation for Innovation

Organizing Committees for Professional Meetings
CSAIL conference; Hood River, OR 2009-2014
Oregon Visual Working Memory meeting; Portland, OR 2012
International conference on Working Memory; Cambridge UK 2014

*Departmental and University Committee Memberships*
Cognition and Perception (Iowa) area faculty search, 1997-8
Cognition and Perception (Iowa) area graduate student admissions, 1998-9
Lewis Center for Neuroimaging: Executive Committee, 2001-2004
Cognitive faculty search, 2002-3
Cognitive faculty search, 2003-4
Graduate Student Admissions Committee, 2002-3
Graduate Education Committee, 2003-2005

**Chair**, Individualized Masters Program Committee, 2003-2005
**Elected**, Psychology Department Executive Committee, 2005-2007
Graduate Admissions Committee, 2005-2006
Clinical faculty search, 2006
Psychology Colloquium Committee, 2006-2008
Undergraduate Education Committee, 2007-2008
**Chair**, Psychology Human Subjects Pool, 2007-2008
University Institutional Review Board (IRB), 2006-2008
Tenure Committee for Dr. Kentros, 2009-2010
**Chair**, Graduate Admissions Committee, 2009-2011
**Elected,** Psychology Department Executive Committee, 2010-2012
**Chair**, Cognitive faculty Search, 2011-2014
**Chair**, Tenure committee for Dr. Unsworth 2011-2012
**Elected,** Psychology Department Executive Committee, 2013-2015
Lewis Center for Neuroimaging: Executive Committee, 2013-2015
Attneave lecture committee; 2013-2014
**Chair**, Tenure committee for Dr. Casasanto 2016-2017
Graduate Education Committee 2015-2017
**Elected,** Psychology Department Steering Committee, 2017-2019
**Chair**, Tenure committee for Dr. Berman, 2018-2019
**Chair**, Search committee Psychology. 2018-2019

*Student Committee Memberships*

**First Year Project Committee**: Stevens; Perez; Drew; McCollough; Oh; Rowland; Fukuda; Batterink
**Supporting Area**: V. Perez; Aikath; Lester; Hulbert
**Preliminary Examination Committee**: Capek; Halverson; Yamada; Perez (chair); Drew (chair); Pakulak
**Dissertation Committee**: Capek; Bell;Yamada; Halverson; Holbrook; Perez(chair); Pakulak; Aikath; Rowland; Drew(chair); McCollough (chair); Ester; Fukuda (chair); Oswald; Reed; Isbell; Mance (chair); Dungan (chair)
**Masters Evaluation Committee**: Machizawa; Fieger; Ikkai; Fair; Ishikawa; Paulsen; Ashby; Umemoto
**Honors Thesis**: Shula; Hansen; Ikkai; Fair; Corder; Fukuda; Shiozawa; Ashby; Grady

*Supervision of Students*

| **Name of Student** | **Position in my Laboratory** |
|---|---|
| Colin Quirk | PhD Student |
| Nicole Hakim | PhD Student |
| Kirsten Adam | PhD Student (Completed PhD May 2018; Now Post-doc at UCSD) |
| Brittany Dungan | PhD Student (Completed PhD May 2015; Now UX analyst at Riot Games) |
| Irida Mance | PhD Student (Completed PhD May 2015; Now Research Scientist at Apple) |
| Roy Luria | Post-doc (Now Assoc Prof at Tel Aviv University) |
| Hiroyuki Tsubomi | Post-doc (Now Assoc Prof at University of Toyama) |
| Keisuke Fukuda | PhD Student (Completed PhD May 2012; now Asst Prof af U Toronto) |
| Andrew McCollough | PhD Student (Completed PhD May, 2011; now Post-doc at OHSU) |
| Trafton Drew | PhD Student (completed PhD May, 2009; now Asst Prof at U of Utah) |
| Veronica Perez | PhD Student (completed PhD May, 2008; now Asst Prof at UCSD) |
| Nathan Ashby | Master's student (completed degree 2009; now at Max Planck Inst. PhD program) |
| Masahiro Machizawa | Master's student (completed degree 2003; now Asst Prof at Hiroshima University) |
| Akiko Ikkai | Master's student (completed degree 2005; now Post-Doc at Johns Hopkins) |

| | |
|---|---|
| Brittany Dungan | Honor's student (completed thesis 2010) |
| Nathan Ashby | Honor's student (completed thesis 2007) |
| Keisuke Fukuda | Honor's student (completed thesis 2006) |
| Laura Shula | Honor's student (completed thesis 2003) |
| Jason Fair | Honor's student (completed thesis 2004) |

| *Teaching* | *Type of Course (# of students)* | |
|---|---|---|
| **University of Iowa** | | |
| Cognition and the Brain | Undergraduate | (~65) |
| Sensation and Perception | Undergraduate | (~80) |
| Experimental Psychology II | Undergraduate | (~35) |
| Introduction to Cognition | Undergraduate | (~40) |
| | | |
| **University of Oregon** | | |
| Cognitive Psychology (Psy 435/535) | Undergraduate | (~50-65) |
| Experimental Research Methods (Psy 303) | Undergraduate | (~55) |
| Transfer Student Seminar (Psy 399) | Undergraduate | (~30) |
| First Year Project Seminar (Psy 607) | Graduate | (~16) |
| Seminar in Attention (Psy 607) | Graduate | (~12) |
| Seminar in Cognitive Neuroscience (Psy 607) | Graduate | (~20) |
| Issues in Cognitive Neuroscience (Psy 614) | Graduate | (~15) |

***Extra-mural Support***

National Institute of Mental Health NRSA fellowship (2000-2002) Institute for Neural Computation, UC San Diego; "Selective storage in visual working memory.

National Institute of Mental Health R03 grant (2003-2005) "Updating Representations in Visual Working Memory"; 2 years $100,000 direct costs. **Principal Investigator**.

Oregon Medical Research Foundation Research Grant (2004-2005) "Neural Measurements of Working Memory Capacity"; 1 year $30,000 direct costs. **Principal Investigator**.

National Science Foundation grant (2006-2010) "Controlling the allocation of visual memory capacity"; 4 years $525,000 direct costs. **Principal Investigator**.

National Institute of Mental Health R01 grant (2007-2011) "Control of Dynamic Attention"; 4 years $772,000 direct costs (PI, Todd Horowitz). Vogel **Principal Investigator on subcontract (**$168,000 direct costs for subcontract**)**.

National Institute of Mental Health R01 grant (2009-2014) "The distinction between number and resolution in visual working memory"; 5 years $2,070,509 direct costs. **Co-Principal Investigator** (w/ Ed Awh).

National Institute of Mental Health competitive supplement (2010-2011) "The distinction between number and resolution in visual working memory"; 1 year $149,493 direct costs. **Co-Principal Investigator** (w/ Ed Awh).

Office of Naval Research grant (2012-2015) "Optimizing memory capacity through attentional consistency training" 3 years $366,277 direct costs. **Principal Investigator.**

National Institute of Mental Health R01 grant (2014-2019) "Oscillatory measures of number and precision in working memory"; 5 years $3,081,988 direct costs. **Co-Principal Investigator** (w/ Ed Awh).

Office of Naval Research grant (2015-2018) "Improving cognitive performance by detecting and correcting attentional lapses" 3 years $581,190 direct costs. **Principal Investigator.**

Office of Naval Research grant (2018-2021) "Decoding Expert attention with Deep Learning of EEG" 3 years $780,000 direct costs. **Principal Investigator.**

***Publications*** *(* denotes papers coauthored by my graduate students or post-docs)*

*Peer-Reviewed Publications* ***(total number of citations = 20,300 ; H-index = 52 ; i10-index = 73)***

1. Luck, S. J., Vogel, E. K., & Shapiro, K. L. (1996). Word meanings can be accessed but not reported during the attentional blink. **Nature**, 383, 616-618.

2. Luck, S. J. & Vogel, E. K. (1997). The capacity of visual working memory for features and conjunctions. **Nature**, 390, 279-281.

3. Luck, S. J. & Vogel, E. K. (1998). Visual and auditory working memory capacity: Response from Luck and Vogel. **Trends in Cognitive Sciences**, 2, 78-80.

4. Hillyard, S. A., Vogel, E. K., & Luck, S. J. (1998). Sensory gain control (amplification) as a mechanism of selective attention: Electrophysiological and neuroimaging evidence. **Philosophical Transactions of the Royal Society: Biological Sciences**, 353, 1257-1270.

5. Vogel, E. K., Luck, S. J., & Shapiro, K. L. (1998). Electrophysiological evidence for a post-perceptual locus of suppression during the attentional blink. **Journal of Experimental Psychology: Human Perception and Performance**, 24 (6), 1656-1674.

6. Vogel, E. K. & Luck, S. J. (2000). The visual N1 component as an index of a discrimination process. **Psychophysiology**, 37, 190-203.

7. Luck, S. J., Woodman, G. F., & Vogel, E. K. (2000). Event-related potential studies of attention. **Trends in Cognitive Sciences**, 4, 432-440.

8. Vogel, E. K., Woodman, G. F., & Luck, S. J. (2001). Storage of features, conjunctions, and objects in visual working memory. **Journal of Experimental Psychology: Human Perception and Performance**, 27 (1) 92-114.

9. Woodman, G. F., Vogel, E. K., & Luck, S. J. (2001). Visual search remains efficient when visual working memory is full. **Psychological Science** 12, 219-224.

10. Schmidt, B. K., Vogel, E. K., Woodman, G. F., & Luck, S. J. (2002). Voluntary and involuntary control of visual working memory. **Perception & Psychophysics**, 64, 754-763.

11. Vecera, S. P., Vogel, E. K., & Woodman, G. F. (2002). Lower region: A new cue to figure-ground segregation. **Journal of Experimental Psychology: General**, 131 (2) 194-205.

12. Hopf, J. M., Vogel, E. K., Woodman, G. F., Hagner, T., Heinze, H. J., & Luck, S. J. (2002). Localizing visual discrimination processes in time and space. **Journal of Neurophysiology**, 88, 2088-2095.

13. Vogel, E. K., & Luck, S. J. (2002). Delayed working memory consolidation during the attentional blink. **Psychonomic Bulletin & Review**, 9, 739-743.

14. Vogel, E. K. & *Machizawa, M. G. (2004). Neural activity predicts individual differences in visual working memory capacity. **Nature**, 428, 784-751.

15. Woodman, G. F. & Vogel, E. K. (2005). Fractionating working memory: Memory encoding and maintenance are independent processes. **Psychological Science,** 16, 106-113.

16. Vogel, E. K., Woodman, G. F., & Luck, S. J. (2005). Pushing around the locus of selection: Evidence for the flexible selection hypothesis. **Journal of Cognitive Neuroscience,** 17, 1907-1922.

17. Vogel, E. K., *McCollough, A. W., & *Machizawa, M. G. (2005). Neural measures reveal individual differences in controlling access to visual working memory. **Nature**, 438, 500-503.

18. Vogel, E. K., Woodman, G. F., & Luck, S. J. (2006). The time course of consolidation in visual working memory. **Journal of Experimental Psychology: Human Perception and Performance,** 32, 1436-1451.

19. Awh, E., Vogel, E. K., & Oh, S. (2006). Interactions between selective attention and working memory. **Neuroscience,** 139, 201-208.

20. *Drew, T., *McCollough, A. W., & Vogel, E. K. (2006). Event-related potential measures of working memory. **Clinical Electroencephalography and Neuroscience,** 37, 286-291.

21. *McCollough, A. W., *Machizawa, M. G., & Vogel, E. K. (2007). Electrophysiological measures of maintaining representations in visual working memory. **Cortex,** 43, 77-94.

22. Awh, E., Barton, B., & Vogel, E. K. (2007). Visual working memory represents a fixed number of items regardless of complexity. **Psychological Science,** 18, 622-628.

23. Woodman, G. F. & Vogel, E. K. (2008). Selective storage and maintenance of an object's features in visual working memory. **Psychonomic Bulletin and Review**, 15, 223-229.

24. Scolari, M., Vogel, E.K., & Awh, E. (2008). Perceptual expertise enhances the resolution but not the number of items that can be maintained in visual working memory. **Psychonomic Bulletin and Review**, 15, 215-222**.**

25. *Drew, T., & Vogel, E. K. (2008). Recently attended masks are less effective. **Perception & Psychophysics**, 70, 96-103**.**

26. Vogel, E. K. & Awh, E. (2008). How to exploit diversity for scientific gain: Using individual differences to constrain cognitive theory. **Current Directions in Psychological Science**, 17(2), 171-176**.**

27. *Drew, T. & Vogel, E. K. (2008). Neural measures of individual differences in selecting and tracking multiple moving objects. **Journal of Neuroscience**, 28(16), 4183-4191.

28. Serences, J. T., Ester, E. F., Vogel, E. K., & Awh, E. (2009). Stimulus-specific delay activity in human primary visual cortex. **Psychological Science**, 20 (2) 207-214.

29. *Drew, T., *McCollough, A.W., Horowitz, T.S., & Vogel, E.K. (2009). Attentional enhancement during multiple object tracking. **Psychonomic Bulletin and Review**, 16 (2), 411-417.

30. Hyun, J.-S., Woodman, G. F., Vogel, E. K., Hollingworth, A., & Luck, S. J. (2009). The comparison of visual working memory representations with perceptual inputs. **Journal of Experimental Psychology: Human Perception and Performance**, 35, 1140-1160.

31. *Fukuda, K. & Vogel, E.K. (2009). Human variation in overriding attentional capture. **Journal of Neuroscience,** 29, 8726-8733.

32. *Drew, T., *McCollough, A. W., Horowitz, T. S., & Vogel, E. K. (2009). Attentional enhancement during multiple object tracking. **Psychonomic Bulletin & Review**, 16, 411-417.

33. Umemoto, A., Scolari, M., Vogel, E.K., & Awh, E. (2010). Implicit knowledge about target location guides encoding into visual working memory. **Journal of Experimental Psychology: Human Perception and Performance**.

34. *Ikkai, A., *McCollough, A. W., & Vogel, E. K. (2010). Contralateral delay activity provides a neural measure of the number of representations in visual working memory. **Journal of Neurophysiology,** 103, 1963-1968,

35. *Fukuda, K., Awh, E., & Vogel, E. K. (2010). Discrete capacity limits in visual working memory. **Current Opinion in Neurobiology,** 20, 177-182.

36. *Fukuda, K. Vogel, E.K., Mayr, U., & Awh, E. (2010). Quantity not quality: The relationship between fluid intelligence and working memory capacity. **Psychonomic Bulletin & Review,** 17(5), 673-679.

37. Lee, E.Y., Cowan, N., Vogel, E.K., Rolan, T., Valle-Inclan, F., & Hackley, S. (2010). Parkinson's patients are impaired at filtering irrelevant information from visual working memory. **Brain,** 133, 2677-2689.

38. Voytek, B., Davis, M., Yago, E., Barcelo, F., Vogel, E.K., & Knight, R.T. (2010). Dynamic neuroplasticity after human prefrontal cortex damage. **Neuron,** 68, 401-408.

39. Jost, K. Bryck, R., Vogel, E.K., & Mayr, U. (2010). Are old adults just like low working memory young adults? Filtering efficiency and age differences in visual working memory. **Cerebral Cortex,** 21, 1147-1154.

40. *Fukuda, K. & Vogel, E.K. (2011). Individual differences in recovery time from attentional capture. **Psychological Science**, 22(3) 361-368.

41. *Drew, T., Horowitz, T.S., Wolfe, J.M., & Vogel, E.K. (2011). Delineating the neural signatures of tracking spatial position and working memory during attentive tracking. **Journal of Neuroscience,** 31, 659-668.

43. *Luria, R. & Vogel, E.K. (2011). Shape-color and color-color conjunction stimuli are represented as bound objects in visual working memory. **Neuropsychologia,** 49, 1632-1639.

44. *Luria, R. & Vogel, E.K. (2011). Visual search demands dictate reliance upon working memory storage. **Journal of Neuroscience**, 31, 6199-6207.

45. *Drew, T., Horowitz, T. S., Wolfe, J. M., & Vogel, E. K. (2012). Neural measures of dynamic changes in attentive tracking load. **Journal of Cognitive Neuroscience**, 24, 440-450.

46. Woodman, G. F., Vogel, E. K. & Luck, S. J. (2012). Flexibility in visual working memory: Accurate change detection in the face of irrelevant variations in position. **Visual Cognition,** 20, 1-28.

47. Drummond, S.P., Anderson, D.A., Straus, L.D., Vogel, E. K., & *Perez, V. P. (2012). The effects of two types of sleep deprivation on visual working memory capacity and filtering efficiency. **PLOS One,** 7, e35653.

48. Ester, E.E., *Drew, T., Klee, D., Vogel, E. K., & Awh, E. (2012). Neural measures reveal a fixed item limit in subitizing. **Journal of Neuroscience,** 32, 7169-7177.

49. LeCompte, M. A., Goodyear, A. C., Demitroff, M. N., Batchelor, D., Vogel, E. K., Mooney, C., Rock, B. N. & Seidel, A. W. (2012). An independent evaluation of conflicting microspherule results from different investigations of the younger dryas impact hypothesis. **Proceedings of the National Academy of Sciences,** Sept 17, E2960-E2969.

50. Spronk, M., Vogel, E. K., & Jonkman, L. M. (2012). Electrophysiological evidence for immature processing capacity and filtering in visuospatial working memory in adolescents. **PLOS One,** 7(8), E42262.

51. Mayer, J.S, *Fukuda, K., Vogel, E. K., & Park, S. (2012). Impaired contingent attentional capture predicts working memory capacity in schizophrenia. **PLOS One,** 7, E48586.

52. *Drew, T., Horowitz, T. S., & Vogel, E. K. (2013). Swapping or dropping? Electrophysiological measures of difficulty during multiple object tracking. **Cognition,** 126, 213-223.

53. Cashdollar, N., *Fukuda, K., Bocklage, A., Aurtenetxe, S., Vogel, E. K., & Gazzaley, A. (2013). Prolonged disengagement from attentional capture in normal aging. **Psychology and Aging,** 28, 77-86.

54. *Mance, I. & Vogel, E. K. (2013). Visual Working Memory: a review. **WIREs Cognitive Science,** 4, 179-190.

55. Spronk, M., Vogel, E. K., & Jonkman, L. M. (2013). No behavioral or ERP evidence for a developmental lag in visual working memory capacity or filtering in adolescents and adults with ADHD. **PLOS One,** 8, E62673.

56. *Tsubomi, H., *Fukuda, K., Watanabe, K., & Vogel, E. K. (2013). Neural limits to representing objects still within view. **Journal of Neuroscience,** 33, 8257-8263.

57. LeCompte, M. A., Demitroff, M. N., Batchelor, D., Vogel, E. K., Mooney, C., Rock, B. N. & Seidel, A. W. (2013). Reply to Boslough: Prior studies validating research are ignored. **Proceedings of the National Academy of Sciences,** 110, E1652.

58. Luck, S. J. & Vogel, E. K. (2013). Visual working memory capacity: From psychophysics and neurobiology to individual differences in cognitive ability. **Trends in Cognitive Sciences,** 17, 391-400.

59. *Ester, E. F., *Fukuda, K., May, L. M., Vogel, E. K. & Awh, E. (2014). Evidence for a discrete resource limit in attending multiple locations. **Cognitive Affective and Behavioral Neuroscience,** 14, 62-77.

60. *Luria, R. & Vogel, E. K. (2014). Come together, right now: Dynamic overwriting of an object's history through common fate. **Journal of Cognitive Neuroscience,** 26(8), 1819-1828.

61. Unsworth, N., *Fukuda, K., Awh, E., & Vogel, E. K. (2014). Working memory and fluid intelligence: Capacity, attention control, and secondary memory retrieval. **Cognitive Psychology,** 71, 1-26**.**

62. *Drew, T., *Mance, I., Horowitz, T.S., Wolfe, J.M., & Vogel, E. K. (2014). A soft handoff of attention across cerebral hemispheres. **Current Biology,** 24, 1133-1137**.**

63. *Fukuda, K., Woodman, G. F. & Vogel, E. K. (2015). Individual differences in visual working memory capacity: Contributions of attentional control to storage. **Mechanisms of Sensory Working Memory: Attention & Performance XXV**. Elsevier, 105-119.

64. Unsworth, N., *Fukuda, K., Awh, E., & Vogel, E. K. (2015). Working memory delay activity predicts individual differences in cognitive abilities. **Journal of Cognitive Neuroscience,** 27, 853-865.

65. *Adam, K., *Mance, I., *Fukuda, K., & Vogel, E. K. (2015). The contribution of attentional lapses to individual differences in working memory capacity. **Journal of Cognitive Neuroscience,** 27, 1601-1616.

66. *Isbell, E., *Fukuda, K., Neville, H.J., & Vogel, E.K. (2015). Visual working memory continues to develop through adolescence. **Frontiers in Developmental Psychology,** 6:696.

67. Eriksson, J., Vogel, E. K., Lansner, A., Bergstrom, F., & Nyberg, L. (2015). Neurocognitive architecture of working memory. **Neuron,** 88, 33-46.

68. *Fukuda, K., *Mance, I., & Vogel, E. K. (2015). Alpha power modulation and event-related slow wave provide dissociable correlates of visual working memory. **Journal of Neuroscience,** 35, 14009-14016.

69. Foster, J. J., Sutterer, D. W., Serences, J. T., Vogel, E. K., & Awh, E. (2016). The topography of alpha-band activity tracks the content of spatial working memory. **Journal of Neurophysiology,** 115, 168-177.

70. *Luria, R., Balaban, H., Awh, E., Vogel, E. K. (2016). The contralateral delay activity as a neural measure of visual working memory. **Neuroscience & Biobehavioral Reviews**, 62, 100-108.

71. *Adam, K. & Vogel, E. K. (2017). Reducing failures of working memory with performance feedback. **Psychonomic Bulletin & Review,** 5/3 1-18.

72. Foster, J. J, Sutterer, D. W., Serences, J. T., Vogel, E. K., & Awh, E. (in press). Alpha-band oscillations enable spatially and temporally resolved tracking of covert spatial attention. **Psychological Science.**

73. Xu, Z.,*Adam, K., Fang, X., & Vogel, E. K. (in press). The reliability and stability of visual working memory capacity. **Behavioral Research Methods.**

74. *Adam, K. & Vogel, E. K. (in press). Confident failures: Lapses of working memory reveal a metacognitive blind spot. **Attention, Perception, & Psychophysics.**

75. *Adam, K., Vogel, E.K. & Awh, E. (in press). Clear evidence for item limits in visual working memory. **Cognitive Psychology.**

76. *Adam, K., Robison, M. K., & Vogel, E. K. (in press). Contralateral delay activity tracks fluctuations in working memory performance. **Journal of Cognitive Neuroscience.**

77. *Feldman-Wustefeld, T. & Vogel, E. K. (in press). Neural evidence for the contribution of active suppression during working memory filtering. **Cerebral Cortex**.

78. *Feldman-Wustefeld, T., Vogel, E. K., & Awh, E. (in press). Contralateral delay activity indexes Working Memory storage, not the current focus of attention. **Journal of Cognitive Neuroscience**.

79. Awh, E. & Vogel, E. K. (in press). Online and offline states of memory in the human brain. **The Cognitive Neurosciences**, Vol III.

80. *Hakim, N. & Vogel, E. K. (in press). Phase coding memories in mind. **PLOS Biology**.

81. *Hakim, N., *Adam, K., *Gunseli, E., Awh, E., & Vogel, E. K. (in press). Dissecting the neural focus of attention reveals distinct processes for spatial attention and object-based storage in visual working memory. **Psychological Science**.

*Book Chapters and Other Invited Publications*

1. Luck, S. J. & Vogel, E. K. (2001). Multiple sources of interference in dual-task performance: The cases of the attentional blink and the psychological refractory period. In K. L. Shapiro (Ed.), **The limits of attention: Temporal constraints on human information processing**, New York: Oxford University Press.

2. Woodman, G.F., Vogel, E.K., Luck, S.J. (2001). Attention is not unitary: Response to Cowan (2001). **Behavioral and Brain Sciences**, 24, 153-154.

3. *McCollough, A. W. & Vogel, E. K. (2008). Your brain's spam filter. **Scientific American Mind,** June/July, 32-35.

4. Awh, E. & Vogel, E. K. (2008). The bouncer in the brain. **Nature Neuroscience,** News & Views commentary, 11, 5-6**.**

5. *Drew, T. & Vogel, E. K. (2008). The fuzziness of memory. **Scientific American,** Mind Matters Online Commentary, November.

6. *Drew, T. & Vogel, E. K. (2009). Working Memory, Capacity Limitations. In: L. Squire (Ed.). **The New Encyclopedia of Neuroscience,** Volume 10, pp. 523-531. Amsterdam, Elsevier.

7. Vogel, E.K. & *Fukuda, K. (2009). In mind and out of phase. **Proceedings of the National Academy of Sciences**, 106, 21017-21018.

8. *Perez, V.B. & Vogel, E.K. (2012). What can ERPs tell us about working memory? In S. Luck & E. Kappenman (Eds.), **Oxford Handbook of Event-related Potential Components**. New York, Oxford University Press.

9. Ester, E. F., Vogel, E.K., & Awh, E. (2012). Discrete resource limits in visual working memory and visual selective attention. In M. Posner's (Ed.). **The Cognitive Neuroscience of Attention, 2nd edition**. New York, Guilford Press.

10. *Dungan, B. J. & Vogel, E. K. (2015). Short-term memory. In Arthur Toga's (Ed.) **Brain Mapping: An Encyclopedic reference**. Vol 3, pp. 481-485. Amsterdam, Elsevier.

11. Awh, E. & Vogel, E. K. (2015). Attention: Feedback focuses a wandering mind. **Nature Neuroscience**

12. Adam, K. & Vogel, E. K. (2016). Tuning in by tuning out distractions. **Proceedings of the National Academy of Sciences**

*Selected Invited Lectures*

**1999**
Vision Research Center, Vanderbilt University

**2000**
Department of Visual System Analysis; University of Amsterdam
Institute for Neural Computation; UC San Diego
Department of Psychology, University of Iowa
Department of Cognitive Science; UC San Diego

**2001**
Department of Psychology; Vrije University, Netherlands
Salk Institute; UC San Diego

**2004**
Department of Psychology, University of Puget Sound
Center for Mammalian Genetics, University of Oregon
Symposium Speaker, International Conference on Working Memory; Kyoto, Japan
Brain Sciences Institute; RIKEN, Saitama, Japan
Symposium Speaker, Psychonomics Society; Minneapolis, MN

**2005**
Brain & Cognitive Sciences department; MIT
Computational & Neural Systems Department; Boston University

**2006**
Colloquium Speaker, Oregon Health Sciences University
Department of Psychology; Vrije University, Netherlands
Department of Psychology; Johns Hopkins University

**2007**
Individual Differences in Vision Symposium; Vision Sciences Society, Sarasota, Fl
Department of Cognitive Psychology; Leiden University, Netherlands
Attentional Binding Symposium; Endo Neuro Pscyho meeting; Doorwerth, Netherlands
Master Lecture; Royal Dutch Academy of Sciences; Amsterdam, Netherlands
Colloquium Speaker; Psychology Department; North Dakota State University
New Frontiers in Brain Sciences; Picower Center for Learning & Memory; MIT

**2008**
Symposium Speaker; University of Copenhagen; Denmark
Symposium Speaker; Cognitive Neuroscience Society; San Francisco, CA
Keynote Speaker; Binding in Working Memory meeting; Bristol, UK
Keynote Speaker; European Society of Working Memory; Bristol, UK
Symposium Speaker; International Congress of Psychology; Berlin, Germany
Colloquium Speaker; Department of Psychology; University of Toronto

**2009**
Colloquium Speaker; Department of Psychology; UC Berkeley
Colloquium Speaker; Department of Psychology; Harvard University
Colloquium Speaker; Picower Institute; Massachusetts Institute of Technology
Colloquium Speaker; Department of Opthalmology; Harvard Medical School
Symposium Speaker; Summer Institute in Cognitive Neuroscience; Santa Barbara, CA
Colloquium Speaker; Center for Mind and Brain; UC Davis

**2010**
Colloquium Speaker; Center for Integrative Cognitive Neuroscience; Vanderbilt University
Keynote Speaker; European Workshop on Imagery and Cognition; Helsinki, Finland
Invited Speaker; Gordon Research Conference on Neurobiology of Cognition; New Hampshire

**2011**
Colloquium Speaker; Department of Psychology; Johns Hopkins University

**2013**
Colloquium Speaker; Department of Psychology; Northwestern University
Colloquium Speaker; Cognitive and Neural Systems; UC San Diego
Keynote Speaker; School of Psychology; Southwestern University; Chongqing, China
Colloquium Speaker; Department of Psychology; University of Miami

**2014**
Colloquium speaker; Department of Psychology; University of Chicago
Colloquium speaker; Department of Psychology; Michigan State University
Invited Speaker; International Conference on Working Memory; Cambridge UK

**2015**
Keynote speaker; XIII International Magdeburg Conferences on Learning & Memory; Magdeburg, Germany
Symposium Speaker; Psychonomics Society; Chicago, IL
Colloquium Speaker; Department of Psychology; University of Illinois, Urbana-Champaign

**2016**
Colloquium Speaker; Department of Psychology; University of Wisconsin, Milwaukee
Colloquium Speaker; Department of Psychology; University of Notre Dame
Symposium Speaker; Office of Naval Research; Arlington, VA

**2017**
Symposium Speaker; Winter Conference on Neuroplasticity; St. Georges, Grenada
Symposium Speaker; "Attentional lapses"; Cognitive Neuroscience Society, San Francisco, CA
Invited Speaker; Kavli Institute for Systems Neuroscience; Trondheim, Norway

**2018**
Colloquium Speaker; University of Miami; Miami, Florida.
Colloquium Speaker; Florida Atlantic University; Boca Raton, Florida
Colloquium Speaker; University of Colorado, Boulder.
Helmholtz lecture; Utrecht University, Netherlands.

*Conference Presentations*
Available upon request

*Selected Extramural Activities / Community Service*
**Volunteer teacher**, Summer Academy to Inspire Learning (SAIL) 2007-2013

**Consultant and Expert Witness in judicial proceedings**:
*Distracted Driving*
2010 Howell vs. Boyle & The City of Beaverton; US District Court case #CV08-727KI
2012 Burrows vs. Fisher Communications, Inc; Multnomah County Circuit Court case #1111-14356
2013 Peralta vs. Washington State Police; US District Court
2016 Battenfield vs Wildish Inc.; US District Court
*Eyewitness testimony*
2013 State vs Demetrius Brown; Multnomah County Circuit Court case #120632681