

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD
April, 2010

I. EDUCATIONAL AND PROFESSIONAL HISTORY

A. Institutions attended

Undergraduate Study

Millikin University, Decatur, Illinois, 1967-1971, Psychology & English Literature, B.A. in 1971.

Graduate Study

Loyola University, Chicago, Illinois, 1971-1973, Psychology: Perception & Psychophysics.

State University of New York, Buffalo, New York, 1973-1977, Experimental Psychology: Perception & Psychophysics, Ph.D. in 1978.

B. Professional and academic positions

Assistant Professor	1977-1983	Department of Psychology, The University of Iowa
Associate Research Scientist	1983-1993	Department of Radiology, The University of Iowa
Adjunct Associate Professor	1989-1993	Department of Radiology, The University of Iowa
Research Scientist	1993-1997	Department of Radiology, The University of Iowa
Adjunct Professor	1993-1997	Department of Radiology, The University of Iowa
Professor	1997-1999	Department of Radiology, The University of Iowa
Professor with Tenure	1999-Present	Department of Radiology, The University of Iowa

C. Honors, Awards, Recognition, Outstanding Achievements

Old Gold Summer Fellowships, 1978 and 1980.

The Stauffer Award of the Association of University Radiologists, 1987 - Best Clinical Article in *Investigative Radiology* in 1986: "Tentative diagnoses facilitate the detection of diverse lesions in chest radiographs" by **Berbaum KS**, Franken EA, Dorfman DD, Barloon T, Ell SR, Lu CC, Smith W, Abu-Yousef MM.

Certificate of Merit from American Roentgen Ray Society Meeting, San Diego, CA, 1989 for a paper "Political trends in vascular and interventional radiology: A randomized survey" by Smith TP, Cragg AH, **Berbaum KS**.

The Stauffer Award of the Association of University Radiologists, 1999 - Best Basic Science Article in *Academic Radiology* in 1998: "Monte Carlo validation of a multireader method for receiver operating characteristic discrete rating data – Factorial experimental design" by Dorfman DD, **Berbaum KS**, Lenth RV, Chen Y-F, Donaghy B.

II. **TEACHING**

A. Teaching assignments on semester by semester basis

During my appointment as assistant professor in psychology at the University of Iowa (1977-1983), I taught six different undergraduate courses and two different graduate courses on perception, memory, decision making, problem solving and artificial intelligence. Undergraduate courses included: Cognitive Psychology (12 semesters), Learning Memory and Conceptual Processes (2 semesters), Experimental Psychology (1 semester), Psychology of Thinking (1 semester), Perception (1 semester), and Artificial Intelligence (1 semester). Graduate courses included: Perception and Psychophysics (3 semesters), Computer Simulation of Psychological Processes (3 semesters). During this time, my teaching skills improved to the point where I routinely was rated excellent using SPOT rankings and other measures.

My current teaching responsibilities are primarily in the area of research design and statistical analysis and directed towards faculty, fellows, residents, medical students, and graduate students in other departments. This typically involves one-on-one teaching of basic research principles as applied to specific research problems. My teaching role grew out of a need in radiology for someone with knowledge of experimental design and statistical analysis appropriate for evaluation of diagnostic performance of imaging methodologies. A teacher was needed who combined backgrounds in psychophysical methodology, applied statistics and radiology research.

B. Students supervised

While in the Department of Psychology, I chaired the Ph.D. thesis committees of two doctoral students in psychology (Lenel, 1981; Chung 1983). Further, I served on six masters committees (Herring, 1979; Ims, 1979; Yurko, 1979; Williams, 1978; Caplan, 1978; Hutz, 1979) and eight Ph.D. committees (Dunlap, 1980; Stelmachowicz, 1980 [speech pathology]; Forest, 1982 [speech pathology]; Ims, 1980; Lenel, 1981; Herring, 1981; Nemmers, 1982; Chung, 1983). During those years, I spent approximately 100 hours a year in undergraduate and graduate psychology student career counseling.

My supervision of research projects by fourth-year medical students over the years has been helpful in finding them residencies (Marley, 1990; Meis, 1991; Anderson, 1991; Kuehn, 1992;

Lueben, 1992; Kannam, 1993; Kreinbring, 1994; Yang, 1996). One measure of the success of this supervision is that each of these projects has led to a publication.

During their third year, radiology residents are required to complete a research project as part of their training with a faculty mentor. Virtually all of these projects require assistance in design and analysis. Over the years, I have worked closely with approximately 100 radiology residents on these and other research projects. Each project requires between five to forty hours of consultation.

More extensive consultation has been required for faculty research projects. Each year, I provide individual consultation to a number of faculty members. This has required between five to eighty hours per project. I served on a Ph.D. committee in the Department of Electrical and Computer Engineering (Alford, 1996).

This type of one-on-one teaching is very effective because I can teach the basic concepts of experimental design and statistical analysis in the context of the student's, resident's or faculty's own medical research project. For me, this is very satisfying work: it provides a chance to teach fundamental concepts to a receptive audience and at the same time see interesting and important research projects come to well-formed conclusions.

C. Other contributions to institutional programs

I have given faculty teaching conferences and grand rounds in Radiology and Pathology on a number of topics, including research design and statistics, medical pattern recognition, applying for NIH grants, ROC curve analysis and other methods of technology evaluation. I participate in teaching Health Informatics I (021:266 Library & Information Science, 096:283 College of Nursing, 06K:225 Management Science, 056:287 Industrial Engineering 050:283 College of Medicine) which uses web-accessible multimedia learning materials. The lectures given for this course address issues introduced by a reading assignment from:

Berbaum KS, Madsen M, Dorfman DD: Physical and Psychophysical Measurement of Images. (Chapter 9) In Hendee WR, Wells P (Eds), *The Perception of Visual Information*, Springer Verlag, 1993:232-273. (The second edition of this book is currently in press.)

The expertise I bring to this course and future courses I may develop is in evaluating diagnostic performance of imaging modalities and diagnostic tests. My research on perceptual factors in radiological interpretation and psychophysical methods for evaluation of diagnostic systems uniquely qualifies me to teach this topic.

My curriculum vitae lists the following publications concerning teaching [14, 16, 18, 20, 24, 34, 59, 106, 110, 141, 141], five of which concern prediction and measurement of resident diagnostic performance.

Although my current classroom teaching is not extensive, I have been fortunate to have well-funded research. At least half of my effort has been funded through grants for the last 20 years, and 75% of my effort funded for the last 13 years on externally funded grants, mostly from the NIH. My research will be supported at this level for at least the next four years. In the past, this percentage of salary coverage through external sources was considered outstanding, but there now seems increased emphasis on even greater coverage. I intend to respond to this challenge. If successful, this may further limit my availability for teaching. Be that as it may, I am considering expanding my teaching role by developing a series of lectures on Medical Decision Making which would be given to new residents as part of their introductory training.

III. SCHOLARSHIP

A. Publications or creative works (least to most recent)

Peer-reviewed papers

1. Weisstein N, Harris CS, **Berbaum K**, Tangney J, and Williams A: Contrast reduction by small localized stimuli: Extensive spatial spread of above-threshold orientation-selective masking. *Vision Research* 1977;17:341-350.
2. Weisstein N, Maguire W, and **Berbaum K**: A phantom motion after effect. *Science* 1977;198:955-959.
3. Tangney J, Weisstein N, and **Berbaum K**: Masking independent of both separation and spatial frequency. *Vision Research* 1979;19:817-823.
4. **Berbaum K**, Lenel JC, and Rosenbaum M: Dimensions of figural identity and apparent motion. *Journal of Experimental Psychology* 1981;7:1312-1317.
5. **Berbaum K**, Chung CS: Perceptive field sizes and a new version of Hermann grid. *Perception* 1981;10:95-89. (abstracted by invitation in *Ophthalmic Literature*).
6. **Berbaum K**, Chung CS: Muller-Lyer illusion induced by imagination. *Journal of Mental Imagery* 1981;5:125-128.
7. **Berbaum K**, Tharp D, and Mroczek K: Depth perception of surfaces in pictures. *Perception* 1983; 12:5-20. (lead article)
8. **Berbaum K**, Lenel JC: Objects in the path of apparent motion. *American Journal of Psychology* 1983;96:491-501.
9. **Berbaum K**, Bever T, Chung CS: Light source position in the perception of object shape. *Perception* 1983;12:411-416.
10. **Berbaum K**: Reducing popping into view of objects and detail in area-of-interest displays. *Information Display* 8-10, January 1984.
11. Chung CS, **Berbaum K**: Form and depth in global stereopsis. *Journal of Experimental Psychology* 1984;10:258-275.
12. **Berbaum K**, Bever T, and Chung CS: Extending the perception of shape from known to unknown shading. *Perception* 1984;13:479-488.
13. Lenel JC, **Berbaum K**: Measures of displacement and type of background in apparent motion with random dot cinematograms. *American Journal of Psychology* 1984;97:563-582.
14. Smoker WRK, **Berbaum K**, Luebke NH, Jacoby CG: Spatial perception testing in diagnostic radiology. *American Journal of Roentgenology* 1984;143:1105-1109. (Abstracted by invitation in *1986 Yearbook in Radiology*. David G. Bragg and J.A. Sorenson (ed), Yearbook Medical Publishers, Inc., Chicago. 1986:573-574.)
15. Eltoft DA, Aylward PE, Collins SM, Skorton DJ, Noel NP, Knusp BN, **Berbaum K**, Taylor AL, Kerber RE: Real-time image enhancement in two-dimensional echocardiography. In *Computers in Cardiology*, Los Angeles, IEEE Computer Society, 1984.
16. **Berbaum K**, Franken EA, Smith W: The effect of comparison films upon resident interpretation of pediatric chest radiographs. *Investigative Radiology* 1985;20:124-128.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 5

17. Simon J, Paullin CH, Overmyer S, **Berbaum K**: Reaction time to word meaning and ink color of laterally-presented Stroop stimuli: effects of handedness and sex. *International Journal of Neuroscience* 1985;28:21-33.
18. **Berbaum K**, Smoker WRK, Smith WL: Measurement and prediction of diagnostic performance during radiology residence. *American Journal of Roentgenology* 1985;145:1305-1311.
19. Dorfman DD, **Berbaum K**: RSCORE-J: Pooled rating method data: A computer program for analyzing pooled ROC curves. *Behavioral Research Methods and Instrumentation* 1986;18:452-462.
20. Smith WL, **Berbaum K**, Franken EA, Ell S: Comparison of lecture and case presentation formats for teaching radiology to residents. *Investigative Radiology* 1986;21:285-286.
21. **Berbaum K**, Chung CS, Loke W: Improved localization of moving targets with prior knowledge of direction of target motion. *American Journal of Psychology* 1986;99:509-514.
22. **Berbaum KS**, Franken EA, Dorfman DD, Barloon T, Ell SR, Lu CC, Smith W, Abu-Yousef MM: Tentative diagnoses facilitate the detection of diverse lesions in chest radiographs. *Investigative Radiology* 1986;21:532-539. (Stauffer Award Article, 1987); (Abstracted by invitation in the *1988 Yearbook in Radiology*. D.G. Bragg and W. R. Hendee, (eds). Yearbook Medical Publishers, Inc., Chicago, 1988: 472-473.)
23. Franken EA, **Berbaum KS**, Dunn V, Smith WL, Ehrhardt JC, Levitz GS, Breckenridge RE: Impact of MR imaging on clinical diagnosis and management: A prospective study. *Radiology* 1986;161:377-380.
24. Tarico VS, Altmaier EM, Smith WL, Franken EA, **Berbaum KS**: Development and validation of an accomplishment interview for radiology residents. *Journal of Medical Education* 1986;61:845-847.
25. Kennedy RS, **Berbaum KS**, Williams MC, Brannan J, Welch RB: Transfer of perceptual-motor training and the space adaptation syndrome. *Aviation, Space and Environmental Medicine* 1987;58:A29-33.
26. Conrad GR, Wesolowski CA, **Berbaum KS**, Jensen KC, Kirchner PT: Renal arteriovenous transit times of [Tc-99m] radiolabeled chelates. *Journal of Nuclear Medicine* 1987;28:1134-1143.
27. Simon JR, **Berbaum KS**: The effect of irrelevant information on retrieval for relevant information. *Acta Psychologica* 1987;67:33-57.
28. **Berbaum KS**, Franken EA, Dorfman DD, Barloon T: Influence of clinical history upon detection of nodules and other lesions. *Investigative Radiology* 1988;23:48-55, and:60-61.
29. Cragg AH, **Berbaum KS**, Smith TP: A prospective blinded trial of warm and cold lidocaine for intradermal injection. *American Journal of Roentgenology* 1988;150:1183-1184.
30. Kennedy RS, **Berbaum KS**, Collyer SC, May JG, Dunlap WP: Spatial requirements for visual simulation of aircraft at real-world distances. *Human Factors* 1988;30:153-161.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 6

31. Barloon TJ, Lu CC, Franken EA, Honda H, **Berbaum KS**: Small bowel enteroclysis survey. *Gastrointestinal Radiology* 1988;13:203-206.
32. Yuh WTC, Wiese JA, Abu-Yousef MM, Rezai K, Sato Y, **Berbaum KS**, Kao SCS, Hunsicker LG, Corry RJ: Pancreatic Transplant Imaging. *Radiology* 1988;167:679-683.
33. **Berbaum KS**, El-Khoury G, Franken EA, Kathol M, Montgomery W, Hesson W: The impact of clinical history on the detection of fractures. *Radiology* 1988;168:507-511.
34. **Berbaum K**, Platz CE: Perception testing in surgical pathology. *Human Pathology* 1988;19:1127-1131.
35. El-Khoury GYE, Larson RK, Kathol MH, **Berbaum KS**, Furst DE: Seronegative and seropositive rheumatoid arthritis: Radiologic differences. *Radiology* 1988;168:517-520.
36. Kennedy RS, Lilienthal MG, **Berbaum KS**, Baltzley DR, McCauley ME: Simulator sickness in U.S. Navy flight simulators. *Aviation, Space, and Environmental Medicine* 1989;60:10-16.
37. Baltzley DR, Kennedy RS, **Berbaum KS**, Lilienthal MG, Gower DW: The time course of postflight simulator sickness symptoms. *Aviation, Space, and Environmental Medicine* 1989;60:1043-8.
38. **Berbaum KS**, Dorfman DD, Franken EA: Measuring observer performance by ROC analysis: Indications and complications. *Investigative Radiology* 1989;24:228-233.
39. Smith TP, Cragg AH, **Berbaum KS**: Political trends in vascular and interventional radiology: A randomized survey. *Radiology* 1989;170:941-944.
40. Franken EA, Driscoll CE, **Berbaum KS**, Smith WL, Sato Y, Steinkraus LW, Kao SCS: Teleradiology for a family practice center. *Journal of the American Medical Association* 1989;261:3014-3015.
41. Hettinger LJ, **Berbaum KS**, Kennedy RS, Dunlap WP, Nolan MD: Vection and simulator sickness. *Military Psychology* 1990;2:171-181.
42. Simon JA, **Berbaum KS**: Effect of conflicting cues on information processing: The "Stroop Effect" vs the "Simon Effect". *Acta Psychologica* 1990;73:159-170.
43. **Berbaum KS**, Franken EA, Dorfman DD, Rooholamini SA, Kathol MH, Barloon TJ, Behlke FM, Sato Y, Lu CC, El-Khoury GY, Flickinger FW, Montgomery WJ: Satisfaction of search in diagnostic radiology. *Investigative Radiology* 1990;25:133-140.
44. **Berbaum KS**, Franken EA, El-Khoury GY: Impact of clinical history on radiographic detection of fractures: A comparison of radiologists and orthopedists. *American Journal of Roentgenology* 1989;153:1221-1224.
45. Barloon TJ, Yang CJC, **Berbaum KS**, Lu CC, Honda H: Plasma electrolyte status following enteroclysis in patients with partial small-bowel obstruction. *Investigative Radiology* 1989;24:616-618.
46. Barloon TJ, Brown RC, **Berbaum KS**: Current status of adult uroradiology: a survey of members of the society of uroradiology. *American Journal of Roentgenology* 1990;154:301-304.
47. Smith TP, Cragg AH, **Berbaum KS**, Ryals TJ, Sato Y: Prospective comparison of techniques for lower extremity angiography. *Radiology* 1990;174:951-955.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 7

48. Smith TP, Cragg AH, Landas SK, **Berbaum KS**: Plaque modification with tetracycline: Enhanced tissue ablation during excimer lasing. *Radiology* 1990;174:1009-1011.
49. Yuh WTC, Sato Y, Gray SD, Loes DJ, Kao SCS, **Berbaum KS**, Ryals TJ, Dolan KD: Magnetic resonance imaging and computed tomography in pediatric head and neck masses. *Annals of Otolaryngology, Rhinology, and Laryngology* 1991;100:54-62.
50. Franken EA, Smith WL, **Berbaum KS**, Owen D, Hilsenrath P: *Planning, expectation, and image evaluation for PACS at the University of Iowa Hospitals and Clinics*. Proceedings SPIE - The International Society for Optical Engineering, Medical Imaging IV: PACS System Design and Evaluation, 1990.
51. **Berbaum KS**, Franken EA Jr, Honda HH, McGuire C, Weis RR, Barloon T: Evaluation of a PACS workstation for assessment of body CT studies. *Journal of Computer Assisted Tomography* 1990;14:853-8. (Abstracted by invitation in the *1992 Yearbook in Radiology*. Maynard D, (ed). Mosby Year Book, Inc., Chicago, 1992.)
52. Kahn D, Argenyi EA, **Berbaum KS**, Rezai K: The incidence of serious hemodynamic changes in physically-limited patients following oral diapyridamole challenge before thallium-201 scintigraphy. *Clinical Nuclear Medicine* 1990;15:678-682.
53. Franken EA Jr, Smith WL, **Berbaum KS**, Kao SCS, Sato Y: Comparison of a PACS workstation with conventional film for interpretation of neonatal examinations: a paired comparison study. *Pediatric Radiology* 1991;21:336-340. (Abstracted by invitation in *The 1993 Yearbook in Diagnostic Radiology*. Federle MP, Clark RA, Gross BH, Madewell CD, Maynard CD, Sackett JF, Young LW (eds). Mosby, Inc., Chicago, 1993:604-605.)
54. Hilsenrath PE, Smith WL, **Berbaum KS**, Franken EA, Owen DA: The economics of PACS evaluation. *American Journal of Roentgenology* 1991;156:177-180.
55. Cragg AH, Smith TP, Corson J, Nakagawa N, Castaneda F, Kresowik T, Sharp J, Shamma A, **Berbaum KS**: Two urokinase dose regimens in native arterial and graft occlusions: Initial results of a prospective, randomized clinical trial. *Radiology* 1991;178:681-686.
56. Cragg AH, Nakagawa N, Smith TP, **Berbaum KS**: The effect of catheter size on hematoma formation after diagnostic angiography. *Journal of Vascular and Interventional Radiology* 1991;2:231-233.
57. **Berbaum KS**, Franken EA, Dorfman DD, Rooholamini S, Coffman CE, Cornell SH, Cragg AH, Galvin JR, Honda HH, Kao SCS, Kimball DA, Ryals TJ, Sickels WJ, Smith AP: Time-course of satisfaction of search. *Investigative Radiology* 1991;26:640-648.
58. Cragg AH, Smith TP, **Berbaum KS**, Nakagawa N: Randomized double blind trial of midazolam/placebo and midazolam/fentanyl for sedation and analgesia in lower-extremity angiography. *American Journal of Roentgenology* 1991;157:173-176.
59. Smith WL, **Berbaum KS**: Improving resident selection: Discrimination by perceptual abilities. *Investigative Radiology* 1991;26:910-912.
60. **Berbaum KS**, Kennedy RS, Hettinger LJ. Visual tasks in helicopter shipboard landing. *Applied Ergonomics* 1991;22:231-239.
61. Smith TP, Cragg AH, **Berbaum KS**, Nakagawa N: Comparison of the efficacy of digital subtraction and film-screen angiography of the lower limb: Prospective study in 50 patients. *American Journal of Roentgenology* 1992;158:431-436.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 8

62. Kennedy RS, Fowlkes JE, **Berbaum KS**, Lilienthal MG: Use of a motion sickness history questionnaire for prediction of simulator sickness. *Aviation, Space, and Environmental Medicine* 1992;63:588-593.
63. Renfrew DL, Franken EA Jr, **Berbaum KS**, Weigelt FH, Abu-Yousef MM: Error in radiology: Classification and lessons of 182 cases presented at a problem case conference. *Radiology* 1992;183:145-150.
64. Honda H, Coffman CE, **Berbaum KS**, Barloon TJ, Masuda K: CT analysis of metastatic neoplasms to the kidney: Comparison with primary renal cell carcinoma. *Acta Radiologica* 1992;33:39-44.
65. Avizonis VN, Hussey DH, Anderson KM, Jani SK, **Berbaum KS**: Three-dimensional viewing of and dosimetric calculations of Au-198 implants of the prostate. *Radiology* 1992;184:275-279.
66. Franken EA Jr, **Berbaum KS**, Marley SM, Smith WL, Sato Y: Evaluation of a PACS workstation for interpreting of neonatal examinations: An ROC study. *Investigative Radiology* 1992;27:732-737.
67. Dorfman DD, **Berbaum KS**, Metz CE: Receiver operating characteristic rating analysis: Generalization to the population of readers and patients with the jackknife method. *Investigative Radiology* 1992;27:723-731.
68. El-Khoury GY, Wira RL, **Berbaum KS**, Pope TL, Monu JUV: Magnetic resonance imaging of patellar tendinitis. *Radiology* 1992;184:849-854.
69. Bormann JL, Stanford W, Stenberg RG, Winniford MD, Galvin JR, **Berbaum KS**, Talman CL, Marcus ML: Ultrafast computed tomographic detection of coronary artery calcification as an indicator of stenosis. *American Journal of Cardiac Imaging* 1992;6:191-196.
70. Cragg AH, Stoll LL, Smith TP, **Berbaum KS**: Effect of antineoplastic agents on smooth muscle cell proliferation in vitro: implications for prevention of restenosis after transluminal angioplasty. *Journal of Vascular and Interventional Radiology* 1992;3:273-277.
71. Franken EA Jr, **Berbaum KS**, Smith WL, Chang P, Driscoll C, Bergus G: Teleradiology for consultation of practitioners and radiologists. *Annals of the New York Academy of Science* 1992;670:277-280.
72. **Berbaum KS**, Franken EA, Jr, Anderson KL, Dorfman DD, Erkonen WE, Farrar GP, Geraghty JJ, Gleason TJ, MacNaughton ME, Phillips ME, Renfrew DL, Walker CW, Whitten CG, Young DC: The influence of clinical history on visual search with single and multiple abnormalities. *Investigative Radiology* 1993;28:191-201.
73. Renfrew DL, Witte DL, **Berbaum KS**, Barloon TJ: Comparison of oral cholecystography and ultrasonography for the evaluation of chronic cholecystitis using patient outcome as the reference standard. *Investigative Radiology* 1993;28:404-408.
74. Harkins KL, Moore TE, Yuh WTC, Kathol MH, Hawes DR, El-Khoury GY, **Berbaum KS**: Gadolinium-enhanced MRI of soft tissue masses. *Australian Radiology* 1993;37:30-34.
75. Franken EA Jr, **Berbaum KS**, Lu CH, Kannam S, Dorfman DD, Warnock NG, Simonson TM, Pelsang RE: Satisfaction of search in detection of plain film abnormalities in abdominal contrast examinations. *Investigative Radiology* 1994;29:403-409.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 9

76. Barloon TJ, Lu CH, Honda HH, **Berbaum KS**: Does a normal small-bowel enteroclysis exclude small-bowel disease? A long-term follow-up of consecutive studies. *Abdominal Imaging* 1994;19:113-115.
77. White K, **Berbaum KS**, Smith WL: The role of previous radiographs and reports in the interpretation of current radiographs. *Investigative Radiology* 1994;29:263-265.
78. **Berbaum KS**, Franken EA Jr, Dorfman DD, Lueben K: Influence of clinical history on perception of abnormalities in pediatric radiographs. *Academic Radiology* 1994;1:217-223.
79. **Berbaum KS**, El-Khoury GY, Franken EA Jr, Kuehn DM, Meis DM, Dorfman DD, Warnock NG, Thompson BH, Kao SCS, Kathol MH: Missed fractures resulting from satisfaction of search effect. *Emergency Radiology* 1994;1:242-249.
80. Saltzman CL, Brandser EA, **Berbaum KS**, DeGnore L, Holmes JR, Katcherian DA, Teasdall RD, Alexander IJ. Reliability of standard foot radiographic measurements. *Foot & Ankle International* 1994;15:661-665.
81. Franken EA Jr., **Berbaum KS**. Evaluation of teleradiology for image interpretation. *Telemedicine Today* 1994;3:7-8
82. Aideyan UO, **Berbaum KS**, Smith WL: Influence of prior radiological information on the interpretation of radiological examinations. *Academic Radiology* 1995;2:205-208.
83. Dorfman DD, **Berbaum KS**, Lenth RV. Multi-reader multi-case ROC methodology: A bootstrap analysis. *Academic Radiology* 1995;2:626-633.
84. Dorfman DD, **Berbaum KS**. Degeneracy and discrete ROC rating data. *Academic Radiology* 1995;2:907-915.
85. Brown BP, Schrier JE, **Berbaum KS**, Shirazi S, Schulze-Delrieu: Haustral septations increase axial and radial distribution of luminal contents in glass models of the colon. *American Journal of Physiology* 1995;269:G706-G709.
86. Bergus GR, Franken EA Jr, Koch J, Smith WL, Evans ER, **Berbaum KS**: Radiologic interpretation by family physicians in an office practice setting. *The Journal of Family Practice* 1995;41:352-356.
87. Franken EA Jr., Bergus GR, Koch TJ, **Berbaum KS**, Smith WL: Added value of radiologist consultation to family practitioners in the outpatient setting. *Radiology* 1995;197:759-762.
88. Franken EA Jr, **Berbaum KS**, Smith WL, Chang PJ, Owen DA, Bergus GR: Teleradiology for rural hospitals: analysis of a field study. *Journal of Telemedicine and Telecare*. 1995;1:202-208.
89. Barloon TJ, Brown BP, Abu-Yousef MM, Warnock N, **Berbaum KS**: Sonography of acute appendicitis in pregnancy. *Abdominal Imaging* 1995;20:149-151.
90. Argenyi EE, Soffer EE, Madsen MT, **Berbaum K**, Walkner WO: Scintigraphic evaluation of small bowel transit in healthy subjects: inter- and intrasubject variability. *American Journal of Gastroenterology* 1995;90:938-42.
91. Saltzman CL, Brandser EA, Anderson CM, **Berbaum KS**, Brown TD: Coronal plane rotation of the first metatarsal. *Foot & Ankle International* 1996;17:157-61.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 10

92. Brandser EA, Riley MA, **Berbaum KS**, El Khoury GY, Bennett DL: MR imaging of anterior cruciate ligament injury: Independent value of primary and secondary signs. *American Journal of Roentgenology* 1996;167:121-6.
93. Warnock NG, Aragon G, Harris K, **Berbaum K**: Transcranial Doppler sonography in adults: Reference data for the color/duplex technique. *Journal of Vascular Investigation* 1996;2:34-40.
94. Franken EA Jr., **Berbaum KS**: Subspecialty radiology consultation by interactive telemedicine. *Journal of Telemedicine and Telecare* 1996;2:35-41.
95. **Berbaum KS**, Franken EA Jr., Dorfman DD, Miller EM, Krupinski EA, Kreinbring K, Caldwell RT, Lu CH: Cause of satisfaction of search effects in contrast studies of the abdomen. *Academic Radiology*, 1996;3:815-826.
96. DeAngelis GA, Dempsey B, Berr S, Fajardo LL, Sublett J, Hillman BJ, Weaver A, **Berbaum KS**, Dwyer SJ III: Diagnostic efficacy of compressed digitized real-time sonography of uterine fibroids. *Academic Radiology* 1997;4:83-89.
97. Dorfman DD, **Berbaum KS**, Metz CE, Lenth RV, Hanley JA, Abu-Dagga H: Proper receiver operating characteristic analysis: The bigamma model. *Academic Radiology* 1996;4:138-149.
98. Black CM, Lang EV, Kusnick CA, Siebes M, Barnhart W, **Berbaum KS**, Hoffman EA: Densitometric analysis of eccentric vascular stenosis: Comparison of CO₂ and iodinated contrast medium. *Academic Radiology* 1996;3:985-993. (1996 AUR Memorial Award)
99. Ely JW, **Berbaum KS**, Bergus GR, Thompson BH, Levy BT, Graber MA, Evans ER, Bedell DA, Fick DS: Diagnosing left lower lobe pneumonia: Usefulness of the 'spine sign' on lateral chest radiographs. *Journal of Family Practice* 1996;43:242-248.
100. Steffensmeier SJ, Saltzman CL, **Berbaum KS**, Brown TD: Effects of medial and lateral displacement calcaneal osteotomies on tibiotalar joint contact stresses. *Journal of Orthopaedic Research* 1996;14:980-985.
101. Yuh WT, Quets JP, Lee HI, Simonson TM, Michalson LS, Nguyen PT, Sato Y, Mayr NA, **Berbaum KS**: Anatomic distribution of metastases in the vertebral body and modes of hematogenous spread. *Spine* 1996;21:2243-50.
102. Franken EA Jr, **Berbaum KS**, Brandser EA, D'Alessandro MP, Schweiger GD, Smith WL: Pediatric radiology at a rural hospital: Value of teleradiology and subspecialty consultation. *American Journal of Roentgenology* 1997;168:1349-1352.
103. Kennedy RS, **Berbaum KS**, Lilienthal MG: Disorientation and postural ataxia following flight simulation. *Aviation, Space, and Environmental Medicine* 1997;68:13-17.
104. Franken EA Jr, Harkins KL, **Berbaum KS**: Teleradiology consultation for a rural hospital: Patterns of use. *Academic Radiology* 1997;4:492-496
105. **Berbaum KS**, Franken EA Jr, Dorfman DD, Miller EM, Caldwell R, Kuehn DM, Berbaum ML: Role of faulty visual search in the satisfaction of search effect in chest radiology. *Academic Radiology* 1998;5:9-19.
106. Lang EV, **Berbaum KS**: Educating interventional radiology personnel in nonpharmacologic analgesia: Effect on patients' pain perception. *Academic Radiology* 1997;4:753-757.

107. **Berbaum KS**, Smith WL: Use of reports of previous radiologic studies. *Academic Radiology* 1998;5:111-114.
108. Lang EV, Chen F, Fick LJ, **Berbaum KS**: Determinants of intravenous conscious sedation for arteriography. *Journal of Vascular and Interventional Radiology* 1998;9:407-412.
109. Dorfman DD, **Berbaum KS**, Lenth RV, Chen Y-F, Donaghy B: Monte Carlo validation of a multireader method for receiver operating characteristic discrete rating data – Factorial experimental design. *Academic Radiology* 1998;5:591-602. (Stauffer Award Article, 1999).
110. Thompson BH, **Berbaum KS**, George MJ, Ely JW: Identifying left lower lobe pneumonia at chest radiography – Performance of family practice residents before and after a didactic session. *Academic Radiology* 1998;5:324-328.
111. Dorfman DD, **Berbaum KS**, Lenth RV, Chen Y-F: Monte Carlo validation of a multireader method for receiver operating characteristic discrete rating data: Split plot experimental design. Proceedings of SPIE - The International Society for Optical Engineering, *Medical Imaging 1999: Image Perception and Performance* 1999;3663:91-99.
112. Kao SC, Adamson SD, Tatman LH, **Berbaum KS**: A survey of post-discharge side effects of conscious sedation using chloral hydrate in pediatric CT and MR imaging. *Pediatric Radiology* 1999;29:287-290.
113. Lang EV, Benotsch EG, Fick LJ, Lutgendorf S, Berbaum ML, **Berbaum KS**, Logan H, Spiegel D: Adjunctive non-pharmacological analgesia for invasive medical procedures: a randomized trial. *Lancet* 2000;355:1486-90.
114. Brandser EA, **Berbaum KS**, Dorfman DD, Braksiek RJ, El-Khoury GY, Saltzman CL, Marsh JL, Clark WA: Contribution of individual projections alone and in combination for radiographic detection of ankle fractures. *American Journal of Roentgenology* 2000;174:1691-1697.
115. Dorfman DD, **Berbaum KS**, Brandser EA: A contaminated binormal model for ROC data - Part I. Some interesting examples of binormal degeneracy. *Academic Radiology* 2000;7:420-426.
116. Dorfman DD, **Berbaum KS**: A contaminated binormal model for ROC data - Part II. A formal model. *Academic Radiology* 2000;7:427-437.
117. Dorfman DD, **Berbaum KS**: A contaminated binormal model for ROC data - Part III. Initial evaluation with detection ROC data. *Academic Radiology* 2000;7:438-447.
118. **Berbaum KS**, Dorfman DD, Franken EA Jr, Caldwell RT: Proper ROC analysis and joint ROC analysis of the satisfaction of search effect in chest radiography. *Academic Radiology* 2000;7:945-958.
119. **Berbaum KS**, Franken EA Jr, Dorfman DD, Caldwell RT, Krupinski EA: Role of faulty decision making in the satisfaction of search effect in chest radiography. *Academic Radiology* 2000;7:1098-1106.
120. Caldwell RT, **Berbaum KS**, Borah J: Correcting errors in eye-position data arising from the distortion of magnetic fields by display devices. *Behavior Research Methods, Instruments, & Computers* 2000;32:572-578.

121. Mayr NA, Yuh WTC, Arnholt JC, Ehrhardt JC, Sorosky JI, Magnotta VA, **Berbaum KS**, Zhen W, Paulino AC, Oberley LW, Sood AK, Buatti JM: Pixel analysis of MR perfusion imaging in predicting radiation therapy outcome in cervical cancer. *Journal of Magnetic Resonance Imaging* 2000;12:1027-1033.
122. **Berbaum KS**, Brandser EA, Franken EA Jr, Dorfman DD, Caldwell RT, Krupinski EA: Gaze dwell times on acute trauma injuries missed because of satisfaction of search. *Academic Radiology* 2001;8:304-14.
123. Taoka T, Mayr NA, Lee HJ, Yuh WT, Simonson TM, Rezai K, **Berbaum KS**: Factors influencing visualization of vertebral metastases on MR imaging versus bone scintigraphy. *American Journal of Roentgenology* 2001;176:1525-30.
124. Vrachliotis TG, Rabkin DJ, **Berbaum K**, Lang EV: Impact of unilateral common iliac vein occlusion on trapping efficacy of the Greenfield filter: an in vitro study. *Academic Radiology* 2001;8:494-500.
125. Leigh L, Rabkin D, **Berbaum K**, Vrachliotis TG, Brophy DP, Lang EV: Impact of graft material configuration on stent-graft endoleak in vitro. *Journal of Vascular & Interventional Radiology* 2001;12:1423-7.
126. Esserman L, Cowley H, Eberle C, Kirkpatrick A, Chang S, **Berbaum K**, Gale A: Improving the accuracy of mammography: volume and outcome relationships. *Journal of the National Cancer Institute* 2002;94:369-75.
127. **Berbaum KS**, Dorfman DD, Franken EA Jr, Caldwell RT: An empirical comparison of discrete ratings and subjective probability ratings. *Academic Radiology* 2002;9:756-63.
128. Koch T, Lang EV, Hatsiopoulou O, Anderson B, **Berbaum K**, Spiegel D. Adverse short-term effects of attention-control treatment on hypnotizability: a challenge in designing controlled hypnosis trials. *International Journal of Clinical & Experimental Hypnosis* 2003;51:357-68.
129. Stinshoff VJ, Lang EV, **Berbaum KS**, Lutgendorf S, Logan H, Berbaum M. Effect of sex and gender on drug-seeking behavior during invasive medical procedures. *Academic Radiology* 2004;11:390-7.
130. Kahn D, Menda Y, Kernstine K, Bushnell D, McLaughlin K, Miller S, **Berbaum K**. The utility of 99mTc depreotide compared with F-18 fluorodeoxyglucose positron emission tomography and surgical staging in patients with suspected non-small cell lung cancer. *Chest* 2004;125:494-501.
131. Obuchowski NA, Beiden SV, **Berbaum KS**, Hillis SL, Ishwaran H, Song HH, Wagner RF. Multi-case ROC analyses: an empirical comparison of five methods. *Academic Radiology* 2004;11:980-995.
132. Hillis SL, **Berbaum KS**. Power estimation for the Dorfman-Berbaum-Metz method. *Academic Radiology* 2004;11:1260-1273.
133. Chakraborty DP, **Berbaum KS**. Observer studies involving detection and localization: modeling, analysis, and validation. *Medical Physics* 2004;31:2313-30.
134. Hillis SL, Obuchowski NA, Schartz KM, **Berbaum KS**. A comparison of the Dorfman-Berbaum-Metz and Obuchowski-Rockette methods for receiver operating characteristic (ROC) data. *Statistics in Medicine* 2005;24:1579-607.

135. **Berbaum KS**, Franken EA Jr, Dorfman DD, Caldwell RT, Lu CH. Can order of report prevent satisfaction of search in abdominal contrast studies? *Academic Radiology* 2005; 12:74-84.
136. Lang EV, Hatsiopoulou O, Koch T, **Berbaum K**, Lutgendorf S, Kettenmann E, Logan H, Kaptchuk TJ. Can words hurt? Patient–provider interactions during invasive procedures. *Pain* 2005; 114:303-309.
137. Schupp C, **Berbaum K**, Berbaum M, Lang EV. Pain and anxiety during interventional radiological procedures. Effect of patients' state anxiety at baseline and modulation by nonpharmacologic analgesia adjuncts. *J Vasc Intervent Radiol* 2005;16:1585-1592.
138. White ML, Zhang Y, Smoker WR, Kirby PA, Hayakawa M, Sickels WJ, Ryken TC, **Berbaum K**. Fluid-attenuated inversion-recovery MR imaging in assessment of intracranial oligodendrogliomas. *Computerized Medical Imaging & Graphics* 2005;29:279-85.
139. Penedo M, Souto M, Tahoces PG, Carreira JM, Villalon J, Porto G, Seoane C, Vidal JJ, **Berbaum KS**, Chakraborty DP, Fajardo LL. Free-response receiver operating characteristic evaluation of lossy JPEG2000 and object-based set partitioning in hierarchical trees compression of digitized mammograms. *Radiology* 2005;237:450-7.
140. Ohashi K, El-Khoury GY, Bennett DL, Restrepo JM, **Berbaum KS**. Orthopedic hardware complications diagnosed with multi-detector row CT. *Radiology* 2005 237:570-7.
141. McDonald JM, **Berbaum K**, Bennett DL, Mullan B. Radiology residency call: residents' perceptions of the on-call experience. *Journal of the American College of Radiology* 2005;2:932-8.
142. **Berbaum KS**, Franken EA Jr, Caldwell RT, Schartz KM. Can a checklist reduce SOS errors in chest radiography? *Academic Radiology* 2006;13:296-304.
143. Madsen MT, **Berbaum KS**, Ellingson AN, Thompson BH, Mullan BF, Caldwell RT. A new software tool for removing, storing, and adding abnormalities to medical images for perception research studies. *Academic Radiology* 2006;13:305-312.
144. **Berbaum KS**, Franken EA Jr. Commentary: Does clinical history affect perception? *Academic Radiology* 2006;13:402-403.
145. Lang EV, **Berbaum KS**, Faintuch S, Hatsiopoulou O, Halsey N, Li X, Berbaum ML, Laser E, Baum J. Adjunctive self-hypnotic relaxation for outpatient medical procedures: a prospective randomized trial with women undergoing large core breast biopsy. *Pain* 2006;126:155-64.
146. Ohashi K, El-Khoury GY, Abu-Zahra KW, **Berbaum KS**. Interobserver agreement for Letournel acetabular fracture classification with multidetector CT: are standard Judet radiographs necessary? *Radiology* 2006;241:386-91.
147. **Berbaum KS**. God, like the Devil, is in the details. *Academic Radiology* 2006;13:1311-6.
148. Lutgendorf SK, Lang EV, **Berbaum KS**, Russell D, Berbaum ML, Logan H, Benotsch EG, Schulz-Stubner S, Turesky D, Spiegel D. Effects of age on responsiveness to adjunct hypnotic analgesia during invasive medical procedures. *Psychosomatic Medicine* 2007;69:191-9.
149. Ohashi K, Restrepo JM, El-Khoury GY, **Berbaum KS**. Peroneal tendon subluxation and

- dislocation: detection on volume-rendered images--initial experience. *Radiology* 2007;242:252-7.
150. Meinel LA, Stolpen AH, **Berbaum KS**, Fajardo LL, Reinhardt JM. Breast MRI lesion classification: improved performance of human readers with a backpropagation neural network computer-aided diagnosis (CAD) system. *Journal of Magnetic Resonance Imaging* 2007;25:89-95.
 151. **Berbaum KS**, El-Khoury GY, Ohashi K, Scharzt KM, Caldwell RT, Madsen M, Franken EA Jr. Satisfaction of search in multitrauma patients: Severity of detected fractures. *Academic Radiology* 2007;14:711-22.
 152. **Berbaum KS**, Caldwell RT, Scharzt KM, Thompson BH, Franken EA Jr. Does computer-aided diagnosis for lung tumors change satisfaction of search in chest radiography? *Academic Radiology* 2007;14:1069-76.
 153. Lang EV, **Berbaum KS**, Pauker SG, Faintuch S, Salazar GM, Lutgendorf S, Laser E, Logan H, Spiegel D. Beneficial effects of hypnosis and adverse effects of empathic attention during percutaneous tumor treatment: when being nice does not suffice. *Journal of Vascular Interventional Radiology* 2008;19:897-905.
 154. Hillis SL, **Berbaum KS**, Metz CE. Recent developments in the Dorfman-Berbaum-Metz procedure for multireader ROC study analysis. *Academic Radiology* 2008;15:647-61.
 155. Lang EV, **Berbaum KS**, Pauker SG, Faintuch S, Salazar GM, Lutgendorf S, Laser E, Logan H, Spiegel D. Beneficial effects of hypnosis and adverse effects of empathic attention during percutaneous tumor treatment: when being nice does not suffice. *Journal of Vascular Interventional Radiology* 2008;19:897-905.
 156. Kundel HL, **Berbaum K**, Dorfman D, Gur D, Metz CE, Swensson RG, Chakraborty DP, Hillis SL, Krupinski EA, Wagner RF. Receiver operating characteristic (ROC) analysis in medical imaging (ICRU Report 79). *Journal of the International Commission on Radiation Units and Measurements* 2008;8:1-62. doi:10.1093/jicru/ndn003
 157. Lang EV, **Berbaum KS**, Lutgendorf SK. Large-core breast biopsy: abnormal salivary cortisol profiles associated with uncertainty of diagnosis. *Radiology* 2009;250:631-7.
 158. Krupinski EA, **Berbaum KS**. Measurement of visual strain in radiologists. *Academic Radiology* 2009;16:947-50. [Epub 2009 May 5, PMID: 19406673 PubMed - in process, PMCID: PMC2706933 Available on 2010/08/01].
 159. Krupinski EA, **Berbaum KS**. The Medical Image Perception Society update on key issues for image perception research. *Radiology* 2009 Aug 25. [Epub ahead of print, PMID: 19709995 PubMed - as supplied by publisher]
 160. Krupinski EA, **Berbaum KS**, Caldwell RT, Scharzt KM, Kim J. Long radiology workdays reduce detection and accommodation accuracy. *Journal of the American College of Radiology* 2010;7:698-704. doi:10.1016/j.jacr.2010.03.004
 161. Pesce LL, Metz CE, **Berbaum KS**. On the convexity of ROC curves estimated from radiological test results. *Acad Radiol.* 2010;17:960-968. doi:10.1016/j.acra.2010.04.001.
 162. Hillis SL, Obuchowski NA, **Berbaum KS**. Power estimation for multireader ROC methods: An updated and unified approach. *Academic Radiology*, in press.

Chapters and Technical Reports

1. Haug EJ, Anderson D, **Berbaum K**, Evans DL, Hinrichs J, Kim SS, Kuhl JG, Lee WS, Lenel J, Stoner J, Tsai FF, Bernard J, Malwitz D, Turpin D, Sinacori J, Allen W, McAreavy J: *Feasibility Study and Conceptual Design of a National Advanced Driving Simulator*. US Department of Transportation, DOT HS-807-596, 1990.
2. Stoner JW, Haug EJ, **Berbaum KS**, Evans DGL, Kuhl JG, Lenel JC, McAreavy JF, Tsai FF: *Introduction to the Iowa Driving Simulator and Simulation Research Program*. Technical Report R-86, Center for Simulation and Design Optimization of Mechanical Systems, College of Engineering, The University of Iowa, Iowa City, IA, 1990.
3. Franken EA, **Berbaum KS**: Perceptual aspects of cardiac imaging. *Cardiac imaging - Principles and practice: A companion to Braunwald's heart disease*. Marcus ML, Schelbert HR, Skorton DJ, Wolf G (eds) and Braunwald E (consulting ed), Philadelphia: W.B. Sanders Publishing Company, 1991:87-92.
4. **Berbaum KS**, Madsen M, Dorfman DD: Physical and Psychophysical Measurement of Images. (Chapter 9) In Hendee WR, Wells P (Eds), *The Perception of Visual Information*, Springer Verlag, 1993:232-273.
5. Franken EA Jr., **Berbaum KS**, Cox CG, Johnson JA, Meoli CJ, Redick MC, Sato Y, Seidel FG, Smith WL. Low resolution telemedicine images for consultation in pediatric radiology. Berlin: Springer-Verlag, Computer Assisted Radiography Symposium, 1995.
6. Franken EA, **Berbaum KS**: Perceptual aspects of cardiac imaging. *Cardiac imaging - Principles and practice: A companion to Braunwald's heart disease*. (Second Edition) Marcus ML, Schelbert HR, Skorton DJ, Wolf G (eds) and Braunwald E (consulting ed), Philadelphia: W.B. Sanders Publishing Company, 1996:72-78.
7. **Berbaum KS**, Dorfman DD, Madsen M: Physical and Psychophysical Measurement of Images. In Hendee WR, Wells PNT (eds), *The Perception of Visual Information (second edition)*, New York: Springer Verlag, 1997:251-295.
8. **Berbaum KS**, Franken EA Jr, Caldwell RT, Schartz KM. Satisfaction of search in traditional radiographic imaging. In: Samei E, Krupinski E, Jacobson F, eds. *The Handbook of Medical Image Perception and Techniques*. Cambridge, UK: Cambridge University Press, 2010:107-138, (approximately 28,000 words and 15 original figures).

Reviews

1. **Berbaum KS**, Franken EA Jr: Critical Review of Cooperstein LA, Good BC, Eelkema EA, et al. "The effect of clinical history on chest radiograph interpretations in a PACS environment." *Investigative Radiology* 1991;26:512-513.

Letters to the Editor

1. **Berbaum KS**, Franken EA Jr: Reply to Nodine CR, Krupinski EA, Kundel HL, Toto L, Herman GT. *Investigative Radiology* 1992;27:571-573.
2. **Berbaum KS**. Difficulty of judging retrospectively whether a diagnosis has been "missed." *Radiology* 1995;194:582-583.
3. **Berbaum KS**. Satisfaction of search in osteoradiology. [Letter] *American Journal of Roentgenology* 2001;177:252-3.
4. **Berbaum KS**. Dr Berbaum replies. *Academic Radiology* 2006;13:923-4.

B. Areas of Research Interest and Current Projects

Areas of Research Interest: Observer performance in diagnostic radiology, Receiver operating characteristic (ROC) analysis, Eye-position recording, Human pattern recognition, visual perception, psychophysics.

Current Projects: Perceptual factors in diagnosis, Control of diagnostic error, Development of new ROC methodology for evaluation of diagnostic systems, Evaluation of diagnostic systems.

Together with my colleagues, Tony Franken and Don Dorfman, I founded the Medical Image Perception Laboratory to study the human component of medical imaging. The motivation for this laboratory is well expressed in the following quotation from Hal Kundel, a pioneer in the study of medical image perception:

"As long as humans read images, the capability of the human visual perceptual system will define the limits of performance."

— Harold Kundel (in *Seminars in Respiratory Medicine*, 1989)

Our interdisciplinary perception laboratory became one of the few laboratories in the world to pursue the goal of reducing detection errors in medical imaging through a better understanding of the underlying perceptual processes involved. The laboratory provides an experimental milieu where observer detection accuracy and visual search can be accurately measured. It provides an intellectual forum for development of new methods for evaluating diagnostic systems. The laboratory serves as an area for consultation on experimental design and statistical analysis.

My publication record consists of 155 published papers, several chapters and reviews, and 112 scientific presentations and exhibits. A number of these publications are largely the result of my earlier work in psychology (seventeen papers concerned with visual perception [journal articles 1-13, 17, 21, 27, and 42 of my CV] and seven with flight simulation [journal articles 25, 30, 36, 37, 41, 60, 62, 103]). There are also a number of clinical studies of diagnostic systems and techniques that span a range of radiology subspecialties: interventional [29, 39, 47, 48, 55, 56, 58, 61, 70, 98, 106, 108, 113,124,125, 128, 129, 136, 137, 145, 149, 153], skeletal [35, 68, 80, 91, 92, 100, 140, 146, 148, 150], gastrointestinal and urological [31, 45, 46, 64, 76, 85], breast imaging [126, 139, 151], MRI [23, 32, 49, 74, 101,121,123, 138], ultrasound [73, 89, 93], chest [99, 110], cardiac radiology [69, chapter references 3 and 6], nuclear medicine [26, 52, 90, 130], and radiation therapy [65]. However, the bulk of my work has been in three areas of radiologic research: perceptual factors in radiologic diagnosis, development of ROC methodology for evaluating diagnostic systems, and evaluation of picture archiving and communications systems (PACS) and teleradiology.

Perceptual Factors in Radiologic Diagnosis. The long-term objective of my research on perceptual factors in radiological interpretation is to understand how the perception of abnormalities in a radiology examination occurs and to develop strategies for improved diagnostic accuracy and patient outcome. Failure to detect an abnormality is the most common class of error in diagnostic imaging and generally considered the most serious by the medical community. The vast majority of technical research and clinical endeavor to reduce this error is concentrated in improving image quality so that abnormalities are more visible. Our approach is to study, and thereby improve, the interpretive process itself. Interpretation is the most crucial, yet least understood part of the diagnostic process. The understanding gained from this research could lead to a reduction in diagnostic error. This reduction could be most significant with increased image interpretation by non-radiologists, who, being principally driven by their

clinical suspicion, are more susceptible to errors involving unanticipated abnormalities. My publications on perceptual factors in radiologic diagnosis can be found in journal articles 14, 16, 18, 22, 28, 33, 34, 43, 44, 57, 59, 63, 72, 75, 77, 78, 79, 82, 95, 105, 107, 118, 119, 120, 122, 135, 142, 143, 144, 151, 152, 155] and chapter references 3, 6 and 8.

Development of ROC Methodology for Evaluating Diagnostic Systems. The other primary way to reduce diagnostic errors is to improve imaging technology so that abnormalities are more visible. Instead of improving the observer, one improves the image. A major problem is to determine when this goal has been achieved. Assessing the benefits of new imaging modalities is critical for the maintenance of cost-effective health care. Physical measures of how well a diagnostic system demonstrates test objects or "phantoms" are incomplete for such evaluation because they often make unjustified assumptions about which aspects of images are relevant in the interpretative process. A more comprehensive approach is to judge diagnostic systems in terms of how well they allow the observer to detect disease. Psychophysics provides a family of methodologies for assessing diagnostic performance of imaging systems in which human observers serve as pattern recognizers. My research applies existing psychophysical techniques to the evaluation of diagnostic systems and develops new techniques tailored to special requirements of diagnostic system evaluations in working situations.

This research addresses a major problem in diagnostic radiology: the evaluation of diagnostic systems. ROC methodology is an accepted methodology for assessing diagnostic performance of imaging systems in which human observers serve as detectors and decision makers. Our laboratory has developed a new methodology that provides a comprehensive framework to analyze ROC studies with multiple readers taking into account both reader-sample and case-sample variation (Dorfman, Berbaum, Metz, 1992). The new methodology has been rather well received:

"The proposed analysis of Dorfman and Berbaum has clear advantages to previously reported ones because by considering cases and readers to be random effects, it can be generalized to both the population of cases and that of readers. Furthermore, the approach can be applied to a variety of experimental designs."

— Rockette, Gur, Kurs-Lasky & King (in *Academic Radiology*, 1995)

My publications on evaluation of diagnostic systems can be found in journal articles 19, 38, 67, 83, 84, 97, 109, 111, 115, 116, 117, 118, 127, 131, 132, 133, 134, 147, 154 and chapter references 4 and 7.

Evaluation of PACS (picture archiving and communications systems) and Teleradiology. Recent years have seen increased use of digital imaging for management, display, and storage of radiographic studies. Primary and final interpretation using such networks without hard-copy images is rapidly increasing and our department is being rapidly transformed from film-based to electronic. Digital formats are fundamental to applications of medical informatics and computer aided-diagnosis. Teleradiology is becoming commonplace in our practice; rural Iowa, which has relatively less capital available for medical care, now has the opportunity with teleradiology to improve quality of available local care. My investigations in electronic imaging and teleradiology have been published in journal articles 40, 50, 51, 53, 54, 66, 71, 81, 86, 87, 88, 94, 96, 102, and 104; and chapter reference 5.

C. Published reviews of scholarship

Funding for the NIH grant (RO1 EB000145): *Satisfaction of search in diagnostic radiology*, for which I serve as principal investigator (50% effort), has again been renewed. The most recent

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 18

scientific review of this grant yielded 4 more years of funding (years 19 through 22 of the grant, 2008-2010) at a total committed level of \$1,514,068. This project had eighteen previous years of support (1986-1989: \$84,129; 1989-1992: \$250,601; 1993-1996: \$562,641; 1997-2002, \$1,223,357, 2002-2007, \$1,648,729). This research investigates a type of false-negative error that occurs when multiple abnormalities are present in an imaging study. Another recent achievement was the renewal of a grant to develop ROC methods (NIH grant RO1 EB000863): *Improved DBM ROC Methods for Diagnostic Radiology*, for which I serve as principal investigator (20% effort). This application was funded for 4 years at committed level of \$2,459,557 (previous award 2003-2007, \$1,826,040. In addition, I serve as PI of the University of Iowa subcontract to the University of Arizona on an NIH grant entitled *Eye strain in Radiologists* (12.5% effort and salary support, UI subcontract total: \$442,443, NIH Grant R01 EB004987, PI: Elizabeth Krupinski, PhD, 2006-2010). These grants will bring more than a half million dollars in indirect costs per year into the University of Iowa. I also serve as an investigator (25% effort and salary support) for *Abnormality Manipulation for Tomographic Image Perception Research* (NIH Grant R01 EB006638, PI: Mark Madsen, PhD, total committed costs: \$1,012,500, 2007-2010).

D. Grants received

Previous

1. *Investigations of a visual syntax using ambiguous and impossible patterns of features*, NIH Biomedical Science Support Grant 5 S07 RR07035-12, \$5,000, 1977-1978, Principal Investigator.
2. *Precursors of tridimensional form perception*, NIH Small Grant 1 R03 MH 33432-01, \$5,000, 1979-1980, Principal Investigator.
3. *The influence of relative motion in the peripheral visual field upon visual search*, NIH Biomedical Science Support Grant 2 S07 RR07035-16, \$7,500, 1982-1983, Principal Investigator.
4. *Satisfaction of search in diagnostic radiology*, NIH Grant RO1 CA42453, \$84,129 (total), 1986-1989, Principal Investigator, 50% effort and salary support.
5. *Image interpretations at interactive consoles vs film in a neuroradiology service*, Grant from Siemens Medical Systems, \$100,617 (total), 1987-1991, Principal Investigator.
6. *Satisfaction of search in diagnostic radiology*, NIH Grant R01 CA42453, \$250,601 (total committed), 1989-1992, Principal Investigator, 50% effort and salary support.
7. *Satisfaction of search in diagnostic radiology*, NIH Grant R01 CA42453, \$562,641 (total committed), 1993-1996, Principal Investigator, 50% effort and salary support.
8. *New ROC methodology for evaluation of diagnostic systems*, NIH Grant R01 CA62362 (P.I.: DD Dorfman, PhD), \$709,437 (total committed), 1994-1997, Investigator, 25% effort and salary support.
9. *Biomedical Application of High Performance Computing and Communications*, NLM NIH Contract N01-LM-4-3511 (P.I.: Michael Kienzle, MD with subproject VIb directed by Eric Hoffman, PhD and Paul Chang, MD), \$7,250,017 (\$1,409,234 for subproject VIb), 1994-1997, Investigator, 10% effort and salary support.
10. *Computer Aided Diagnosis and Feature-Guided Data Reduction Systems in Mammography*, USAMRMC DAMD17-96-1-6254 (P.I.: H-P Chan, PhD, University of

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 19

- Michigan, subcontract to University of Iowa, P.I.: DD Dorfman, PhD), subcontract total: \$117,001, 1996-1999, Investigator, 5% effort and salary support.
11. *Prosthetics Fitting Systems*, NIH Grant R01 4D30169 (P.I.: MW Vannier, MD), \$285,000 (annual direct costs), 1992-1998, Investigator, 5% effort and salary support.
 12. *Nonpharmacologic analgesia for invasive procedures*, NIH Grant R01 MH56274 (P.I.: EV Lang, MD), \$300,000, 1997-2000, Investigator, 5% effort and salary support.
 13. *Satisfaction of search in diagnostic radiology*, NIH Grant R01 CA42453, \$1,223,357 (total committed), 1997-2002, Principal Investigator, 50% effort and salary support.
 14. *Normal MR Neuromorphometry by Global Pattern Matching*, NIH Grant R01 N535 368 (P.I.: MW Vannier, MD), \$247,000 (annual direct costs), 1996-2001, Investigator, 4% effort and salary support.
 15. *New ROC methodology for evaluation of diagnostic systems*, NIH Grant R01 CA62362 (P.I.: DD Dorfman, PhD), \$1,208,125 (total committed), 1997-2001, Investigator, 35% effort and salary support.
 16. *New ROC methodology for evaluation of diagnostic systems*, NIH Grant R01 CA62362, no-cost extension, 2001-2003, Principal Investigator, 15% effort and salary support.
 17. *Inflammatory Parenchymal Lung Disease: Structure/Function*, NIH Grant R01 HL60158 (P.I.: Eric Hoffman, PhD), \$2,112,084 (total committed), 1999-2004, Investigator, 5% effort and salary support.
 18. *Improved DBM ROC Methods for Diagnostic Radiology*, NIH Grant R01 EB000863, \$1,826,040 (total committed costs) or \$569,460 (University of Iowa direct costs), \$289,076 (University of Iowa indirect costs), 2003-2007, Principal Investigator, 20% effort and salary support.
 19. *Satisfaction of Search in Diagnostic Radiology*, NIH Grant R01 EB000145, \$1,648,729 (total committed costs) or \$1,125,000 (direct) and \$523,729 (indirect), 2002-2007, Principal Investigator, 50% effort and salary support for 5 years.

Current

20. *Improved DBM ROC Methods for Diagnostic Radiology*, NIH Grant R01 EB000863, \$2,459,557 (total committed costs) and \$1,190,964 (University of Iowa total costs excluding subcontracts), \$792,943 (University of Iowa direct costs), \$398,021 (University of Iowa indirect costs), 2007-2011, Principal Investigator, 20% effort and salary support.
21. *Eyestrain in Radiologists*, NIH Grant R01 EB004987 (PI: Elizabeth Krupinski, PhD), 2006-2010, Dr. Berbaum is PI of the University of Iowa subcontract with the University of Arizona (12.5% effort and salary support), UI subcontract: \$442,443 (total), \$308,011 (direct), \$134,432 (indirect).
22. *Abnormality Manipulation for Tomographic Image Perception Research*, NIH Grant R01 EB006638 (PI: Mark Madsen, PhD), \$1,012,500 (total committed costs) or \$675,000 (direct), \$337,500 (indirect) 2007-2010, Investigator, 25% effort and salary support.
23. *Satisfaction of Search in Diagnostic Radiology*, NIH Grant R01 EB000145-19, \$1,514,068 (total committed costs) or \$1,020,457 (direct) and \$493,611 (indirect), 2008-2012, Principal Investigator, 50% effort and salary support for 4 years.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 20

E. Conference presentations, Visiting Professorships

1. Weisstein N, **Berbaum K**, Ozog G, Williams A, Tangney J: *What do subjects mean by 'uniformly faded contrast'?* Annual meeting of the Association for Research in Vision and Ophthalmology, Sarasota, FL, 1974.
2. Weisstein N, Matthews M, **Berbaum K**: *Adaptation and masking by illusory contours.* Annual meeting of the Psychonomic Society, St. Louis, MO, 1974.
3. Tangney J, **Berbaum K**, Weisstein N: *Masking independent of both separation and frequency: Implications for a Fourier approach.* Annual meeting of the Association for Research in Vision and Ophthalmology, Sarasota, FL, 1975.
4. **Berbaum K**, Weisstein N, Harris CS: *Certain types of vertices aid line detection.* Annual meeting of the Psychonomic Society, Denver, CO, 1975.
5. Weisstein N, Maguire W, **Berbaum K**: *Visual phantoms produced by moving subjective contours generate a motion after effect.* Annual meeting of the Association for Research in Vision and Ophthalmology, Sarasota, FL, 1976.
6. **Berbaum K** and Weisstein N: *Connecting two vertices and object superiority.* Annual meeting of the Psychonomic Society, Washington, D.C., 1977.
7. **Berbaum K**: *Brightness constancy and contrast.* Bell Telephone Laboratories - Human Factors Groups, Holmdel and Whippany, NJ, January 15, 1980.
8. **Berbaum K**: *Three dimensional perception from two dimensional displays.* National Aeronautics and Space Administration, Ames Research Center - Life Sciences Division, Moffett Field, CA, November 7, 1980.
9. **Berbaum K**: *Perceiving shape from shading.* National Aeronautics and Space Administration, Ames Research Center - Life Sciences Division, Moffett Field, CA, July 21, 1981.
10. **Berbaum K**: *Reducing popping into view of objects and detail in eye-coupled air-of-interest displays.* Naval Air Systems Command Research Review - Aircrew Physiology, Orlando, FL, May 7, 1983.
11. **Berbaum K**, Franken EA Jr, Smith WL: *Resident performance in pediatric chest x-ray: The effect of comparison films.* Perception and Detection in Medical Imaging Conference, Sponsored by the Department of Radiology of the University of Utah, Oct. 6-7, 1983.
12. Smoker WRK, **Berbaum K**, Luebke NH, Jacoby CG: *Perceptual visualization testing in diagnostic radiology.* American Roentgen Ray Society meeting, Las Vegas, NV, April 9-13, 1984.
13. **Berbaum K**, Franken EA Jr, Smith WL: *The effect of comparison films upon interpretation of pediatric chest radiographs.* Association of University Radiologists meeting, Newport Beach, CA, May 7-10, 1984.
14. Session chairman: *Motion perception.* Psychonomic Society Meeting, San Antonio, TX. November 1984.
15. **Berbaum KS**, Franken EA, Dorfman DD, Barloon T, Eil SR, Lu CH, Smith W, Abu-Yousef MM: *Tentative diagnoses facilitate the detection of diverse lesions in chest*

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 21

- radiographs*. Farwest Image Perception Conference, Albuquerque, NM, July 17-18, 1986.
16. Smith WL, **Berbaum KS**, Franken EA Jr, El-Khoury GY, Weigelt F: *Acquisition of film interpretation test skills*. Annual meeting of the Association of University Radiologists, Charleston, SC, March 1987.
 17. **Berbaum K**: *Applications of signal detection methodology in diagnostic radiology*. Regional meeting of the IEEE, Cedar Rapids, IA, March 19, 1987.
 18. **Berbaum KS**, Platz CE: *Pattern recognition in pathology residents*. Pathology Grand Rounds, University of Iowa, Department of Pathology, September, 1987.
 19. **Berbaum KS**, Franken EA, Dorfman DD: *Tentative diagnoses facilitate the detection of diverse lesions in chest radiographs*. Annual meeting of the Psychonomic Society, Seattle, WA, 1987.
 20. **Berbaum KS**, El-Khoury GY, Franken EA, Kathol MH, Montgomery WJ, Hesson W: *The impact of pertinent history and physical exam on the detection of fractures*. Annual meeting of the Radiological Society of North America, Chicago, IL, 1987.
 21. El-Khoury GY, Larson RK, Kathol MH, **Berbaum KS**, Furst DE: *Radiographic differences between seronegative and seropositive rheumatoid arthritis; do they really exist?* Annual meeting of the Radiological Society of North America, Chicago, IL, 1987.
 22. **Berbaum KS**: *Photography vs. vision in space*. A seminar for the Space Shuttle Earth Observations Office, Solar System Exploration Division, NASA/Johnson Space Center, Houston, TX, October, 1988.
 23. **Berbaum KS**: *Illusory reversal of perceived surface shape in space*. A seminar for the Space Biomedical Research Institute, NASA/Johnson Space Center, Houston, TX, October, 1988.
 24. Franken EA Jr, Driscoll CE, **Berbaum KS**, Smith WL, Sato Y, Kao SCS, Steinkraus L: *Teleradiology for a family practice center*. Annual meeting of the Radiological Society of North America, Chicago, IL, 1988.
 25. Smith TP, **Berbaum KS**, Cragg AH: *Political trends in vascular and interventional radiology: Randomized Survey*. Annual meeting of the Radiological Society of North America, Chicago, IL, 1988.
 26. Honda H, Coffman CE, Flickinger FW, Franken EA Jr, **Berbaum KS**: *CT analysis of metastatic neoplasms to the kidney: Comparison with primary renal cell carcinoma*. Annual meeting of the Radiological Society of North America, Chicago, IL, 1988.
 27. Schreiber AE, Honda H, **Berbaum K**, Franken EA Jr, Lu CH: *CT determinants of prognosis in pancreatic carcinoma*. Annual meeting of the Radiological Society of North America, Chicago, IL, 1988.
 28. Yuh WTC, Sato Y, Gray SD, Kao SCS, **Berbaum KS**, Crockett DM, Smith WL, Ryals TJ, Dolan KD: *MR in pediatric head and chest masses*. Annual meeting of the Radiological Society of North America, Chicago, IL, 1988.
 29. Schreiber AE, Honda H, **Berbaum K**, Franken EA Jr, Lu CH: *CT determinants of prognosis in pancreatic carcinoma*. Exhibited at the Annual meeting of the Radiological Society of North America, Chicago, IL, 1988.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 22

30. **Berbaum KS:** *Perceptual factors in diagnostic radiology.* Department of Radiology, UCLA, January, 1989.
31. **Berbaum KS:** *Selection of ROC methods.* Department of Radiology, UCLA, January, 1989.
32. **Berbaum KS,** Franken EA, Rooholamini SA, Dorfman DD, Kathol MH, Barloon TJ, Behlke FM, Sato Y, Lu, CH, El-Khoury GYE, Flickinger FW, Montgomery WJ: *Satisfaction of search in diagnostic radiology.* Association of University Radiologists Meeting, Seattle, WA, May 19-25, 1989.
33. Yuh WTC, Sato Y, Gray SD, Kao SCS, **Berbaum KS,** Crockett DM, Dolan KD, Smith WL, Franken EA Jr: *MR in pediatric head and neck masses.* American Roentgen Ray Society Annual Meeting, New Orleans, LA, May, 1989.
34. Stanford W, Hemann L, Rooholamini S, Honda H, Flickinger F, Zavala D, **Berbaum KS:** *Ultrafast Computed Tomography in noncardiac thoracic imaging: Comparison with conventional computed tomography.* International Congress of Radiology, Paris, France, 1989.
35. **Berbaum KS:** Invited Lecture - *Issues in ROC methodology.* Farwest Image Perception Conference III, Tucson, AZ, October 19, 1989.
36. Smith TP, Cragg AH, Landas SK, **Berbaum KS:** *Plaque modification with tetracycline: Enhanced tissue ablation during excimer lasing.* Annual meeting of the Radiological Society of North America, Chicago, 1989.
37. Franken EA Jr, **Berbaum KS,** Honda H, McGuire C, Weis RR, Barloon T: *Evaluation of a PACS workstation for interpreting body CT studies.* Annual meeting of the Radiological Society of North America, Chicago, IL, 1989.
38. **Berbaum KS:** *State of the art ROC methodology.* UIHC Radiology Department Grand Rounds, December 5, 1989.
39. Smith TP, **Berbaum KS,** Cragg AH: *Political considerations in interventional radiology: A randomized study of American radiologists.* Annual Meeting of the Society of Cardiovascular and Interventional Radiology, San Diego, CA, 1989.
40. Smith TP, **Berbaum KS,** Cragg AH: *Political trends in vascular and interventional radiology: A randomized survey.* Annual Meeting of the American Roentgen Ray Society, San Diego, CA, 1989 (Awarded Certificate of Merit).
41. Franken EA, Smith WL, **Berbaum KS,** Owen D, Hilsenrath P: *Planning, expectation, and image evaluation for PACS at the University of Iowa Hospitals and Clinics.* Medical Imaging IV - A part of SPIE's thematic applied science and engineering series. (sponsored by the International Society for Optical Engineering), Newport Beach, CA, February 5-9, 1990.
42. Franken EA Jr, Smith WL, **Berbaum KS,** Kao SCS, Sato Y: *Comparison of PACS workstation with conventional film for interpretation of neonatal Radiographs.* Society for Pediatric Radiology, Cincinnati, OH, April 18-22, 1990.
43. **Berbaum KS,** Franken EA, Rooholamini S, Coffman CE, Cornell SH, Cragg AH, Galvin JR, Honda HH, Kao SCS, Kimball DA, Ryals TJ, Sickels WJ, Smith AP: *Time-course of satisfaction of search.* Association of University Radiologists Meeting, Minneapolis, MN, April 22-27, 1990.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 23

44. Franken EA Jr, **Berbaum KS**, Marley SM, Smith WL, Sato Y: *Comparative performance of a PACS workstation for interpreting neonatal examinations*. Association of University Radiologists Meeting, Minneapolis, MN, April 22-27, 1990.
45. Sullivan J, Ryals T, Smith WL, **Berbaum KS**, Sickels WJ: *Use of CT scan in evaluating headaches*. Association of University Radiologists Meeting, Minneapolis, MN, April 22-27, 1990.
46. **Berbaum KS**: *Progress on the satisfaction-of-search phenomena*. Grant Rounds, Department of Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, October 29, 1990.
47. Bormann JL, Stanford W, Stenberg RG, Winniford MO, Galvin JR, **Berbaum KS**, Talman CL: *Ultrafast CT detection of coronary artery stenosis*. Annual meeting of the American Heart Association, November, 1990, Dallas, TX.
48. **Berbaum KS**, Franken EA Jr: *The effect of satisfaction of search on search time*. Perception in Radiology Session, Annual meeting of the Radiological Society of North America, Chicago, IL, 1990.
49. Sullivan JH, Ryals T, Smith WL, **Berbaum KS**, Sickels W: *Use of CT scan in evaluating headaches*. presented at the annual meeting of the Association of University Radiologists, 1991.
50. **Berbaum KS**, Franken EA Jr, Smith WL, Dorfman DD: *Sampling issues in receiver operating characteristic (ROC) studies of picture archiving and communications systems (PACS)*. World Congress on Medical Physics and Biomedical Engineering, Kyoto, Japan, July, 1991.
51. **Berbaum KS**, Franken EA, Jr, Anderson KL, Dorfman DD, Erkonen WE, Farrar GP, Geraghty JJ, Gleason TJ, MacNaughton ME, Phillips ME, Renfrew DL, Walker CW, Whitten CG, Young DC: *The influence of clinical history on visual search with single and multiple abnormalities*. Farwest Image Perception Conference IV, Mobile, AL, October 12, 1991.
52. Dorfman DD, **Berbaum KS**, Metz CE: *ROC rating analysis: Generalization to the population of readers and cases with the jackknife method*. Farwest Image Perception Conference IV, Mobile, AL, October 12, 1991.
53. **Berbaum KS**: Discussant for *Expertise in visual diagnosis: A review of the literature* (authored by Geoffrey R. Norman). 102th Annual Meeting of the Association of American Medical College (AAMC)-Research in Medical Education (RIME), Washington, DC, November, 8-14, 1991.
54. **Berbaum KS**, Franken EA, Jr, Anderson KL, Dorfman DD, Erkonen WE, Farrar GP, Geraghty JJ, Gleason TJ, MacNaughton ME, Phillips ME, Renfrew DL, Walker CW, Whitten CG, Young DC: *The influence of clinical history on visual search with single and multiple abnormalities*. Association of University Radiologists Meeting, Chicago, IL, April 22-26, 1992.
55. Dorfman DD, **Berbaum KS**, Metz CE: *ROC rating analysis: Generalization to the population of readers and cases with the jackknife method*. Association of University Radiologists Meeting, Chicago, IL, April 22-26, 1992.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 24

56. **Berbaum KS:** *A new ROC methodology for technology evaluation.* Mammographic Image Analysis Society Meeting, Nottingham, Great Britain, August 28, 1992.
57. **Berbaum KS,** El-Khoury GY, Kuehn DM, Dorfman DD, Meis DM, Franken EA Jr, Whitten CG, Warnock NG, Mueller DP, Thompson BH, Janson B, Kao SCS, Kathol MH, Moore TE, Smith WL, Stanford W: *Satisfaction of search in the detection of acute fractures in the trauma patients with multiple images.* Annual meeting of the Radiological Society of North America, Chicago, IL, 1992.
58. Franken EA Jr, **Berbaum KS,** Lu CH, Kannam S, Barloon TJ, Warnock N, Bass S, Brown B, D'Alessandro M, Habboub H, Hemann L, Ketelaar M, Simonson T, Pelsang R, Skopec P: *Satisfaction of search in detection of plain film abnormalities in contrast examinations.* Association of University Radiologists Meeting, Cincinnati, Ohio, May 19-23, 1993; also presented at the Farwest Perception Conference, Newport Beach, CA, October 7, 1993.
59. **Berbaum KS,** Franken EA Jr, Dorfman DD, Lueben K, Chang PJ, Sato Y, Parker S, El-Khoury GY, Jansen B, Rodrigues A, Brown B, Pelsang R, Buehner L, Simonson T: *Influence of clinical history on perception of abnormalities in pediatric radiographs.* Association of University Radiologists Meeting, Cincinnati, Ohio, May 19-23, 1993; also presented at the Farwest Perception Conference, Newport Beach, CA, October 7, 1993.
60. Chang PJ, Bird SM, **Berbaum KS,** Galvin JR: *Observed ROC performance as a function of abnormality subtlety and/or severity: Quantitative stratification with ILO classification of lung radiographs.* Annual meeting of the Radiological Society of North America, Chicago, IL, 1993.
61. El-Khoury GY, **Berbaum KS,** Franken EA Jr, Kuehn DM, Meis DM: *Satisfaction of search in the multitrauma patient.* American Society of Emergency Radiology, Orlando, FL, April 10-13, 1994.
62. Aideyan UO, **Berbaum KS,** Smith WL: *Influence of prior radiological information on the interpretation of radiological examinations.* Presented at the Association of University Radiologists 42nd Annual Meeting, Boston, MA, May 4-8, 1994.
63. Warnock NG, Harris K, Smith W, **Berbaum KS:** *Defining and measuring the quality of the radiological report - preliminary studies.* Presented at the Association of University Radiologists 42nd Annual Meeting, Boston, MA, May 4-8, 1994.
64. Simonson TM, Yuh WTC, Michalson LS, Nguyen PT, Sato Y, **Berbaum KS,** Lee HJ: *Anatomic distribution of metastases in the vertebral body and modes of hematogenous spread.* Scientific Presentation, American Society of Neuroradiology, 32 Annual Meeting, Nashville, TN, May 3-7, 1994.
65. Yuh WTC, Lee HJ, Simonson TM, Michalson LS, Nguyen PT, Sato Y, Rezai K, **Berbaum KS:** *Why is MR imaging superior to bone scintigraphy in detection of metastases to the vertebral body?* Scientific Presentation, American Society of Neuroradiology, 32 Annual Meeting, Nashville, TN, May 3-7, 1994.
66. Simonson TM, Yuh WTC, Crosby DL, Michalson LS, Dorfman DD, Wiechert RJ, Lee HJ, **Berbaum KS:** *The value of contrast enhancement in making the correct diagnosis of major brain pathology.* Scientific Presentation, American Society of Neuroradiology, 32 Annual Meeting, Nashville, TN, May 3-7, 1994.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 25

67. Michalson AE, Yuh WTC, Michalson LS, Simonson TM, **Berbaum KS**: *Spin-echo MR evaluation of neurovascular compression of the medulla in essential hypertension*. Scientific Presentation, American Society of Neuroradiology, 32nd Annual Meeting, Nashville, TN, May 3-7, 1994.
68. Dorfman DD, **Berbaum KS**: *A solution to the degeneracy problem in discrete ROC rating data*. Annual meeting of the Radiological Society of North America, Chicago, IL, 1994.
69. Brown BP, Schrier JE, **Berbaum KS**, Shirazi SS, Schulze-Delrieu K: *Septations increase the axial and radial distribution of solid and liquid luminal contents in glass models of the colon: Preliminary data for testing hypotheses in vitro and in vivo*. SPIE (International Society for Optical Engineering), 1995.
70. Dorfman DD, **Berbaum KS**, Lenth RV: *Multi-reader multi-case ROC methodology: A bootstrap analysis*. Presented at the Association of University Radiologists 43rd Annual Meeting, San Diego, CA, April 4-8, 1995.
71. **Berbaum KS**, Franken EA Jr, Dorfman DD, Lu CE, Kreinbring K: *Gaze dwell times on plain film abnormalities in abdominal contrast studies*. Presented at the Association of University Radiologists 43rd Annual Meeting, San Diego, CA, April 4-8, 1995.
72. **Berbaum KS**: *A psychologist's view of psychophysical studies in medical imaging*. Invited Address, American Association of Physicists in Medicine, 37th Annual Meeting and Technical Exhibition, July 23-27, 1995, Boston, MA.
73. **Berbaum KS**: *Causes of satisfaction of search effects in abdominal contrast studies*. The Sixth Farwest Image Perception Conference, October 13-15, 1995, Philadelphia, PA.
74. Riley MA, Brandser EA, El-Khoury GY, **Berbaum KS**, Bennett DL: *Blinded evaluation of secondary signs for predicting anterior cruciate ligament tears at MR imaging*. Annual meeting of the Radiological Society of North America, Chicago, IL, 1995.
75. Davis SW, Brown BP, Lim HK, Abu-Yousef MM, Barloon TJ, Pelsang RE, Warnock NG, **Berbaum KS**, Albanese MA: *On-line vs batch reading of ultrasound examinations*. Annual Meeting of the American Institute Ultrasound in Medicine, 1995.
76. Kuehn DM, **Berbaum KS**, El Khoury GY, Franken EA Jr, Dorfman DD, Miller EM, Caldwell RT: *Gaze dwell times on multiple acute trauma injuries*. Presented at the Association of University Radiologists 44th Annual Meeting, Birmingham, AL, April 17-21, 1996.
77. Black CM, Kusnick CA, Lang EV, Siebes M, Barnhart W, **Berbaum KS**, Hoffman EA: *Angiographic analysis of eccentric vascular stenosis: Comparison of CO₂ and iodinated contrast medium*. Presented at the Association of University Radiologists 44th Annual Meeting, Birmingham, AL, April 17-21, 1996.
78. Dorfman DD, **Berbaum KS**, Lenth RV, Chen Y-F: *Statistical analysis of multireader receiver operating characteristic discrete rating data: Validation by computer simulation*. The Seventh Farwest Image Perception Conference, October 16-18, 1997, Tucson, AZ.
79. **Berbaum KS**, Franken EA Jr, Dorfman DD, Caldwell R: *The role of faulty search in satisfaction of search effects in chest radiology*. The Seventh Farwest Image Perception Conference, October 16-18, 1997, Tucson, AZ.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 26

80. Brown BP, Fletcher JG, Pelsang RE, Barloon TJ, **Berbaum KS**, Abu-Yousef: *Batch reading versus on-line reading of ultrasound examinations: Evidence that there is added value having a sonologist in the ultrasound clinic*. Annual meeting of the Radiological Society of North America, Chicago, IL, 1997.
81. Dorfman DD, **Berbaum KS**, Lenth RV, Chen Y-F: *Monte Carlo validation of a multireader method for receiver operating characteristic discrete rating data: Split plot experimental design*. Annual Meeting of the SPIE - The International Society for Optical Engineering, Medical Imaging 1999: Image Perception, San Diego, CA, February, 1999.
82. Dorfman DD, **Berbaum KS**, Lenth RV, Chen Y-F: *Monte Carlo validation of a multireader method for receiver operating characteristic discrete rating data: Split plot experimental design*. The Eighthth Farwest Image Perception Conference, May 28-30, 1999, Nakoda Lodge, Alberta, Canada.
83. **Berbaum KS**, Franken EA Jr, Dorfman DD, Caldwell RT, Krupinski EA: *A re-examination of the cause of the satisfaction of search effect in chest radiography using verbal protocol*. The Eighthth Farwest Image Perception Conference, May 28-30, 1999, Nakoda Lodge, Alberta, Canada.
84. Krupinski EA, **Berbaum KS**, Chakraborty DP, Dorfman DD, Swensson RG, Wagner R: *Workshop: How I learned to stop worrying and love ROC analysis*. Annual Meeting of the SPIE - The International Society for Optical Engineering, Medical Imaging 2000: Image Perception and Performance, San Diego, CA, February, 2000.
85. Dorfman DD, **Berbaum KS**: *A formal contaminated binormal model and fits of the model to classic ROC data*. Annual Meeting of the SPIE - The International Society for Optical Engineering, Medical Imaging 2001: Image Perception and Performance, San Diego, CA, February, 2001.
86. **Berbaum KS**, Dorfman DD: *Some interesting examples of binormal degeneracy and analysis using a contaminated binormal model*. Annual Meeting of the SPIE - The International Society for Optical Engineering, Medical Imaging 2001: Image Perception and Performance, San Diego, CA, February, 2001.
87. Dorfman DD, **Berbaum KS**: *A formal contaminated binormal model and fits of the model to classic ROC data*. Presented at the Association of University Radiologists 49th Annual Meeting, Toronto, Canada, May 16-20, 2001.
88. **Berbaum KS**, Dorfman DD: *Some interesting examples of binormal degeneracy and analysis using a contaminated binormal model*. Presented at the Association of University Radiologists 49th Annual Meeting, Toronto, Canada, May 16-20, 2001.
89. Kundel HL, **Berbaum KS**, Krupinski EA: *Workshop on satisfaction of search*. Medical Image Perception Conference IX, Warrenton, VA, September 20-23, 2001.
90. **Berbaum KS**, Dorfman DD: *Some interesting examples of binormal degeneracy and analysis using a contaminated binormal model*. Medical Image Perception Conference IX (Farwest), September 20-23, 2001, Warrenton, VA.
91. Dorfman DD, **Berbaum KS**: *A formal contaminated binormal model and fits of the model to classic ROC data*. Medical Image Perception Conference IX (Farwest), September 20-23, 2001, Warrenton, VA.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 27

92. **Berbaum KS:** *Special Presentation: Recollections celebrating the life of Donald D. Dorfman.* Medical Image Perception Conference IX (Farwest), September 20-23, 2001, Warrenton, VA.
93. Chakraborty DP, **Berbaum KS:** *Comparing inter-modality diagnostic accuracies in tasks Involving lesion localization: A jackknife AFROC approach.* Annual meeting of the Radiological Society of North America, Chicago, IL, 2002, Paper Number 94 in Session A10.
94. **Berbaum KS,** Dorfman DD, Franken EA Jr, Caldwell RT. An empirical comparison of discrete ratings and subjective probability ratings. Medical Image Perception Conference X, Durham, NC, September 11-14, 2003.
95. Hillis SL, Schartz KM, **Berbaum KS:** *A comparison of the Dorfman-Berbaum-Metz and Obuchowski-Rockette methods for receiver operating characteristic (ROC) data.* (Poster) Medical Image Perception Conference X, Durham, NC, September 11-14, 2003.
96. Ohashi K, El-Khoury GY, Bennett D, Restrepo J, **Berbaum KS.** *Hardware complications evaluated by multi-detector row CT.* Annual meeting of the Radiological Society of North America, Chicago, IL, 2003.
97. Abu-Zahra K, Ohashi K, El-Khoury GY, Sasaka K, **Berbaum KS.** *Assessing reliability of the Letournel acetabular fracture classification using multi-detector row CT: Are the standard Judet radiographic views still necessary?* Annual meeting of the Radiological Society of North America, Chicago, IL, 2004.
98. **Berbaum KS,** Franken EA Jr, Caldwell RT. *Order of report in abdominal contrast studies: Can satisfaction of search be prevented?* Medical Image Perception Conference XI, Lake Bowness on Windermere, UK, September 27-30, 2005.
99. Arbash-Meinell L, Stolpen A, Fajardo L, **Berbaum KS,** Reinhardt J. *Comparison of human readers and artificial classifiers in classifying breast MRI lesions.* Annual meeting of the Radiological Society of North America, Chicago, IL, 2005.
100. Hoffman E, Reddy S, Barr G, **Berbaum KS,** McLennan G, Van Beek E. *Quantitative evaluation of emphysema: Is coronary calcium screening CT a surrogate for a full lung study?* (Poster) Annual meeting of the Radiological Society of North America, Chicago, IL, 2005.
101. Ohashi K, El-Khoury GY, **Berbaum KS,** Sasaka K, McKinley T, Marsh L. *Interobserver variability between orthopedic surgeons and musculoskeletal radiologists in classifying acetabular fractures using the Letournel acetabular fracture classification.* Annual meeting of the Radiological Society of North America, Chicago, IL, 2005.
102. Madsen MT, **Berbaum KS,** Ellingson A, Thompson BH, Mullan BF. *Lesion removal and lesion addition algorithms in lung volumetric data sets for perception studies.* Annual Meeting of the SPIE – The International Society for Optical Engineering, Medical Imaging 2006: Image Perception and Performance, San Diego, CA, February, 2006.
103. Schartz K, Pesce L, Hillis S, Metz CE, Berbaum ML, **Berbaum KS.** *DBM MRMC: Software to perform analysis of variance for multi-reader multi-case receiver operating characteristic experiments using various observer models and accuracy parameters.* (Education Exhibits—Inforad) Annual meeting of the Radiological Society of North America, Chicago, IL, 2006.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 28

104. Sasaka K, Ohashi K, Ahn JM, Geijer M, **Berbaum K**, El-Khoury GY. *The efficacy of MD-CT in the evaluation of surgical fusion and fracture union in extremities*. Annual meeting of the Radiological Society of North America, Chicago, IL, 2006.
105. Lang E, **Berbaum KS**, Faintuch S, Hatsiopoulou O, Berbaum ML, Baum J. *Adjunctive self-hypnotic relaxation during image-guided large core needle biopsy of the breast: A prospective randomized trial*. Annual meeting of the Radiological Society of North America, Chicago, IL, 2006.
106. Schartz KM, **Berbaum KS**, Caldwell RT, Madsen MT. *WorkstationJ: workstation emulation software for medical image perception and technology evaluation research*. Annual Meeting of the SPIE – The International Society for Optical Engineering, Medical Imaging 2007: Image Perception and Performance, San Diego, CA, February, 2007.
107. **Berbaum KS**, El-Khoury GY, Ohashi K, Schartz KM, Caldwell RT, Madsen MT, Franken EA Jr. *Satisfaction of search in multi-trauma patients: Severity of detected fractures*. Presented at the Association of University Radiologists 55th Annual Meeting, Denver, CO, April 24-28, 2007.
108. **Berbaum KS**, El-Khoury GY, Ohashi K, Schartz KM, Caldwell RT, Madsen MT, Franken EA Jr. *Satisfaction of search in multi-trauma patients: Severity of detected fractures*. Medical Image Perception Conference XII, Iowa City, IA, October 17-20, 2007.
109. Schartz KM, **Berbaum KS**, Caldwell RT, Madsen MT. *Software to facilitate medical image perception and technology evaluation research*. Medical Image Perception Conference XII, Iowa City, IA, October 17-20, 2007.
110. Madsen MT, **Berbaum KS**, Caldwell RT, Schartz KM. *Abnormality manipulation tools for medical image perception research*. Medical Image Perception Conference XII, Iowa City, IA, October 17-20, 2007.
111. Inaoka T, El-Khoury G, Ohashi K, Singh H, **Berbaum K**. *Imaging of thoracic spine (T-spine) fractures in the era of MDCT: A review of 613 fractures*. Annual meeting of the Radiological Society of North America, Chicago, IL, 2007.
112. Krupinski EA, Johns A, **Berbaum KS**. *Measurement of visual strain in radiologists. (Poster)*. Annual Meeting of the SPIE – The International Society for Optical Engineering, Medical Imaging 2008: Image Perception and Performance, San Diego, CA, February, 2008.
113. Inaoka T, Ohashi K, El-Khoury GY, Berbaum K. *Sagittal-slice fractures (anterior fracture-dislocation) of the thoracic spine: MRI findings and neurologic outcomes*. Annual meeting of the Radiological Society of North America, Chicago, IL, 2008.
114. Madsen MT, Durst GR, Caldwell RT, Schartz KM, Thompson BH, **Berbaum KS**. *Validation of an improved abnormality insertion method for medical image perception investigations*. Presentation at the Annual Meeting of the SPIE – The International Society for Optical Engineering, Medical Imaging 2009, Lake Buena Vista, Florida, February 7-12, 2009.
115. Schartz KM, **Berbaum KS**, Caldwell RT, Madsen MT. *WorkstationJ*. Software workshop presentation at the Annual Meeting of the SPIE – The International Society for Optical Engineering, Medical Imaging 2009, Lake Buena Vista, Florida, February 7-12, 2009.

COLLEGE OF MEDICINE CURRICULUM VITAE

Kevin S. Berbaum, PhD

Page 29

116. Madsen MT, Scharzt KM, Caldwell RT, & **Berbaum KS**. *Abnormality manipulation software tools*. Software workshop presentation at the Annual Meeting of the SPIE – The International Society for Optical Engineering, Medical Imaging 2009, Lake Buena Vista, Florida, February 7-12, 2009.
117. Krupinski EA, Berbaum KS. *Impact of visual fatigue on observer performance*. Poster at the Annual Meeting of the SPIE – The International Society for Optical Engineering, Medical Imaging 2009, Lake Buena Vista, Florida, February 7-12, 2009.
118. Scharzt KM, **Berbaum KS**, Caldwell RT, Madsen MT. *WorkstationJ as ImageJ plugin for medical image studies*. Presentation at the R&D Symposium at the Annual Meeting of The Society for Imaging Informatics in Medicine, Charlette, North Carolina, June 4-7, 2009.
119. Scharzt KM, **Berbaum KS**, Caldwell RT, Madsen MT. *WorkstationJ as ImageJ plugin for medical image studies*. **Software demonstration at the Annual Meeting of The Society for Imaging Informatics in Medicine, Charlette, North Carolina, June 4-7, 2009.**

IV. SERVICE

A. Offices held in professional organizations

Editor (member of the editorial board), *Academic Radiology*, appointed 10/92.

Reviewer for scientific journals: *Medical Decision Making*, *American Journal of Roentgenology*, *Medical Physics*, *Radiology*.

Special Reviewer for The Diagnostic Radiology Study Section of NIH: February 28-March 2, 1990, Washington, DC; site visits to Memphis, 1990, Philadelphia, 1990 and 1992, Boston, 1991, 1992, and 1993, Washington, 1991 and 1992, and Ann Arbor, 1991; Special Reviewer for the National Library of Medicine on Training Grant Applications in Medical Informatics in 1991.

Reviewer for the Department of Defense Breast Cancer Research Program, 1995, 1996, 2000, 2003. (U.S. Army Medical Research and Materiel Command, Fort Detrick, MD)

Professional Affiliations: Human Factors Society (1979-Present), Psychonomics Society (1983-Present), Association of University Radiologists (1989-Present), Radiological Society of North America (1990-Present).

I have served on various departmental committees over the years. Most recently, I co-chaired the promotions and faculty review committee with Mark Madsen during 2007-2008. I served on the Advisory Committee to Office of Research in Medical Education (1996-1998).

My CV lists two technical reports:

Haug EJ, Anderson D, Berbaum K, et al: *Feasibility Study and Conceptual Design of a National Advanced Driving Simulator*. U.S. Department of Transportation, DOT HS-807-596, 1990.

Stoner JW, Haug EJ, Berbaum KS, et al: *Introduction to the Iowa Driving Simulator and Simulation Research Program*. Technical Report R-86, Center for Simulation and Design Optimization of Mechanical Systems, College of Engineering, The University of Iowa, Iowa City, IA, 1990.

The first report was the original feasibility study for the National Advanced Driving Simulator (NADS) which is a multimillion dollar facility being constructed at the University of Iowa on the Oakdale campus. The second report describes the Iowa Driving Simulator which was a bridging device that was important in creating and maintaining the expertise necessary to be awarded the larger device. Not only did I participate in authoring these reports, I also played an active role helping Ed Haug and Jim Stoner promote industry partnerships for these devices and DOT interest in the University of Iowa as the site for the device. In the early nineties, before we won the NADS award, I was virtually the only individual at the University familiar with both applied psychological/human factors research and simulation-based research. My aid helped the University of Iowa to acquire this national laboratory and represents an example of good citizenship and service to the University.

I am a founding member of the Medical Image Perception Society (MIPS) and have served on the organizing committee for its Medical Image Perception Conference. The MIPS is an international scientific group concerned with observer performance research in diagnostic radiology. It also is a locus of interest for psychophysical models and methods and visual search important in medical observer performance and image perception research. The 12th meeting of the Medical Image Perception Conference was held at the University of Iowa on October 17-20, 2007. I was the host and moderated several sessions. The conference was supported in part by a grant from National Institutes of Health, National Cancer Institute (R13 EB007885) which supported the attendance of 12 student scholars. For the last several years, I have served as a member of the organizing committee of the SPIE's (Society of Photo-optical Instrument Engineers) Medical Image Perception Workshop.