

## Curriculum Vita

**John E. Hummel**

### *Current Position:*

Professor  
Department of Psychology  
University of Illinois, Urbana-Champaign

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### *Personal Record:*

Date of Birth:	May 30, 1964
Place of Birth:	Wilmington, Delaware
Citizenship:	U.S.A.

### *Education:*

Ph.D.	University of Minnesota, 1990 Minneapolis, MN Major: Experimental Psychology Minor: Cognitive Science
B.S.	Mary Washington College, 1986 Fredericksburg, Virginia Major: Psychology Magna Cum Laude, Phi Beta Kappa

### *Previous Positions:*

Professor, Department of Psychology, UCLA, July, 2001 - June, 2005.  
Associate Professor, Department of Psychology, UCLA, July, 1997 - June, 2001.  
Assistant Professor, Department of Psychology, UCLA, July, 1991 - June, 1997.  
Postdoctoral Fellow, Center for Psychophysical Investigation of Perceptual Representations,  
University of Minnesota, August, 1990 - July, 1991.

**Honors and Awards:**

Fellow, Association for Psychological Science, 2011  
Graduate Student Organization Award for Excellence in Teaching and Advising, University of Illinois Dept. of Psychology, 2010  
J. Arthur Woodward Graduate Mentoring Award, UCLA Dept. of Psychology, 2005  
Faculty Distinguished Teaching Award, UCLA Dept. of Psychology, 2000  
Distinguished Psychology Graduate in Residence, Mary Washington College, 1996  
UCLA Faculty Career Development Award, 1993  
National Science Foundation Graduate Fellowship, 1987-90  
Doctoral Dissertation Fellowship, University of Minnesota, 1990-1991  
Psychology Department Fellowship, University of Minnesota, July, 1990  
NICHD Traineeship, 1986-1987

**Publications:**

- Lin, T.-J., Anderson, R. C., Hummel, J. E., Jadallah, M., Miller, B. W., Nguyen-Jahiel, K., Morris, J. A., Kuo, L.-J., Kim, I.-H., Wu, X., & Dong, T. (in press). Children's use of analogy during collaborative reasoning. *Child Development*
- Kogut, P., Gordon, J., Morgenthaler, D., Hummel, J., Monroe, E., Goertzel, B., Ethan Trehwitt, E., & Whitake, E. (in press). Recognizing geospatial patterns with biologically-inspired relational reasoning. In *Second International Conference on Biologically Inspired Cognitive Architectures (BICA 2011)*.
- Biancaniello, P., Szumowski, T., Rosenbluth, D., Darvill, J., Hinerschitz, N., Hummel, J., & Mihalas, S. (in press). Towards a biologically-inspired model for relational mapping using spiking neurons. In *Second International Conference on Biologically Inspired Cognitive Architectures (BICA 2011)*.
- Hummel, J. E. (in press). Object recognition. In D. Reisberg (Ed.) *Oxford Handbook of Cognitive Psychology*. Oxford, UK: Oxford University Press.
- Doumas, L. A. A. & Hummel, J. E. (in press). Computational models of higher cognition. In K. J. Holyoak & R. G. Morrison (Eds.). *The Oxford handbook of thinking and reasoning*. Oxford, UK: Oxford University Press.
- Hummel, J. E. (2011). Getting symbols out of a neural architecture. *Connection Science*, 23, 109-118.
- Jung, W., & Hummel, J. E. (2011). Progressive alignment facilitates learning of deterministic but not probabilistic relational categories. In *Proceedings of the 33<sup>rd</sup> Annual Conference of the Cognitive Science Society*.
- Hummel, J. E. (2010). Symbolic vs. associative learning. *Cognitive Science*, 34, 958-965.
- Landy, D. H. & Hummel, J. E. (2010). Explanatory reasoning for inductive confidence. In *Proceedings of the 32<sup>nd</sup> Annual Conference of the Cognitive Science Society*.

- Doumas, L. A. A., & Hummel, J. E. (2010). A computational account of the development of the generalization of shape information. *Cognitive Science*, 34, 698 – 712.
- Jung, W., & Hummel, J. E. (2009). Learning probabilistic relational categories. In B. Kokinov, K. Holyoak and D. Gentner (Eds.) *New Frontiers in Analogy Research: Proceedings of the Second International Conference on Analogy*. Sofia, Bulgaria.
- Landy, D. H., & Hummel, J. E. (2009). Explanatory reasoning for inductive confidence. In B. Kokinov, K. Holyoak and D. Gentner (Eds.) *New Frontiers in Analogy Research: Proceedings of the Second International Conference on Analogy*. Sofia, Bulgaria.
- Hummel, J. E., & Landy, D. H. (2009). From analogy to explanation: Relaxing the 1:1 mapping constraint... Very carefully. In B. Kokinov, K. Holyoak & D. Gentner (Eds.) *New Frontiers in Analogy Research: Proceedings of the Second International Conference on Analogy*. Sofia, Bulgaria.
- Jung, W., & Hummel, J. E. (2009). Probabilistic relational categories are learnable as long as you don't know you're learning probabilistic relational categories. In *Proceedings of The 31st Annual Conference of the Cognitive Science Society*.
- Knowlton, B. J., McAuliffe, S. P., Coelho, C. J., & Hummel, J. E. (2009). Visual priming of inverted and rotated objects. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 35, 837-848.
- Taylor, E. G., & Hummel, J. E. (2009). Finding similarity in a model of relational reasoning. *Cognitive Systems Research*, 10, 229-239.
- Penn, D. C., Cheng, P. W., Holyoak, K. J., Hummel, J. E., & Povinelli, D. J. (2009). There's more to thinking than propositions. Commentary on Mitchell et al., "The propositional nature of human associative learning," *Behavioral and Brain Sciences*, 32, 221-223.
- Hummel, J. E., Landy, D. H., & Devnich, D. (2008). Toward a process model of explanation with implications for the type-token problem. In *Naturally Inspired AI: Papers from the AAAI Fall Symposium. Technical Report FS-08-06*, 79-86.
- Landy, D., Jones, E., & Hummel, J. E. (2008). Why spatial-numeric associations aren't evidence for a mental number line. *Proceedings of the 30th Annual Conference of the Cognitive Science Society*. Washington, D.C.
- Holyoak, K. J., & Hummel, J. E. (2008). No way to start a space program: Associationism as a launch pad for analogical reasoning. Commentary on R. Leech, D. Mareschal & R. P. Cooper, "Analogy as relational priming: A developmental and computational perspective on the origins of a complex skill." *Behavioral and Brain Sciences*, 31, 388-389.
- Doumas, L. A. A., Hummel, J. E., & Sandhofer, C. M. (2008). A theory of the discovery and predication of relational concepts. *Psychological Review*, 115, 1 - 43.

- Taylor, E. G., & Hummel, J. E. (2007). Perspectives on similarity from the LISA model. In *Proceedings of AnICA07* (an analogy workshop held in conjunction with the 25<sup>th</sup> Annual Meeting of the Cognitive Science Society).
- Doumas, L. A. A., & Hummel, J. E. (2007). A computational account of the development of the generalization of shape information. In *Proceedings of 29th Annual Conference of the Cognitive Science Society*.
- Thoma, V., Davidoff, J., & Hummel, J. E. (2007). Priming of plane-rotated objects depends on attention and view familiarity. *Visual Cognition*, *15*, 179-210.
- Doumas, L. A. A., Holyoak, K. J., & Hummel, J. E. (2006). The problem with using associations to carry binding information. *Behavioral and Brain Sciences*, *29*, 38-39.
- Doumas, L. A. A., Bassok, M., Guthormson, A., & Hummel, J. E. (2006). A theory of reflexive relational generalization. In *Proceedings of the 28th Annual Conference of the Cognitive Science Society*.
- Kittur, A., Holyoak, K. J., & Hummel, J. E. (2006). Using ideal observers in higher-order human category learning. In *Proceedings of the 28th Annual Conference of the Cognitive Science Society*.
- Kittur, A., Hummel, J. E., & Holyoak, K. J. (2006). Ideals aren't always typical: Dissociating goodness-of-exemplar from typicality judgments. In *Proceedings of the 28th Annual Conference of the Cognitive Science Society*.
- Green, C. B., & Hummel, J. E. (2006). Familiar interacting object pairs are perceptually grouped. *Journal of Experimental Psychology: Human Perception and Performance*, *32* (5), 1107-1119.
- Hummel, J. E., & Ross, B. H. (2006). Relating category coherence and analogy: Simulating category use with a model of relational reasoning. In *Proceedings of the 28th Annual Conference of the Cognitive Science Society*.
- Lu, H., Morrison, R., Hummel, J. E., & Holyoak, K. J. (2006). Role of gamma-band synchronization in priming of form discrimination for multi-object displays. *Journal of Experimental Psychology: Human Perception and Performance*, *32*, 610-617.
- Krawczyk, D. C., Holyoak, K. J., & Hummel, J. E. (2005). The one-to-one constraint in analogical mapping and inference. *Cognitive Science*, *29*, 29-38.
- Choplin, J. M., and Hummel, J. E. (2005). Comparison-induced decoy effects. *Memory and Cognition*, *33*, 332-343.
- Hummel, J. E., & Holyoak, K. J. (2005). Relational reasoning in a neurally-plausible cognitive architecture. *Current Directions in Psychological Science*, *14*, 153-157.

- Doumas, L. A. A., & Hummel, J. E. (2005). Approaches to modeling human mental representations: What works, what doesn't and why. In K. J. Holyoak and R. Morrison (Eds.). *The Cambridge handbook of thinking and reasoning*, 73-91. Cambridge, UK: Cambridge University Press.
- Doumas, L. A. A., & Hummel, J. E. (2005). A symbolic-connectionist model of relation discovery. In B. G. Bara, L. Barsalou, & M. Bucciarelli (Eds.), *Proceedings of the 27rd Annual Conference of the Cognitive Science Society*, 606-611. Mahwah, NJ: LEA.
- Green, C. & Hummel, J.E. (2005). Objects that work together may be perceptually grouped. In B.G. Bara, L. Barsalou, and M. Bucciarelli (Eds.): *Proceedings of the 27th Annual Meeting of the Cognitive Science Society*, (pp. 821-826). Mahwah, NJ: Erlbaum.
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- Doumas, L. A. A., & Hummel, J.E. (2004). Structure mapping and relational predication. In *Proceedings of the 26th Annual Conference of the Cognitive Science Society*, 333-338.
- Green, C., & Hummel, J.E. (2004). Functional interactions affect object detection in non-scene displays. In *Proceedings of the 26th Annual Conference of the Cognitive Science Society*, 488-493.
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- Morrison, R.G., Krawczyk, D.C., Holyoak, K.J., Hummel, J.E., Chow, T.W., Miller, B.L., & Knowlton. (2004). A neurocomputational model of analogical reasoning and its breakdown in Frontotemporal Lobar Degeneration. *Journal of Cognitive Neuroscience*, *16*, 260-271.
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- psychology of learning and motivation*, Vol 44. (pp. 201-223). San Diego: Academic Press.
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- Hummel, J. E. (2003). The complementary properties of holistic and analytic representations of object shape. In G. Rhodes & M. Peterson (Eds.), *Perception of faces, objects, and scenes: Analytic and holistic processes* (pp. 212-234). Westport, CT: Greenwood.
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- Hummel, J. E. (2000). Where view-based theories break down: The role of structure in shape perception and object recognition. In E. Dietrich & A. Markman (Eds.), *Cognitive dynamics: Conceptual change in humans and machines* (pp. 157 - 185). Mahwah, NJ: Erlbaum.
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- Kellman, P. J., Burke, T. & Hummel, J. E. (1999). Modeling perceptual learning of abstract invariants. *Proceedings of the 21st Annual Conference of the Cognitive Science Society* (pp. 264-269). Mahwah, NJ: Erlbaum.
- Hummel, J. E. (1999). Binding problem. In R. A. Wilson and F. C. Keil (Eds.), *The MIT Encyclopedia of the Cognitive Sciences* (pp. 85-86). Cambridge, MA: MIT Press.
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- Holyoak, K. J., & Hummel, J. E. (1998). Analogy in a physical symbol system. In K. J. Holyoak, D. Gentner, & B. Kokinov (Eds.), *Advances in analogy research: Integration of theory and data from the cognitive, computational, and neural sciences* (pp. 9-18). Sofia, Bulgaria: New Bulgarian University.

- Hummel, J. E., & Kellman, P. K. (1998). Finding the Pope in the pizza: Abstract invariants and cognitive constraints on perceptual learning. Commentary on P. Schyns, R. Goldstone, & J. Thibaut, The development of features in object concepts. *Behavioral and Brain Sciences*, *21*, 30.
- Stankiewicz, B. J., Hummel, J. E., & Cooper, E. E. (1998). The role of attention in priming for left-right reflections of object images: Evidence for a dual representation of object shape. *Journal of Experimental Psychology: Human Perception and Performance*, *24*, 732-744.
- Saiki, J., & Hummel, J. E. (1998). Connectedness and part-relation integration in shape category learning. *Memory & Cognition*, *26*, 1138 - 1156.
- Hummel, J. E., & Stankiewicz, B. J. (1998). Two roles for attention in shape perception: A structural description model of visual scrutiny. *Visual Cognition*, *5*, 49-79.
- Saiki, J. & Hummel, J. E. (1998). Connectedness and the integration of parts with relations in shape perception. *Journal of Experimental Psychology: Human Perception and Performance*, *24*, 227-251.
- Hummel, J. E., & Holyoak, K. J. (1997). Distributed representations of structure: A theory of analogical access and mapping. *Psychological Review*, *104*, 427-466. Reprinted in T. A. Polk & C. M. Siefert (Eds.) (2002), *Cognitive modeling*. Cambridge, MA: MIT Press.
- Hummel, J. E. (1997). Structure and binding in object perception. In J. W. Donahoe \* & V. P. Dorsel (Eds.), *Neural Network Approaches to Cognition: Biobehavioral Foundations*. Amsterdam, Netherlands: Elsevier Science Publishers.
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- Hummel, J. E. (1994). Reference frames and relations in computational models of object recognition. *Current Directions in Psychological Science*, 3, 111-116.
- Hummel, J. E., Melz, E. R., Thompson, J., & Holyoak, K. J. (1994). Mapping hierarchical structures with synchrony for binding: Preliminary investigations. In A. Ram & K. Eiselt (Eds.), *Proceedings of the 16th Annual Conference of the Cognitive Science Society* (pp. 433-438). Hillsdale, NJ: Erlbaum.
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- Hummel, J. E., & Biederman, I. (1992). Dynamic binding in a neural network for shape recognition. *Psychological Review*, 99, 480-517. Reprinted in T. A. Polk and C. M. Siefert (Eds.) (2002), *Cognitive modeling*. Cambridge, MA: MIT Press.
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- Biederman, I., Hummel, J. E., Gerhardstein, P. C., & Cooper, E. E. (1992). From image edges to geons to viewpoint invariant object models: A neural net implementation. *Applications of Artificial Intelligence X: Machine Vision and Robotics*, 1708, 570-578, SPIE Proceedings Series.

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- Fletcher, C. R., Hummel J. E., & Marsolek C. (1990). Causality and the allocation of attention during comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 16, 233-240.
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- Biederman, I., Blickle, T., Ju, G., Hilton, H., & Hummel, J. E. (1988). Empirical analyses and connectionist modeling of real-time human image understanding. *Proceedings of the 10th Annual Conference of the Cognitive Science Society* (pp 251-256). Hillsdale, NJ: Erlbaum.

***Presentations (partial list, up to 2003):***

- Morrison, R.G., Viskontas, I., & Hummel, J. (2003, April). *A computational account of working memory and inhibition changes in analogical reasoning during normal aging*. Poster accepted for presentation at the Cognitive Neuroscience Society Annual Meeting, New York, NY.
- Hummel, J. E.. (2002, February). Representations of shape for object recognition: Theory and evidence. Keynote Address delivered at the Annual Meeting of The Midwestern Psychological Association, Chicago, IL.
- Morrison, R.G., Hummel, J., & Holyoak, J. (2002, April). *A computational account of working memory and inhibition in analogical reasoning*. Poster presented at the Cognitive Neuroscience Society Annual Meeting, San Francisco, California.
- Hummel, J. E. (2000). Causes and effects of relational representations in vision. Paper presented at the workshop on *Representing Visual Structure*, at the meeting of Neural Information Processing Systems, Breckenridge, CO, December.
- Hummel, J. E. (2000). Two forms of binding in the visual representation of object shape: Theory and evidence. Paper presented at the symposium *Neural binding of space and time: Spatial and temporal mechanisms for feature-object binding*, Leipzig, Germany, March.
- Hummel, J. E. (1999). Variable-value independence and self-supervised learning in a symbolic neural net. Paper presented at the symposium, *Connectionism: What's Structure Got To Do*

- With It?*, organized by Gary Marcus, at the 1999 Meeting of the Cognitive Science Society, Vancouver, British Columbia, Canada, August.
- Hummel, J. E. (1999). Composing symbol structures in a neural network architecture. Paper presented at the symposium, *Representation: New Approaches to Old Problems*, organized by Eric Dietrich and Arthur Markman, at the 1999 Meeting of the Cognitive Science Society, Vancouver, British Columbia, Canada, August.
- Hummel, J.E., Waltz, J.A., Knowlton, B.J., & Holyoak, K.J. (1998). A symbolic-connectionist model of the impact of prefrontal damage on transitive reasoning. *Journal of Cognitive Neuroscience Supplement*, 10, 59.
- Hummel, J. E., & Holyoak, K. J. (1998). A process model of human transitive inference. Paper presented at the Workshop on Spatial Schemas in Abstract Thought, Munich, Germany, July.
- Holyoak, K. J., & Hummel, J. E. (1988). Analogy in a physical symbol system. Keynote paper presented at Advances in Analogy Research, Sofia, Bulgaria, July.
- Hummel, J. E., & Holyoak, K. J. (1998). A process model of human transitive inference. Paper presented at Advances in Analogy Research, Sofia, Bulgaria, July.
- Shyi, G. C. W, Goldstone, R. L., & Hummel, J. E. (1997). Computing representations for bound and unbound 3-D object matching. Paper presented at the 4rd Annual Meeting of Object Perception and Memory (OPAM). Philadelphia, PA, November.
- Palmer, E., Engel, S. A., Hummel, J. E. (1997). Behavioral aspect graphs: Measuring stable views of objects. Paper presented at the 4rd Annual Meeting of Object Perception and Memory (OPAM). Philadelphia, PA, November.
- Kubose, T, Holyoak, K. J., & Hummel, J. E. (1997). Control processes in analogical mapping: Tests of the LISA model. Poster presented at the 38th Annual Meeting of the Psychonomics Society. Philadelphia, PA, November.
- McAuliffe, S. P., Hummel, J. E. (1997). Judgments of visual similarity predict visual priming for objects. Poster presented at the 38th Annual Meeting of the Psychonomics Society. Philadelphia, PA, November.
- Kubose, T., Holyoak, K. J., & Hummel, J. E. (1997). Asymmetries in analogical mapping: A test of a process model. Poster presented at the 19th Annual Meeting of the Cognitive Science Society, Palo Alto, CA.
- Stankiewicz, B. J., & Hummel, J. E. (1997). A structural description model of entry- and subordinate-level object recognition. Paper presented at the Annual Meeting of The Association for Research in Vision and Ophthalmology. Fort Lauderdale, FL., May.
- McAuliffe, S. P., Hummel, J. E. (1996). Priming visual representations of object shape. Paper presented at the 3rd Annual Meeting of Object Perception and Memory (OPAM). Chicago, IL, November.
- McAuliffe, S. P., Hummel, J. E. (1996). Priming visual representations using a weight judgment task. Poster presented at the 37th Annual Meeting of the Psychonomics Society. Chicago, IL, November.
- Hummel, J. E., & Holyoak, K. J. (1996). LISA: A computational model of analogical inference and schema induction. Invited paper presented at the Internatioonal Congress of Psychology. Montreal, Quebec, Canada, August.
- Hummel, J. E., & Stankiewicz, B. J. (1996). Two roles for visual attention in shape perception: A structural description account of visual scrutiny. Invited paper presented at the Cognitive Neuroscience of Visual Attention. Munich, Germany, August.
- Saiki, J., & Hummel, J. E. (1996). Spatial relations are less orientation-sensitive in connected than separated parts. Talk presented at the Meeting of the American Psychological Society, San Francisco, CA, June. Recipient of the APS Student Research Award.

- Stankiewicz, B. J., McAuliffe, S. P., Hummel, J. E., & Palmer, E. M. (1996). Attention and priming for top-bottom reflections of object images. Poster presented at the Annual Meeting of The Association for Research in Vision and Ophthalmology. Fort Lauderdale, Fl., April.
- Hummel, J. E. (1996). Recent progress toward a hybrid theory of object recognition. Invited paper presented at the Smith-Kettlewell Mini-workshop on Object Recognition. San Francisco, January.
- Hummel, J. E. & Stankiewicz, B. J. (1995). Structural descriptions and coordinates: A hybrid theory of object recognition. Poster presented at the 36th Annual Meeting of the Psychonomic Society. Los Angeles, CA, November.
- Stankiewicz, B. J. & Hummel, J. E. (1995). The role of attention in scale-invariant visual priming. Paper presented at the 2nd Annual Meeting of Object Perception and Memory (OPAM). Los Angeles, CA, November.
- Saiki, J. & Hummel, J. E. (1995). Connectedness and the integration of parts with relations. Paper presented at the 2nd Annual Meeting of Object Perception and Memory (OPAM). Los Angeles, CA, November.
- Stankiewicz, B. J., Cooper, E. E., & Hummel, J. E. (1994). The role of attention in left-right reflectional invariance. Poster presented at the 35th Annual Meeting of the Psychonomic Society. St. Louis, MO, November.
- Biederman, I., & Hummel, J. E. (1994). Real-time shape recognition: Implications for temporal asynchrony as an account of the binding problem. Invited paper presented at a symposium on Temporal Coding in the Brain at the 17th Annual Meeting of the European Neuroscience Association. Vienna, Austria, Sept.
- Saiki, J., & Hummel, J. E. (1994). Connectedness facilitates the use of shape/spatial-relation conjunctions in object categorization. Poster presented at Sixth Annual Convention of American Psychological Society. Washington DC, July.
- Saiki, J., & Hummel, J. E. (1993). Selective processing of feature conjunctions in classification learning. Poster presented at the 34th Annual Meeting of the Psychonomic Society. Washington D.C., November.
- Stankiewicz, B. J., & Hummel, J. E. (1993). The role of contrastive properties in subordinate-level shape classification. Poster presented at the Annual Meeting of The Association for Research in Vision and Ophthalmology. Sarasota, Fl., May.
- Biederman, I., Gerhardstein, P. C., Cooper, E. E., Fiser, J., & Hummel, J. E. (1993). Recognition-by-Geons: Current progress and current challenges. Invited paper presented at the International Joint Conference on Artificial Intelligence, Savoie, France, September.
- Hummel, J. E., & Stankiewicz, B. J. (1992). Categorical attributes determine visual similarity even when recognition requires scrutiny. Poster presented at the 33rd Annual Meeting of the Psychonomic Society. St. Louis Missouri, November.
- Biederman, I., Hummel, J. E., Gerhardstein, P.C., & Cooper, E. E. (1992). From image edges to geons to viewpoint-invariant object models: A neural networks approach. Invited paper presented at the International Society for Optical Engineering, Conference on Intelligent Information Systems. Orlando, Fl., April.
- Hummel, J. E. (1991). Structural description and self organizing object classification. Invited paper presented at the NIPs Workshop on Self Organization and Unsupervised Learning in Vision. Vale, CO, December.
- Hummel, J. E., & Biederman, I. (1991). Binding by phase locked neural activity: Implications for a theory of visual attention. Paper presented at the Annual Meeting of The Association for Research in Vision and Ophthalmology. Sarasota, Fl., May.

- Hummel, J. E. & Biederman, I. (1990). Binding invariant shape descriptors for object recognition: A neural net implementation. Paper presented at the Twenty First Annual Meeting of the Psychonomics Society. New Orleans, Louisiana. November.
- Hummel, J. E., & Biederman, I. (1990). Binding invariant shape descriptors: A neural net architecture for structural description and object recognition. Invited Paper presented at the HFSP workshop on Object and Scene Perception. Leuven, Belgium, September.
- Biederman, I., Hummel, J. E., & Cooper, E. E. (1990). Human object recognition. Invited address presented at the *Conference on Visual Information Assimilation in Man and Machine*. Ann Arbor, Michigan, June.
- Biederman, I. & Hummel, J. E., (1990). Grounding mental symbols in object images. Invited paper presented at the Symbol Grounding Workshop at the Sixteenth Annual Meeting of the Society for Philosophy and Psychology, University of Maryland, College Park, MD. June.
- Hummel, J. E., & Biederman, I. (1990). A neural net implementation of Recognition-by-Components. Poster presented at the Annual Meeting of The Association for Research in Vision and Ophthalmology. Sarasota, Fl., May.
- Hummel, J. E., Biederman, I. Gerhardstein, P. C., & Hilton, H. J. (1988). A connectionist model of geon recognition. Paper presented at the Neural Architectures for Computer Vision Workshop at the Meetings of the Seventh National Conference on Artificial Intelligence. St. Paul, MN, August.

### ***Invited Colloquia and Talks:***

- Hummel, J. E. (2011). Two (not necessarily incompatible) models of explanation. Cognitive Brown Bag, University of Illinois, Urbana-Champaign.
- Hummel, J. E. (2010). The proper treatment of symbols in a neural architecture. Plenary address delivered at Compositional Connectionism II: Localist and Distributed Representations, a workshop held in conjunction with the 32<sup>nd</sup> Annual Conference of the Cognitive Science Society.
- Hummel, J. E. (2010). Some oddities regarding the learning, representation and use of relational categories. Aston University. June.
- Hummel, J. E. (2010). Visual working memory for spatial relations. Goldsmiths College, London, June.
- Hummel, J. E. (2009). Representations of shape for object recognition: Theory and evidence. Goldsmiths College, London, May.
- Hummel, J. E. (2009). Representations of shape for object recognition: Theory and evidence. Aston University, May.
- Hummel, J. E. (2009). Representations of shape for object recognition: Theory and evidence. University of Birmingham, May.
- Hummel, J. E. (2007). Representations of shape for object recognition: Theory and evidence. Visual Cognition and Human Performance Brown Bag, University of Illinois, Urbana-Champaign, September.
- Hummel, J. E. (2007). Some oddities regarding the learning, representation and use of relational categories. Purdue University, March.
- Hummel, J. E.. (2006). Learning and inference with schemas and analogies. University of Illinois, Urbana-Champaign.
- Hummel, J. E.. (2006). Dual representations for object recognition: Theory and evidence. University of Illinois, Urbana-Champaign.

- Hummel, J. E.. (2005). Some oddities regarding the learning, representation and use of relational categories. University of Illinois, Urbana-Champaign, December.
- Hummel, J. E.. (2005). Relational reasoning in a neurally-plausible cognitive architecture: An overview of the LISA project. UCLA Linguistics Department, March.
- Hummel, J. E.. (2004). Relational reasoning in a neurally-plausible cognitive architecture: An overview of the LISA project. University of Illinois, Urbana-Champaign, April.
- Hummel, J. E.. (2003). The proper treatment of symbols in a neural architecture: Part II. UCLA Brain Mapping Center, April.
- Hummel, J. E.. (2003). The proper treatment of symbols in a neural architecture. UCLA Brain Mapping Center, April.
- Hummel, J. E.. (2003). The proper treatment of symbols in a neural architecture. SUNY Binghamton, February.
- Hummel, J. E.. (2003). Representations of shape for object recognition: Theory and evidence. SUNY Binghamton, February.
- Hummel, J. E.. (2002). Representations of shape for object recognition: Theory and evidence. Indiana University, January.
- Hummel, J. E.. (2002). The proper treatment of symbols in a neural architecture. University of Illinois, January.
- Hummel, J. E.. (2001). The proper treatment of symbols in a neural architecture. Indiana University, September.
- Hummel, J. E.. (2001). The proper treatment of symbols in a neural architecture. Michigan State University, December.
- Hummel, J. E.. (2000). The proper treatment of symbols in a neural architecture. Cornell University, October 27. (Distinguished Speaker)
- Hummel, J. E. (2000). Representations of shape for object recognition: Theory and evidence. Cornell University, October 26.
- Hummel, J. E.. (2000). Learning and inference with schemas and analogies. University of Iowa, March 10. (Distinguished Speaker)
- Hummel, J. E.. (1999). Learning and inference with schemas and analogies. Indiana University, September 20. (Distinguished Speaker)
- Hummel, J. E. (1998). Representations of shape for object recognition: Theory and evidence. University of California, San Diego, October 15.
- Hummel, J. E. (1997). Representations of shape for object recognition: Theory and evidence. University of California, Berkeley, November 7.
- Hummel, J. E. (1997). Symbolic connectionism. University of California, Los Angeles, October 13.
- Hummel, J. E. (1997). Representations of shape for object recognition: Theory and evidence. Stanford University, Stanford, CA, May. (Distinguished Outside Speaker)
- Hummel, J. E. (1997). Learning and inference with schemas and analogies. Stanford University, Stanford, CA, May. (Distinguished Outside Speaker)
- Hummel, J. E. (1996). Object recognition: It's harder than you think. Invited paper presented at Mary Washington College as part of the 1996 Graduate in Residence. Fredericksburg, VA, September.
- Hummel, J. E. (1996). Neural network models of human object recognition. Computer Science Department, Harvey Mudd College, Pomona CA, April.
- Hummel, J. E. (1995). Recent progress toward a hybrid theory of object recognition. Department of Psychology, University of California, Los Angeles, Los Angeles, CA, October.

- Hummel, J. E. (1994). An architecture for rapid, hierarchical structural description of visual information. Department of Psychology, University of Southern California, October.
- Hummel, J. E. (1994). Dynamic binding and shape recognition in a neural network. Department of Psychology, University of Illinois, Urbana-Champaign, April.
- Hummel, J. E., & Saiki, J. (1993). A neural network for rapid unsupervised learning of object structural descriptions. Department of Psychology, University of California, Irvine, March.
- Hummel, J. E., & Stantiewicz, B. J. (1992). Visual representations mediating difficult shape classification. Department of Psychology, University of California, Los Angeles, Los Angeles, CA, November.
- Hummel, J. E. (1992). Dynamic binding and shape recognition in a neural network. Department of Cognitive and Neural Sciences, California Institute of Technology, April.
- Hummel, J. E. (1991). Parsing line drawings into volumetric parts for shape recognition. Cognitive Science Faculty Research Group, University of California, Los Angeles, Los Angeles, CA, October.
- Hummel, J. E. (1991). Problems in the representation of structure for vision. Department of Psychology, University of California, Los Angeles, Los Angeles, CA, September.
- Hummel, J. E. (1991). A neural network architecture for structural description and object recognition.  
Department of Psychology, University of California, Santa Barbara, Santa Barbara, CA, January.  
Center for Adaptive Systems, Boston University, Boston, MA, February.  
Department of Psychology, University of Michigan, Ann Arbor, MI, February.  
Vision Research Group, University of Michigan, Ann Arbor, MI, February.  
Department of Psychology, Ohio State University, Columbus, OH, February.  
Department of Psychology, University of Georgia, Athens, GA, February.  
Department of Psychology, University of California, Los Angeles, Los Angeles, CA., February.  
Department of Psychology, University of Utah, Salt Lake City, UT., February.  
Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology, Boston, MA., March.  
Department of Psychology, McGill University, Montreal, Quebec, March.  
Department of Psychology, Stanford University, Stanford, CA, March.
- Hummel, J. E. (1990). A neural network model of object recognition that solves the binding problem through temporal synchrony. Center for Research in Learning, Perception and Cognition, University of Minnesota, Minneapolis, MN, April.

**Grants:**

Great Computational Intelligence in the Formal Sciences via Analogical Reasoning. Co-Principal Investigator (Prof. Selmer Brinsjord, PI). January, 2012 – December, 2013. \$610,418 direct + indirect

Consultant for Lockheed Martin on an IRARPA-funded grant to develop a neurally-inspired Artificial Intelligence, January, 2011 - December, 2013. \$150,000 direct + indirect.

Adaptive Problem Solving and Decision Making in Complex and Changing Environments: The Role of Understanding and Explanation. Principal Investigator (Brian Ross, co-PI). AFOSR Grant FA9550-07-1-0147. May 1, 2007 – April 30, 2010. \$458,697 direct costs.

Scalable Instruction in Neuroinformatics at UCLA. Collaborator (Jackson Beatty, P.I.), National Institutes of Mental Health. July 1, 2000 - June 30, 2005. \$295,265 direct costs.

Progressive Alignment and Relational Learning. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 2003 - June, 2004. \$3,784.

Computational and Empirical Investigation of Relational Predication. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 2001 - June, 2002. Approx. \$3,000

Learning and Inference with Schemas and Analogies. Principal Investigator (Keith Holyoak, Co-P.I.), National Science Foundation Grant SBR-9729023. February 1, 1998 - January 31, 2001. \$171,279 direct costs.

HRL Laboratories (formerly Hughes Research Laboratories), Grant to investigate the representation and processing of structured information, especially in the domain of visualization and technology, January, 2000 - January 2001, \$10,000.

Type-token Individuation in Reasoning by Analogy. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 2000 - June, 2001. Approx. \$3,000

Modeling Perceptual Learning of Abstract Invariants. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 1999 - June, 2000. \$3,100.

Developing and Testing a Theory of Similarity. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 1998 - June, 1999. \$2,100.

Development of a Graphical Programming Platform for Teaching Neural Network Modeling. Internal Grant from the UCLA Office of Instructional Development, Chancellor's Committee on Instructional Improvement. July, 1997 - June, 1998. \$9,835.

Memory for Object Views. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 1997 - June, 1998. \$3,000.

Schema Induction in a Structure-Sensitive Connectionist Network. Principal Investigator (Keith Holyoak, Co-P.I.), National Science Foundation Grant SBR-9511504. August 15, 1995 - July 31, 1997. \$107,406 direct costs.

Attention and Visual Priming for Object Images. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 1996 - June, 1997. \$3,000.

Representing Spatial Relations in Memory. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 1995 - June, 1996. \$3,000.

Connectedness and Spatial Relations in Object Perception. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 1994 - June, 1995. \$3,202.

Career Development Award, UCLA Academic Senate. June, 1993.

Computer Facilities for Neural Network Modeling in the UCLA Undergraduate Cognitive Science Laboratory. Internal Grant from the UCLA Office of Instructional Development, Chancellor's Committee on Instructional Improvement. July 1, 1992. \$2,500.

Spatial Relations in Object Recognition. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 1993 - June, 1994. \$4,027.

Image Segmentation in a Neural Network. Internal Grant from the UCLA Academic Senate, Committee on Research. July, 1992 - June, 1993. \$3,000.

Apparent Motion and Perceptual Grouping. Internal Grant from the UCLA Academic Senate, Committee on Research. January, 1992 - June, 1992. \$2,900.

***Courses Taught:***

Perception and Illusion: Cognitive Science, Literature and Art  
Introduction to Cognitive Science  
Cognitive Psychology  
Cognitive Science Laboratory (Neural Networks)  
Cognitive Science Laboratory (Theory and Simulation)  
Graduate Seminars: Cognitive Architectures, Computational Vision, Neural Networks,  
Visuospatial Reasoning, Perceptual Learning  
Visual Information Processing

***Professional Societies:***

Association for Psychological Science, Fellow.  
Behavioral and Brain Sciences, Associate.  
Cognitive Science Society, Member.  
Psychonomic Society, Member.

***Editorial Activities:***

Editorial Board, *Psychological Science*, 2012 -  
Editorial board, *Psychological Review*, 1998-2005  
Editorial board, *Psychonomic Bulletin and Review*, 1998-2002  
Guest Editor for issues 2 and 3 of *Acta Psychologica*, 1999, vol. 102  
I have served as a reviewer for:  
*Attention and Performance, XVI*  
*Behavioral and Brain Sciences*  
*Cognition*  
*Cognitive Psychology*  
*Cognitive Science*  
*Current Directions in Psychological Science*  
*Current Psychology Letters: Behaviour, Brain & Cognition*  
*Handbook of Brain Theory and Neural Networks*  
*IEEE Transactions on Pattern Analysis and Machine Intelligence*  
*International Journal of Applied Mathematics and Computer Science*  
*Journal of Experimental Child Psychology*  
*Journal of Experimental Psychology: General*  
*Journal of Experimental Psychology: Human Perception and Performance*  
*Journal of Experimental Psychology: Learning, Memory and Cognition*  
*Journal of Mathematical Psychology*  
*Memory and Cognition*  
*Neural Computation*  
*Neural Networks*  
*Perception*  
*Perception and Psychophysics*  
*Psychological Bulletin*  
*Psychological Review*  
*Psychological Science*  
*Psychonomic Bulletin and Review*  
*Quarterly Journal of Experimental Psychology*  
*Science*  
*Air Force Office of Scientific Research*  
*National Science Foundation: Cognitive Psychological and Language Studies*  
*National Science Foundation: Economics*

***Administrative Activities (UCLA):***

Cognitive Area Chair, 1999-2001, 2002-2004  
Graduate Admissions Committee, 1992-1998  
Undergraduate Affairs Committee, 1992-1999  
Computer Use Committee, 1991-1999  
Cognitive Science Major Committee, 1991-1999  
Ad Hoc Personnel Review Committee, 1993, 1994, 1997, 1998, 1999, 2000, 2001, 2002  
Campus Ad Hoc Personnel Review Committee, 1999  
Merit Review Committee, 1994-1998  
Cognitive Search Committee, 1994, 1995  
Executive Committee, 1994-1996; 1999-2001

*Administrative Activities (UIUC):*

Tenure Committee, 2005  
Graduate Student Awards Committee, 2005 – 2006  
Graduate Curriculum Committee, 2006 –  
Advisory Alternate, 2006 –  
LAS Courses and Curricula Committee, 2007 –  
Academic Senate, 2007 - 2009

***Other Professional Activities:***

Member, NIH Study Section on Perception and Cognition, January 2006  
Organizer, *OPAM '95*, the 1995 meeting of Object Perception And Memory.

***References:***

Professor Irving Biederman  
William Keck Professor of  
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University of Southern California  
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Professor Patricia Cheng  
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