

# Rachel Sarah Herz

## Work Address

89 Waterman Street  
Brown University  
Providence, RI 02912  
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## Home Address

226 Highland Ave,  
Warwick, RI 02885  
401-885-3994 (Home)  
401-300-2545 (Cell)

**Citizenship:** American and Canadian

**Languages:** English and French

## Education

<i>Institution</i>	<i>Degree</i>	<i>Year</i>	<i>Field</i>
Queen's University	B.A. Honors	1985	Psychology
University of Toronto	M.A.	1987	Psychology
University of Toronto	Ph.D.	1992	Psychology

## Postgraduate Training

1992-1994 NSERC post-doctoral fellow (Psychology), University of British Columbia, Canada

## Faculty Appointments

1994-2000 Assistant Member, Monell Chemical Senses Center, Philadelphia, PA  
2000-2005 Visiting Professor, Department of Psychology, Brown University  
2004-present Faculty, Sleep and Chronobiology Summer Behavioral Sciences Research Apprenticeship Program, E.P. Bradley Sleep and Chronobiology Research Lab, Warren Alpert Medical School of Brown University  
2005-present Visiting Professor, Department of Psychiatry and Human Behavior, Warren Alpert Medical School of Brown University

## Awards and Honors

1989-1991 Ontario Graduate Student Scholarship  
1991-1992 Life Sciences Graduate Degree Completion Award  
1992-1994 NSERC Post-Doctoral Fellowship  
1994 Ajinomoto USA Inaugural Award to Promising Young Scientists in the Chemical Senses  
1998-2000 Morley R. Kare Fellow, Monell Chemical Senses Center  
2002 Moskowitz Jacobs Award for Research Excellence in the Psychophysics of Taste and Smell  
2004- Member of the Society of Sigma Xi  
2004-2010 Distinguished Lecturer, Institute of Food Technologists

## RESEARCH INTERESTS

- **Olfaction: Cognition, Perception, Emotion and Behavior**
  - Language and Context Effects
  - Sex Differences and Social and Sexual Attraction

Techniques include: cognitive-behavioral manipulations, psychophysics, neuroimaging.

## PUBLICATIONS

### *Peer Reviewed Articles*

- Beninger, R.J., & Herz, R.S. (1986). Pimozide blocks establishment but not expression of cocaine-produced environment-specific conditioning. *Life Sciences*, 38, 1425-1431.
- Herz, R.S., & Beninger, R.J. (1987). Comparison of the ability of (+)-amphetamine and caffeine to produce environment-specific conditioning. *Psychopharmacology*, 92, 365-370.
- Sherry, D.F., Vaccarino, A.L., Buckenham, K., & Herz R.S. (1989). The hippocampal complex of food-storing birds. *Brain Behaviour and Evolution*, 34, 308-317.
- Cupchik, G.C., Winston, A., & Herz, R.S. (1992). Judgments of similarity and difference between paintings. *Visual Arts Research*, 18, 36-49.
- Herz, R.S., & Cupchik, G.C. (1992). An experimental characterization of odor-evoked memories in humans. *Chemical Senses*, 17, 519-528.
- Herz, R.S., & Cupchik, G.C. (1993). The effect of hedonic context on evaluations and experience of paintings. *Empirical Studies of the Arts*, 11, 147-166.
- Herz, R.S., Zanette, L., & Sherry, D.F. (1994). The role of visual cues for cache-recovery and spatial memory in the black-capped chickadee. *Animal Behaviour*, 48, 343-351.
- Herz, R.S., & Cupchik, G.C. (1995). The emotional distinctiveness of odor-evoked memories. *Chemical Senses*, 20, 517-528.
- Herz, R.S., & Engen, T. (1996). Odor memory: Review and analysis. *Psychonomic Bulletin and Review*, 3, 300-313.
- Herz, R.S. (1996). A comparison of olfactory, visual and tactile cues for emotional and non-emotional associated memories. *Chemical Senses*, 21, 614-615.
- Herz, R.S. (1997). Emotion experienced during encoding enhances odor retrieval cue effectiveness. *American Journal of Psychology*, 110, 489-505.
- Herz, R.S. (1997). The effects of cue distinctiveness on odor-based context dependent memory. *Memory & Cognition*, 25, 375-380.
- Herz, R.S. & Cahill, E. D. (1997). Differential use of sensory information in sexual behavior as a function of gender. *Human Nature*, 8, 275-286.
- Herz, R.S. (1998). Are odors the best cues to memory? A cross-modal comparison of associative memory stimuli. *Annals of the New York Academy of Sciences*, 855, 670-674.
- Herz, R.S. (1998). An examination of objective and subjective measures of experience associated to odors, music and paintings. *Empirical Studies of the Arts*, 16, 137-152.
- Herz, R.S. (1999). Caffeine effects on mood and memory. *Behaviour, Research and Therapy*, 37, 869-879.

- Epple, G. & Herz, R.S. (1999). Ambient odors associated to failure influence cognitive performance in children. *Developmental Psychobiology*, 35, 103-107.
- Herz, R.S., & von Clef, J. (1999). The influence of verbal labeling on the perception of ambiguous odors. *Chemical Senses*, 24, 599-600.
- Herz, R.S., McCall, C. & Cahill, L. (1999). Hemispheric lateralization in the processing of odor pleasantness versus odor names. *Chemical Senses*, 24, 691-695.
- Herz, R.S. (2000). Verbal coding in olfactory versus non-olfactory cognition. *Memory & Cognition*, 28, 957-964.
- Herz, R.S., & von Clef, J. (2001). The influence of verbal labeling on the perception of odors: Evidence for olfactory illusions? *Perception*, 30, 381-391.
- Herz, R.S., & Epple, G. (2001). The Success of our Failure-Induction Experimental Design: Response to Black. *Developmental Psychobiology*, 39, 149-150.
- Herz, R.S., & Schooler, J.W. (2002). A naturalistic study of autobiographical memories evoked to olfactory versus visual cues. *American Journal of Psychology*, 115, 21-32.
- Herz, R.S., & Inzlicht, M. (2002). Gender differences in response to physical and social signals involved in human mate selection: The importance of smell for women. *Evolution and Human Behavior*, 23, 359-364.
- Herz, R.S. & Beland, S.L. (2002). A test of odor associative learning. *Chemical Senses*, 27, 664.
- Herz, R.S. (2003). The effect of verbal context in olfactory perception. *Journal of Experimental Psychology: General*, 132, 595-606.
- Herz, R.S., Eliassen, J.C., Beland, S.L., & T. Souza. (2003). Neuroimaging evidence for the emotional potency of odor-evoked memory. *Neuropsychologia*, 42, 371-378.
- Carskadon, M., & Herz, R.S. (2004). Minimal olfactory perception during sleep: Why odor alarms will not work for humans. *Sleep*, 27, 402-405.
- Herz, R.S., (2004). A comparison of autobiographical memories triggered by olfactory, visual and auditory stimuli. *Chemical Senses*, 29, 217-224.
- Herz, R.S., Beland, S.L. & Hellerstein, M. (2004). Changing odor hedonic perception through emotional associations in humans. *International Journal of Comparative Psychology*, 17, 315-339.
- Herz, R.S., Schankler, C. & Beland, S. (2004). Olfaction, emotion and associative learning: Effects on motivated behavior. *Motivation and Emotion*, 28, 363-383.
- Herz, R.S. (2005). Odor-associative learning and emotion: Effects on perception and behavior. *Chemical Senses*, 30, i250-i251.
- Herz, R.S. (2009). Aromatherapy facts and fictions: A scientific analysis of olfactory effects on mood, physiology and behavior. *International Journal of Neuroscience*, 119, 263-290.
- Herz, R.S. (2009). Basic Processes in Human Olfactory Cognition: Current questions and future directions. *Annals of the New York Academy of Sciences*, 1170, 313-317.

Herz, R.S. (2010, in press). Trygg Engen. *American Psychologist*.

***Book Chapters and Invited Articles***

Herz, R.S., & Eich, E. (1995). Commentary and Envoi. In Crowder, R.G. & Schab, F.B. (Eds.), *Memory for Odors* (pp. 159-175). Hillsdale, New Jersey: Erlbaum.

Herz, R.S. (1996). The relationship between odor and emotion in memory. *The Aromachology Review*, 5, 1-8.

Epple, G. & Herz, R.S. (1998). The Smell of Failure. *The Aromachology Review*, 7, 1-7.

Herz, R.S. & Laneader, A. (1998). An evaluation of caffeine-induced mood and state-dependent memory effects. In L.S. Harris (Ed.), *NIDA Research Monograph Series*, 179 (p. 160). Bethesda, MD: NIH.

Herz, R.S. (1999). Differential importance of olfactory information in the human heterosexual response as a function of gender. In R.E. Johnson (Ed.), *Advances in Chemical Signals in Vertebrates* (pp. 373-382). New York: Plenum Publishing Corporation.

Herz, R.S. (1999). Olfaction and memory. *H&R Contact*, 77, 23-27.

Herz, R.S. (2000). Scents of Time. *The Sciences (July/August)*, 34-39.

Herz, R.S. (2001). Beliefs influence perception of natural and synthetic odors. *The Aromachology Review*, 9, 1-7.

Herz, R.S. (2001). How odor-evoked memories differ from other memory experiences: Experimental investigations into the Proustian phenomenon. In T. Lorig (Ed). *Compendium of Olfactory Research* (pp. 23-38). New York: Olfactory Research Fund, Ltd.

Herz, R.S. (2001). Ah, sweet skunk: Why we like or dislike what we smell. *Cerebrum*, Vol.3(4), 31-47.

Herz, R.S. (2002). Mood and cognitive performance during odor exposure. In C. Rouby, B. Schaal, D. Dubois, R. Gervais, & A. Holley (Eds.), *Olfaction, Taste and Cognition* (pp.160-177). New York: Cambridge University Press.

Herz, R.S. (2002, November). Do Scents Affect People's Moods or Work Performance? *Scientific American*.  
<http://www.scientificamerican.com/article.cfm?id=do-scents-affect-peoples>

Herz, R.S. (2003). Women's psychology of fragrance: A lifespan study.  
[http://www.senseofsmell.org/research\\_exchange/finalreports.php](http://www.senseofsmell.org/research_exchange/finalreports.php)

Herz, R.S. (2004). Where memory, emotion and olfaction meet. *Clinician's Research Digest*, 22 (4) April 2004, pg.4.

Herz, R.S. (2004). Scentsational memory. *The Scotch Malt Whiskey Society Newsletter*, 74, 6-9.

Herz, R.S. (2004). Lipsitt, Lewis, P: Sensory contributions to infant development. In C.B. Fisher & R.M. Lerner (Eds.), *Applied Developmental Science Encyclopedia* (pp. 666-671). Thousand Oaks, CA: Sage Publications, Inc.

Herz, R.S. (2005). The unique interaction between language and olfactory perception and cognition. *Trends in Experimental Psychology Research*. (pp. 91-109). New York: Nova Science

Publishers, Inc.

Herz, R.S. (2006). I know what I like: Understanding odor preferences. In J. Drobnick (Ed). *The Smell Culture Reader*. (pp. 190- 203). Oxford: Berg.

Herz, R.S. (in press). Civilized sensory rewards: Perfume. In J. Gottfried (Ed). *The Neurobiology of Sensation and Reward*. London: Taylor & Francis.

Herz, R.S. (in press). Aromatherapy. In B. Goldstein (Ed). *Encyclopedia of Perception*. Thousand Oaks, CA: Sage Reference Publications.

Herz, R.S. (in press). Fragrance and Perfume. In B. Goldstein (Ed). *Encyclopedia of Perception*. Thousand Oaks, CA: Sage Reference Publications.

Herz, R.S. (in press). The Emotional, Cognitive and Biological Basics of Olfaction: Implications and Considerations for Scent Marketing. In A. Krishna (Ed). *Sensory Marketing*. New York: Routledge Academic.

Herz, R.S. (in press). Odor evoked memory. In J. Decety & J. Cacioppo (Ed). *Handbook of Social Neuroscience*. New York: Oxford University Press.

### **TEXTBOOKS**

Wolfe, J.E., Kluender, K.R., Levi, D.M., Bartoshuk, L.M., Herz, R.S., Klatzky, R.L. & Lederman, S.J. (2006). *Sensation & Perception*. Sunderland, MA: Sinauer Associates, Inc.

Wolfe, J.E., Kluender, K.R., Levi, D.M., Bartoshuk, L.M., Herz, R.S., Klatzky, R.L. & Lederman, S.J. Merfeld, D. (2008). *Sensation & Perception, 2<sup>nd</sup> Ed*. Sunderland, MA: Sinauer Associates, Inc.

### **POPULAR SCIENCE BOOKS**

Herz, R. (2007). *The Scent of Desire: Discovering Our Enigmatic Sense of Smell*. New York: William Morrow/HarperCollins Publishers.

### **PATENTS**

Herz, R.S. (Published March 30, 2006). *System for Increasing Compliance with Medication Regime*.

Herz, R.S. & McCann, K. (Patent pending). *System for Correlating Smells and Flavors to Descriptive Language*.

### **EXHIBITIONS**

2001-2006 Brain: The World Inside Your Head: *Sensory Memory*. Opening venue: The Smithsonian Institution, Washington, DC, from July 2001-January 2002.

1999 *Olfactory Memory*. The Exploratorium Museum, San Francisco, CA.

### **INVITED LECTURES AND PRESENTATIONS**

#### ***Academia and Education***

Department of Psychology, University of Toronto, March, 1992.

Department of Psychology, University of British Columbia, December, 1993.

The European Chemoreception Organization, Blois, France, July, 1994.

The Addiction Research Foundation, Toronto, April, 1995.

Department of Psychology, University of Pennsylvania, April, 1996.

Department of Psychology, University of Toronto, March, 1997.

International Symposium on Olfaction and Taste, San Diego, July, 2000.  
Department of Psychology, University of Pittsburgh, November, 1997.  
Department of Psychology, Lafayette College, March, 1998.  
Department of Psychology, University of Pennsylvania, October, 1998.  
APS/NIDA Symposium: Motives for behavior: From neurobiological to cognitive perspectives. Denver, CO, June 1999.  
Department of Chemistry, University of Indiana, November, 1999.  
Department of Psychology, Brown University, February 2000.  
International Symposium on Olfaction and Taste, Brighton, England, July, 2000.  
Department of Psychology, Connecticut College, October, 2000.  
Brain Science and Behavior Mentoring Program, Department of Psychology, Brown University, August, 2001.  
Swedish Government Sponsored Invited Guest Lectureship, University of Stockholm, University of Uppsala, Sweden, August 2001.  
Food Update Annual Meeting: Olfactory Cognition: Effects on Mood, Behavior and Memory. Key Biscayne, FL, April 2002.  
Chemical Senses: Molecules to Perception School and Conference: Odor-associative learning and memory. Trieste, Italy, May 2002.  
APS Invited Symposium, *Chair*: Cognitive and Perceptual Issues in Olfaction and Flavor. New Orleans, LA. June, 2002.  
Society of Flavor Chemists, Annual Meeting, *after dinner speaker*: Odor + Emotion = Effects on Perception, Cognition and Behavior. Newark, NJ, February 2004.  
International Symposium on Olfaction and Taste, Kyoto, Japan, July 2004.  
McMaster University, Psychology Department Colloquium, February 3, 2005  
Brandeis University, Psychology Department Colloquium, March 10, 2005  
Society of Cosmetic Chemists, New Jersey Chapter Annual Meeting Invited Speaker, October 5, 2005.  
University of Florida, Center for Smell and Taste Seminar, Gainesville, Florida, November 3, 2005.  
AChemS Invited Symposium, Sarasota, Florida, April 27, 2006.  
Carolinas Psychology Conference, Keynote Speaker, Raleigh, North Carolina, March 31, 2007.  
NYC Arts in Education Roundtable: "What is Creativity?" Lincoln Center, New York City, June 10, 2008.  
Sensory Marketing Conference, Keynote Speaker, University of Michigan, Ann Arbor, Michigan, June 20, 2008.  
International Symposium on Olfaction and Taste, San Francisco, California, July 2008.  
Brown University, Parents/Family Weekend Special Lecture, October 25, 2008.  
University of Montreal, Haute Etudes Comerciales: Scent Marketing Colloquium, October 30, 2008.  
Culturgest: Lisbon, Portugal, November 13, 2008.  
Fahrenheit 212, New York City: "Genius Lunch" Guest Speaker: March 12, 2009.  
Columbia University, School of Architecture, "Preservation in Abstraction Roundtable": March 30, 2009.  
Florida International University, Psychology Department Colloquium, April 16, 2009.  
Brown University: Women & Men of Brown University Special Lecture, April 30, 2009.  
Brown University: Staff Development Day Special Course, June 4, 2009.

***Printed Press Interviews: Partial Listing***

A special profile in *Scientific American* (11/1999) and multiple interviews for: The New York Times, Time Magazine, US News & World Report, The Economist, New Scientist, U.S.A Today, The Washington Post, The LA Times, The London Times, The American Psychology Association Monitor, The Financial Times (London), The Scientist, Oprah Magazine, The New Yorker, Psychology Today.

***Television and Radio Interviews: Partial Listing***

Numerous interviews, including for: CBC, “The Science of the Senses”, @Discovery.ca (The Discovery Channel, Canada), The Discovery Channel USA, ABC Discovery News, ABC News, The BBC, National Geographic, NBC Nightly news, Korean Public Broadcasting, ABC “The Chronicle”, FOX News, National Public Radio, CBS “The Early Show”.

## **FUNDING**

### ***Research Grants Received: Principal Investigator***

- 1995-1996 Olfactory Research Fund: "The emotional distinctiveness of odor-evoked memories." (\$35,000)
- 1996-1997 Olfactory Research Fund: "The emotional quality and accuracy of memories associated to olfactory versus musical stimuli." (\$35,000)
- 1996-1997 NIH/NIDA, B/START: “Caffeine state-dependent memory: Relation to dose & mood.” (\$60,000)
- 1998-2001 H & R Florasynth: “Mechanisms involved in the perception of odor pleasantness.” (\$95,000)
- 2001-2002 Oakland Innovation: “Olfactory emotional conditioning: Effects on perception and cognition.” (\$35,000)
- 2001-2002 Brown University Faculty Development Fund (\$1,500)
- 2001-2002 Brown University Magnetic Resonance Foundation/Itlleson Foundation: “An examination of the neural areas involved in emotional versus non-emotional olfactory and visual memory.” (\$10,000)
- 2003 Sense of Smell Institute: “Women’s psychology of fragrance through the life stages.” (\$15,000)
- 2003-2004 International Flavors and Fragrances: “Emotion and Olfactory Perception.” (\$15,000)

### ***Research Grants: Co-Investigator***

- 1997-1998 Olfactory Research Fund: Collaborator with Gisela Epple, Ph.D. "The influence of odor-evoked memories on child behavior.”
- 1997-1998 NIH/NIA Center Grant for CNLM, University of California, Irvine: Collaborator with Larry Cahill, Ph.D. “Emotional arousal, olfactory memory and the amygdala: Implications for understanding Alzheimer’s disease.”

## **MEMBERSHIPS IN PROFESSIONAL SOCIETIES**

Psychonomic Society (Member), Cognitive Neuroscience Society, Association for Chemoreception Sciences, Association for Psychological Science, Sigma Xi, The Weyland Collegium, International Academy of Digital Arts and Sciences.

## **PROFESSIONAL SERVICE**

***Ad hoc reviewer:*** American Journal of Psychology; Biological Psychology; Chemical Senses; Chemosensory Perception; Developmental Psychobiology; Journal of Experimental Psychology; Learning, Memory and Cognition; Journal of Sleep Research; Memory & Cognition; Neuropsychologia; Physiology and Behavior; Psychological Science, Perception.

**Chief Advisor** for the Sensory Memory exhibit at The Smithsonian Museum (2001-2002) and Olfactory Memory exhibit at the Exploratorium Museum in San Francisco (1999).

**Administrative:** Association for Chemoreception Sciences: Long Range Planning Committee (Executive Council) 2004-2007.  
Association for Chemoreception Sciences: Industry Liaison Committee, Awards Committee (2006-2008).

**Advisory Boards:** The Sense of Smell Institute, The Fragrance Foundation, AromaSys

## TEACHING AND MENTOR EXPERIENCE

### COURSES TAUGHT

#### *Brown University*

2000-2003 Elementary Psychology & Laboratory PY01  
Child Development PY81  
2006-2008 Olfaction and Human Behavior PY019  
2010- The Psychology of Aversion PY1520

#### *University of Pennsylvania*

1995-1999 Undergraduate Lab Seminar in Social Psychology, Co-led with Professor Paul Rozin

#### *University of British Columbia*

1993 Cognition and Perception

#### *University of Toronto*

1991 Developmental Psychology Laboratory

## TEACHING ASSISTANTSHIPS

#### *University of Toronto*

1986 Animal Behaviour Laboratory I  
1987 Introduction to Psychology  
Introduction to Learning  
Animal Behaviour Laboratory II  
1988 Introduction to Developmental Psychology  
Motivation and Emotion  
Aggression  
1989 Introduction to Developmental Psychology  
Introduction to Developmental Psychology  
Psycholinguistics  
1990 Introduction to Social Psychology  
Developmental Psychology Laboratory, Tutorial Leader and Teaching Assistant  
Introduction to Personality  
1991 Developmental Psychology Laboratory, Co-Instructor and Tutorial Leader  
Advanced Social Psychology

## MENTORING

#### *Brown University*

2000-2004 Ph.D. Candidates: Beth Kellerman, Theresa Lagman, Tracy Rupp  
2001-2002 Honors Students: Margaret Hellerstein, Corrente Schankler  
2000-2002 Research Assistants: Molly Morgan-Bove, Sophia Beland

***Monell Chemical Senses Center***

1995-1999 Mentor for minority high school and college students as research assistants in my laboratory. Mentor and supervisor for senior research assistants in my laboratory.

**ACADEMIC SERVICE**

***Brown University***

2002-2004 Sophomore Advisor

2001-2002 Psychology Department Colloquium Committee Chair

***Monell Chemical Senses Center***

1995 In-House Seminar Series Organizer

1996-1997 Sponsors Meeting Organizer

1998-1999 Personnel Committee

1995-1999 *Monell Center Psychology Journal Club*, led a bi-monthly psychology journal discussion group for faculty, post-docs, and students.

1999 IRB Committee and University of Pennsylvania Monell IRB representative.

**PUBLIC RECOGNITION**

-*Newsmakers: The People Behind Today's Headlines, 2008, Issue 1*. L. Avery (Ed). Thomson Gale.

-Celebrity Judge: National Rotten Sneakers Contest. Montpelier Vermont, March, 18, 2008.

-Celebrity Judge: National Rotten Sneakers Contest. Montpelier Vermont, March, 24, 2009.

-Wikipedia: [http://en.wikipedia.org/wiki/Rachel\\_Sarah\\_Herz](http://en.wikipedia.org/wiki/Rachel_Sarah_Herz)

**CONSULTING and PUBLIC RELATIONS**

***Corporate***

Unilever, International Flavors and Fragrances, Firmenich, Haarman & Reimer, AromaSys, McCormick Inc, Proctor & Gamble, Cadbury-Kraft, The Coca-Cola Company, The Kellogg Company, PepsiCo, Kao Corp Japan, Coty, Inc., Pfizer, Inc., Southern Wine & Spirits, Nikon.

***Educational and Medical/Research Organizations***

The Smithsonian Institutes, The Exploratorium Museum, The Franklin Institute, New Jersey Medical School, The Fragrance Foundation, The Sense of Smell Institute, The Institute of Food Technologists, Research Institute for Fragrance Materials.

**EXPERT WITNESS EXPERIENCE**

Various cases involving the perception of odors and loss of the sense of smell. Plaintiff and Defense.

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