

## **Dor Abrahamson, Ph.D.**

Professor  
Graduate School of Education  
Learning Sciences & Human Development  
4110 Berkeley Way West building  
2121 Berkeley Way  
University of California, Berkeley  
Berkeley, CA 94720-1670

TEL (510) 883 4260

Email: [dor@berkeley.edu](mailto:dor@berkeley.edu)

Faculty webpage: <http://gse.berkeley.edu/people/dor-abrahamson>

Laboratory webpage: <https://edrl.berkeley.edu/content/dor-abrahamson>  
<https://orcid.org/0000-0003-2883-4229>

### **Education**

- 2004 Ph.D. in Learning Sciences, Northwestern University, Evanston, IL
- 2000 MA in Cognitive Psychology, Tel Aviv University, Israel (Magna Cum Laude)
- 1992 Music Diploma (cello performance), Jerusalem Academy of Music, Israel.

### **Research Interest and Experience**

Dor Abrahamson researches mathematics learning and teaching. He develops and evaluates theoretical models of these processes by analyzing empirical data collected during implementations of his innovative pedagogical design. Drawing on embodiment and sociocultural paradigms, Abrahamson is particularly interested in modeling how learners coordinate between informal and formal views on situated phenomena and what roles teachers play in ushering these coordinations. Abrahamson's analyses of pedagogical interactions focus on student and teacher use of inference, various modalities, media, discursive genres, semiotic systems, and metaphor.

At the core of Abrahamson's practice are cognitive domain re-analyses with an eye on creating learning materials and activities. Using both traditional media, such as concrete manipulatives, and recent technologies, such as motion sensors, touch screens, agent-based simulations, and artificial intelligence, Abrahamson has worked mostly on the concepts of proportion and probability. This line of research also informs the creation of design frameworks.

Abrahamson's pedagogical inventions have been incorporated into high-profile instructional units that are widely disseminated both through school-based curricular materials and via computer-based interactive software.

Earlier Research Experience at Northwestern: School of Education and Social Policy

On both research projects, below, Abrahamson initiated contacts with districts, principals, and teachers, designed learning materials and activities, led teacher workshops, classroom implementations, data analysis, and writing up for publications, reports, and presentations. Data treatment combined qualitative and quantitative methodologies.

2003-5 *The Center for Connected Learning and Computer-Based Modeling: Post-Doctoral* Fellow leading the Northwestern work on NSF-funded project Integrated Simulation and Modeling Environments (ISME, Uri Wilensky, PI). On this project that investigated student cognition of complex systems, science, social sciences, and mathematics, Abrahamson interviewed individual students to probe for incipient understanding, then led cycles of design, programming, and facilitation of computer-authored learning environments for middle-school student focus groups and networked classrooms. Also, he recruited staff and led weekly project meetings.

2001-3 *Fuson Laboratory for the Development of Mathematics Curricula:* NSF-funded doctoral dissertation project included the design and research of an innovative curricular unit for the mathematical domain of ratio and proportion (Prof. Karen C. Fuson, PI; Uri Wilensky, Co-Advisor). The design is now part of an acclaimed curriculum.

### Courses Taught at Berkeley

- EDUC 290C: Principles for Embodied Design: Exploring Learning-Sciences Perspectives on a Body-Based Approach to the Design of Learning Environments
- EDUC 222C: Design-Based Research in Mixed-Media Learning Environments
- EDUC 290C: Cognitive Ergonomics in STEM Education Research: A Multi-Disciplinary Analysis of Objects-to-Think-With
- EDUC 290C: Modeling-Based Methodology for Design, Learning, and Research
- EDUC 290C: Learning Chance: Computer-Supported Inquiry into Probability
- EDUC 224B: Paradigmatic Didactical–Mathematical Problematic Situations
- EDUC 223B: Research Group:
  - Embodied Design Research Laboratory
  - Embodied Underground
- EDUC 130: Knowing & Learning in Mathematics & Science (CalTeach course)

## Publications

### 1. Refereed Journal Publications and Conference Proceedings

#### a. Refereed Journal Articles

- Abrahamson, D., & Cigan, C. (2003). A design for ratio and proportion. *Mathematics Teaching in the Middle School*, 8(9), 493–501.
- Abrahamson, D. (2006). The shape of things to come: The computational pictograph as a bridge from combinatorial space to outcome distribution. *International Journal of Computers for Mathematics Learning*, 11(1), 137–146.
- Abrahamson, D., Berland, M. W., Shapiro, R. B., Unterman, J. W., & Wilensky, U. J. (2006). Leveraging epistemological diversity through computer-based argumentation in the domain of probability. *For the Learning of Mathematics*, 26(3), 39–45.
- Abrahamson, D., Janusz, R., M., & Wilensky, U. (2006). There once was a 9-Block... — A middle-school design for probability and statistics. *Journal of Statistics Education*, 14(1). Retrieved August 12, 2010, at <http://www.amstat.org/publications/jse/v14n1/abrahamson.html>.
- Abrahamson, D., & Wilensky, U. (2007). Learning axes and bridging tools in a technology-based design for statistics. *International Journal of Computers for Mathematics Learning*, 12(1), 23–55.
- Abrahamson, D. (2009). Embodied design: Constructing means for constructing meaning. *Educational Studies in Mathematics*, 70(1), 27–47.
- Abrahamson, D. (2009). Orchestrating semiotic leaps from tacit to cultural quantitative reasoning — the case of anticipating experimental outcomes of a quasi-binomial random generator. *Cognition and Instruction*, 27(3), 175–224.
- Abrahamson, D. (2009). A student's synthesis of tacit and mathematical knowledge as a researcher's lens on bridging learning theory. In M. Borovcnik & R. Kapadia (Eds.), Research and developments in probability education [Special Issue]. *International Electronic Journal of Mathematics Education*, 4(3), 195–226. Retrieved Aug. 12, 2010 from <http://www.iejme.com/032009/main.htm>
- Veeragoudar Harrell, S., & Abrahamson, D. (2010). Second Life unplugged: A design for fostering at-risk students' STEM agency. In H. Gazit, D. L. Garcia, G. LeMasers, & L. Morgado (Eds.), The metaverse assembled [Special Issue]. *Journal of Virtual Worlds Research*. Retrieved Aug. 12, 2010, at <https://journals.tdl.org/jvwr/article/view/834/716>
- Abrahamson, D., Trninic, D., Gutiérrez, J. F., Huth, J., & Lee, R. G. (2011). Hooks and shifts: A dialectical study of mediated discovery. *Technology, Knowledge, and Learning*, 16(1), 55–85.
- Abrahamson, D., Gutiérrez, J. F., & Baddorf, A. K. (2012). Try to see it my way: The discursive function of idiosyncratic mathematical metaphor. *Mathematical Thinking and Learning*, 14(1), 55–80.

- Abrahamson, D. (2012). Discovery reconceived: Product before process. *For the Learning of Mathematics*, 32(1), 8–15.
- Abrahamson, D. (2012). Rethinking intensive quantities via guided mediated abduction. *The Journal of the Learning Sciences*, 21(4), 626–649.
- Abrahamson, D., Gutiérrez, J. F., Charoenying, T., Negrete, A. G., & Bumbacher, E. (2012). Fostering hooks and shifts: Tutorial tactics for guided mathematical discovery. *Technology, Knowledge, and Learning*, 17(1-2), 61–86.
- Abrahamson, D. (2012). Seeing Chance: Perceptual reasoning as an epistemic resource for grounding compound event spaces. In R. Biehler & D. Pratt (Eds.), Probability in reasoning about data and risk [Special issue]. *ZDM—The International Journal on Mathematics Education*, 44(7), 869–881.
- Abrahamson, D., Lee, R. G., Negrete, A. G., & Gutiérrez, J. F. (2014). Coordinating visualizations of polysemous action: Values added for grounding proportion. In F. Rivera, H. Steinbring, & A. Arcavi (Eds.), Visualization as an epistemological learning tool [Special issue]. *ZDM Mathematics Education*, 46(1), 79–93.
- Abrahamson, D. (2014). Building educational activities for understanding: An elaboration on the embodied-design framework and its epistemic grounds. *International Journal of Child Computer Interaction*, 2(1), 1–16.
- Abrahamson, D., & Trninic, D. (2015). Bringing forth mathematical concepts: Signifying sensorimotor enactment in fields of promoted action. In D. Reid, L. Brown, A. Coles, & M.-D. Lozano (Eds.), Enactivist methodology in mathematics education research [Special issue]. *ZDM Mathematics Education*, 47(2), 295–306.
- Abrahamson, D., & Chase, K. (2015). Interfacing practices: Domain theory emerges via collaborative reflection. *Reflective Practice*, 16(3), 372–389.
- Hutto, D. D., Kirchoff, M. D., & Abrahamson, D. (2015). The enactive roots of STEM: Rethinking educational design in mathematics. In P. Chandler & A. Tricot (Eds.), Human movement, physical and mental health, and learning [Special issue]. *Educational Psychology Review*, 27(3), 371–389.
- Abrahamson, D. (2015). Reinventing learning: A design-research odyssey. In S. Prediger, K. Gravemeijer, & J. Confrey (Eds.), Design research with a focus on learning processes [Special issue]. *ZDM Mathematics Education*, 47(6), 1013–1026.
- Chase, K., & Abrahamson, D. (2015). Reverse-scaffolding algebra: Empirical evaluation of design architecture. In J. Smit, A. Bakker, & R. Wegerif (Eds.), Scaffolding and dialogic teaching in mathematics education [Special issue]. *ZDM Mathematics Education*, 47(7), 1195–1209.
- Abrahamson, D., Shayan, S., Bakker, A., & Van der Schaaf, M. F. (2016). Eye-tracking Piaget: Capturing the emergence of attentional anchors in the coordination of proportional motor action. *Human Development*, 58(4-5), 218–244.

- Abrahamson, D., & Sánchez–García, R. (2016). Learning is moving in new ways: The ecological dynamics of mathematics education. *Journal of the Learning Sciences*, 25(2), 203–239.
- Morgan, P., & Abrahamson, D. (2016). Cultivating the ineffable: The role of contemplative practice in enactivist learning. *For the Learning of Mathematics*, 36(3), 31–37.
- Abrahamson, D., & Bakker, A. (2016). Making sense of movement in embodied design for mathematics learning. In N. Newcombe & S. Weisberg (Eds), Embodied cognition and STEM learning [Special issue]. *Cognitive Research: Principles and Implications (CRPI)*, 1(1), Article #33.
- Zohar, R., Bagno, E., Eylon, B., & Abrahamson, D. (2016). Creativity and cognition in embodied learning of physics concepts. *Dance Now*, 32, 24–31. (Original work published in Hebrew, in Israel)
- Duijzer, A. C. G., Shayan, S., Van der Schaaf, M. F., Bakker, A., Abrahamson, D. (2017). Touchscreen tablets: Coordinating action and perception for mathematical cognition. *Frontiers in Psychology*, 8(144).
- Abrahamson, D., & Kapur, M. (2018). Reinventing discovery learning: A field-wide research program. In D. Abrahamson & M. Kapur (Eds.), *Practicing discovery-based learning: Evaluating new horizons* [Special issue]. *Instructional Science*, 46(1), 1–10.
- Chase, K., & Abrahamson, D. (2018). Searching for buried treasure: Uncovering discovery in discovery-based learning. In D. Abrahamson & M. Kapur (Eds.), *Practicing discovery-based learning: Evaluating new horizons* [Special issue]. *Instructional Science*, 46(1), 11–33.
- Barth–Cohen, L. A., Little, A., & Abrahamson, D. (2018). Building reflective practices in a pre-service math and science teacher education course that focuses on qualitative video analysis. *Journal of Science Teacher Education*, 29(2), 83–101.
- Zohar, R., Bagno, E., Eylon, B., & Abrahamson, D. (2018). Motor skills, creativity, and cognition in learning physics concepts. *Functional Neurology, Rehabilitation, and Ergonomics*, 7(3), 67–76.
- Palatnik, A., & Abrahamson, D. (2018). Rhythmic movement as a tacit enactment goal mobilizes the emergence of mathematical structures. *Educational Studies in Mathematics*, 99(3), 293–309. <https://doi.org/10.1007/s10649-018-9845-0>
- Green, C. A., Abrahamson, D., Chern, H., & O’Sullivan, P. S. (2018). Is robotic surgery highlighting critical gaps in resident training? *Journal of Graduate Medical Education*, 10(5), 491–493.
- Abrahamson, D., Flood, V. J., Miele, J., & Siu, Y.-T. (2019). Enactivism and ethnomethodological conversation analysis as tools for expanding Universal Design for Learning: The case of visually impaired mathematics students. *ZDM Mathematics Education*, 19(2). <https://doi.org/10.1007/s11858-018-0998-1>

Morgan, P., & Abrahamson, D. (2018). Applying contemplative practices to the educational design of mathematics content: Report from a pioneering workshop. *The Journal of Contemplative Inquiry*, 5(1), 107-119.

Abrahamson, D., & Shulman, A. (in press). Constructing movement in mathematics and dance: An interdisciplinary pedagogical dialogue on subjectivity and awareness. *Feldenkrais Research Journal*.

### Journal Articles Under Review / in Preparation

- Abrahamson, D., & Abdu, R. (revise/resubmit). *Coordination dynamics of mathematics education: Envisioning a practice-oriented research paradigm*.
- DeLiema, D., Flood, V. J., Dahn, M., Abrahamson, D., Enyedy, N., & Steen, F. (under review). Debugging failure: A multi-dimensional framework for documenting newcomers' experiences with obstacles. *Instructional Science*.
- Shvarts, A., & Abrahamson, D. (submitted). Dual-eye-tracking Vygotsky: A microgenetic account of a teaching/learning collaboration in an embodied-interaction technological tutorial for mathematics. *Learning, Culture, and Social Interaction*.

### b. Refereed Conference Proceedings

Abrahamson, D. (2002). When “the same” is the same as different differences: Aliya reconciles her perceptual judgment of proportional equivalence with her additive computation skills. In D. Mewborn, P. Sztajn, E. White, H. Wiegel, R. Bryant, and K. Nooney (Eds.), *Proceedings of the 24<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (Vol. 4, pp. 1658–1661). Columbus, OH: Eric Clearinghouse for Science, Mathematics, and Environmental Education.

Abrahamson, D. (2003). Text talk, body talk, table talk: A design of ratio and proportion as classroom parallel events. In N. A. Pateman, B. J. Dougherty, & J. Zilliox (Eds.), *Proceedings of the 27<sup>th</sup> Annual Meeting of the International Group for the Psychology of Mathematics Education* (Vol. 2, pp. 1–8). Columbus, OH: Eric Clearinghouse for Science, Mathematics, and Environmental Education.

- Abrahamson, D., & Wilensky, U. (2003). The quest of the bell curve: A constructionist approach to learning statistics through designing computer-based probability experiments. In M. A. Mariotti (Ed.), *Proceedings of the 3<sup>rd</sup> Conference of the European Society for Research in Mathematics Education*. Pisa, Italy: University of Pisa. Retrieved June 1, 2009, from [http://www.dm.unipi.it/didattica/CERME3/proceedings/Groups/TG5/TG5\\_abrahamson\\_cerme3.pdf](http://www.dm.unipi.it/didattica/CERME3/proceedings/Groups/TG5/TG5_abrahamson_cerme3.pdf)
- Abrahamson, D. (2004). Embodied spatial articulation: A gesture perspective on student negotiation between kinesthetic schemas and epistemic forms in learning mathematics. In D. E. McDougall & J. A. Ross (Eds.), *Proceedings of the 26<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (Vol. 2, pp. 791–797). Windsor, Ontario: Preney.
- Abrahamson, D., & Wilensky, U. (2004). S.A.M.P.L.E.R.: Collaborative interactive computer-based statistics learning environment. In M. Niss (Ed.), *Proceedings of the 10<sup>th</sup> International Congress on Mathematical Education*, Copenhagen, Denmark. Retrieved June 1, 2009, from <http://www.icme-organisers.dk/tsg11/Papers/Abrahamson%20&%20Wilensky.doc>
- Abrahamson, D., & Wilensky, U. (2004). ProbLab: A computer-supported unit in probability and statistics. In M. J. Hoines & A. B. Fuglestad (Eds.), *Proceedings of the 28<sup>th</sup> Annual Meeting of the International Group for the Psychology of Mathematics Education* (Vol. 1, p. 369). Bergen University College.
- Abrahamson, D., Berland, M.W., Shapiro, R. B., Unterman, J. W., & Wilensky, U. (2004). Leveraging epistemological diversity through computer-based argumentation in the domain of probability. In Y. B. Kafai, W. A. Sandoval, N. Enyedy, A. S. Nixon, F. Herrera (Eds.), *Proceedings of the 6<sup>th</sup> International Conference of the Learning Sciences* (pp. 28–35). Mahwah NJ: Lawrence Erlbaum Associates.
- Abrahamson, D., & Wilensky, U. (2005). ProbLab goes to school: Design, teaching, and learning of probability with multi-agent interactive computer models. In M. Bosch (Ed.), *Proceedings of the 4<sup>th</sup> Congress of the European Society for Research in Mathematics Education* (pp. 570–579). Universitat Ramon Llull, Catalonia, Spain: FUNDEMI IQS.
- Abrahamson, D., Blikstein, P., Lamberty, K. K., & Wilensky, U. (2005). Mixed-media learning environments. In M. Eisenberg & A. Eisenberg (Eds.), *Proceedings of the 4<sup>th</sup> International Conference for Interaction Design and Children (IDC 2005)*. Boulder, Colorado: IDC.
- Abrahamson, D., & Wilensky, U. (2005). Understanding chance: From student voice to learning supports in a design experiment in the domain of probability. In G. M. Lloyd, M. Wilson, J. L. M. Wilkins, & S. L. Behm (Eds.), *Proceedings of the 27<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (Vol. 7, pp. 1–8). Roanoke, VA – Virginia Tech: PME-NA.

- Abrahamson, D. (2006). Learning chance: Lessons from a learning-axis and bridging-tools perspective. In A. Rossman & B. Chance (Eds.), *Proceedings of the 7<sup>th</sup> International Conference on Teaching of Statistics*. Salvador, Brazil.
- Abrahamson, D. (2006). “Because in the world, there are more blocks of this type”: The real-worldness of immersive combinatorial analysis as a grounding of simulated probability experiments. In **D. Abrahamson (Organizer)**, What’s a situation in situated cognition? – A constructionist critique of authentic inquiry. In S. Barab, K. Hay, & D. Hickey (Eds.), *Proceedings of the 7<sup>th</sup> International Conference of the Learning Sciences* (Vol. 2, pp. 1015–1021). Mahwah, NJ: Lawrence Erlbaum Associates.
- Abrahamson, D., & Cendak, R. M. (2006). The odds of understanding the law of large numbers: A design for grounding intuitive probability in combinatorial analysis. In J. Novotná, H. Moraová, M. Krátká, N. Stehlíková (Eds.), *Proceedings of the 30<sup>th</sup> Conference of the International Group for the Psychology of Mathematics Education* (Vol. 2, pp. 1–8). Charles University, Prague, Czech Republic: PME.
- Abrahamson, D. (2006). Mathematical representations as conceptual composites: Implications for design. In S. Alatorre, J. L. Cortina, M. Sáiz, & A. Méndez (Eds.), *Proceedings of the 28<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (Vol. 2, pp. 464–466). Universidad Pedagógica Nacional.
- Brar, R., Galpern, A. J., & Abrahamson, D. (2006). Lost in translation: The ‘bean snare’ as a case of the situated–symbolic divide. In S. Alatorre (Ed.), *Proceedings of the 28<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (Vol. 2, pp. 390–391). Universidad Pedagógica Nacional, Mérida, Yucatán, México: PME-NA.
- Abrahamson, D., Blikstein, P., & Wilensky, U. (2007). Classroom model, model classroom: Computer-supported methodology for investigating collaborative-learning pedagogy. In C. Chinn, G. Erkens, & S. Puntambekar (Eds.), *Proceedings of the Biennial Conference on Computer Supported Collaborative Learning* (Vol. 8, Part 1, pp. 46–55). NJ: Rutgers University.
- Abrahamson, D. (2007). Both rhyme and reason: Toward design that goes beyond what meets the eye. In T. Lamberg & L. Wiest (Eds.), *Proceedings of the 29<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 287–295). Stateline (Lake Tahoe), NV: University of Nevada, Reno.
- Abrahamson, D. (2007). Handling problems: Embodied reasoning in situated mathematics. In T. Lamberg & L. Wiest (Eds.), *Proceedings of the 29<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 219–226). Stateline (Lake Tahoe), NV: University of Nevada, Reno.



- Abrahamson, D., Blikstein, P., & Wilensky, U. (2007). Classroom model, model classroom: Computer-supported methodology for investigating collaborative-learning pedagogy. In C. Chinn, G. Erkens, & S. Puntambekar (Eds.), *Proceedings of the Computer Supported Collaborative Learning (CSCL) Conference* (Vol. 8, Part 1, pp. 46–55). NJ: Rutgers University. CD-ROM
- Veeragoudar Harrell, S., & Abrahamson, D. (2007). Computational literacy and mathematics learning in a virtual world: Identity, embodiment, and empowered media engagement. In C. Chinn, G. Erkens, & S. Puntambekar (Eds.), *Proceedings of the Computer Supported Collaborative Learning (CSCL) Conference* (Vol. 8, Part 1, pp. 264–265). NJ: Rutgers University. CD-ROM.
- Abrahamson, D. (2007). The complexity of education research and why we like it. In M. Jacobson (Symposium Organizer & Chair) & W. Clancey (Discussant), *Cognitive systems and the cognitive sciences: Potential for pervasive theoretical and research implications?* In G. Trafton & D. S. McNamara (Eds.), *Proceedings of the 29<sup>th</sup> Meeting of the Cognitive Science Society* (pp. 29–30). Austin, TX: Cognitive Science Society. CD-ROM
- Veeragoudar Harrell, S., & Abrahamson, D. (2008). It takes a virtual village: Transforming urban-youth intellectual agency through critical computational literacy. In S. Veeragoudar Harrell (Chair, Organizer) & S. Barab (Discussant), *Virtually there: Emerging designs for STEM teaching and learning in immersive online 3D microworlds*. Symposium in P. A. Kirschner, F. Prins, V. Jonker & G. Kanselaar (Eds.), *Proceedings of the 8<sup>th</sup> International Conference of the Learning Sciences—International Perspectives in the Learning Sciences: Creating a Learning World (ICLS2008)* (Vol. 3, pp. 383–391). Utrecht, The Netherlands: ISLS.
- Blikstein, P., Abrahamson, D., & Wilensky, U. (2008). The classroom as a complex adaptive system: An agent-based framework to investigate students' emergent collective behaviors. In P. A. Kirschner, F. Prins, V. Jonker & G. Kanselaar (Eds.), *Proceedings of the 8<sup>th</sup> International Conference of the Learning Sciences—International Perspectives in the Learning Sciences: Creating a Learning World (ICLS2008)* (Vol. 3, pp. 12–13). Utrecht, The Netherlands: ISLS.
- Abrahamson, D., & White, T. (2008). Artifacts and aberrations: On the volatility of design research and the serendipity of insight. In P. A. Kirschner, F. Prins, V. Jonker & G. Kanselaar (Eds.), *Proceedings of the 8<sup>th</sup> International Conference of the Learning Sciences—International Perspectives in the Learning Sciences: Creating a Learning World (ICLS2008)* (Vol. 1, pp. 27–34). Utrecht, The Netherlands: ISLS.

- Abrahamson, D. (2008). Bridging theory: A case study of an 11-year-old student engaged in activities designed to support the grounding of outcome-based combinatorial analysis in event-based intuitive judgment. In M. Borovcnik & D. Pratt (Eds. of Topic Study Group 13, Research and Development in the Teaching and Learning of Probability), in the *Proceedings of the International Congress on Mathematical Education (ICME 11)*. Monterrey, Mexico: ICME. Retrieved May 26, 2009, from <http://tsg.icme11.org/tsg/show/14>
- Abrahamson, D., Bryant, M. J., Gutierrez, J. F., Mookerjee, A. V., Souchkova, D., & Thacker, I. (2009). Figuring it out: mathematical learning as guided semiotic disambiguation of useful yet initially entangled intuitions. In S. L. Swars, D. W. Stinson, & S. Lemons-Smith (Eds.), *Proceedings of the 31<sup>st</sup> Annual Meeting of the North-American Chapter of the International Group for the Psychology of Mathematics Education* (Vol. 5, pp. 662–670). Atlanta, GA: Georgia State University.
- Abrahamson, D. (2010). A tempest in a teapot is but a drop in the ocean: Action-objects in analogical mathematical reasoning. In K. Gomez, L. Lyons, & J. Radinsky (Eds.), *Learning in the Disciplines: Proceedings of the 9<sup>th</sup> International Conference of the Learning Sciences (ICLS 2010)* (Vol. 1, pp. 492–499). University of Illinois at Chicago: International Society of the Learning Sciences.
- Reinholz, D., Trninic, D., Howison, M., & Abrahamson, D. (2010). It's not easy being green: Embodied artifacts and the guided emergence of mathematical meaning. In P. Brosnan, Erchick, D., & Flevaris, L. (Eds.), *Proceedings of the 32<sup>nd</sup> Annual Meeting of the North-American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA 32)* (Vol. VI, Ch. 18: Technology, pp. 1488–1496). Columbus, OH: PME-NA.
- Trninic, D., Reinholz, D., Howison, M., & Abrahamson, D. (2010). Design as an object-to-think-with: Semiotic potential emerges through collaborative reflective conversation with material. In P. Brosnan, Erchick, D., & Flevaris, L. (Eds.), *Proceedings of the 32<sup>nd</sup> Annual Meeting of the North-American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA 32)* (Vol. VI, Ch. 18: Technology, 1523–1530). Columbus, OH: PME-NA.
- Howison, M., Trninic, D., Reinholz, D., & Abrahamson, D. (2011). The Mathematical Imagery Trainer: from embodied interaction to conceptual learning. In G. Fitzpatrick, C. Gutwin, B. Begole, W. A. Kellogg, & D. Tan (Eds.), *Proceedings of the annual meeting of CHI: ACM Conference on Human Factors in Computing Systems (CHI 2011)* (Vol. "Full Papers," pp. 1989–1998). ACM: CHI.
- Trninic, D., Gutiérrez, J. F., & Abrahamson, D. (2011). Instruction and embodied design. In A. Antle, P. Marshall, & E. van den Hoven (Chairs), workshop on Embodied Interaction: Theory and Practice in HCI. In G. Fitzpatrick & C. Gutwin (Eds.), *Proceedings of the ACM CHI Conference on Human Factors in Computing Systems (CHI 2011)*. ACM: CHI.

- Trninic, D., Gutiérrez, J. F., & Abrahamson, D. (2011). Virtual mathematical inquiry: Problem solving at the gestural–symbolic interface of remote-control embodied-interaction design. In G. Stahl, H. Spada, N. Miyake, & N. Law (Eds.), *Connecting Computer-Supported Collaborative Learning to Policy and Practice: CSCL2011 Conference Proceedings* (Vol. 1—“Long Papers,” pp. 272–279). Hong Kong: International Society of the Learning Sciences.
- Abrahamson, D., & Trninic, D. (2011). Toward an embodied-interaction design framework for mathematical concepts. In P. Blikstein & P. Marshall (Eds.), *Proceedings of the 10<sup>th</sup> Annual Interaction Design and Children Conference (IDC 2011)*, Ann Arbor, MI, June 20-23 (Vol. “Full papers,” pp. 1–10). IDC.
- Trninic, D., & Abrahamson, D. (2011). Emergent ontology in embodied interaction: Automated feedback as conceptual placeholder. In L. R. Wiest & T. Lamberg (Eds.), *Proceedings of the 33<sup>rd</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1777–1785). Reno, NV: University of Nevada, Reno.
- Abrahamson, D. (Chair & Organizer), & Eisenberg, M. (Discussant). (2012). You’re it! Body, action, and object in STEM learning. In J. v. Aalst, K. Thompson, M. J. Jacobson, & P. Reimann (Eds.), *Proceedings of the International Conference of the Learning Sciences: Future of Learning (ICLS 2012)* (Vol. 1: Full papers, pp. 283–290). Sydney: University of Sydney / ISLS.
- Trninic, D., & Abrahamson, D. (2012). Embodied artifacts and conceptual performances. In J. v. Aalst, K. Thompson, M. J. Jacobson, & P. Reimann (Eds.), *Proceedings of the International Conference of the Learning Sciences: Future of Learning (ICLS 2012)* (Vol. 1: “Full papers,” pp. 283–290). Sydney: University of Sydney / ISLS.
- Abrahamson, D. (2013). Toward a taxonomy of design genres: Fostering mathematical insight via perception-based and action-based experiences. In J. P. Hourcade, E. A. Miller, & A. Egeland (Eds.), *Proceedings of the 12<sup>th</sup> Annual Interaction Design and Children Conference (IDC 2013)* (Vol. “Full Papers,” pp. 218–227). New York: The New School & Sesame Workshop.
- Chase, K., & Abrahamson, D. (2013). Rethinking transparency: constructing meaning in a physical and digital design for algebra. In J. P. Hourcade, E. A. Miller, & A. Egeland (Eds.), *Proceedings of the 12<sup>th</sup> Annual Interaction Design and Children Conference (IDC 2013)* (Vol. “Short Papers,” pp. 475–478). New York: The New School & Sesame Workshop.
- Negrete, A. G., Lee, R. G., & Abrahamson, D. (2013). Facilitating discovery learning in the tablet era: Rethinking activity sequences vis-à-vis digital practices. In M. Martinez & A. Castro Superfine (Eds.), *“Broadening Perspectives on Mathematics Thinking and Learning” – Proceedings of the 35<sup>th</sup> Annual Meeting of the North-American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA 35)* (Chap. 10: “Technology,” p. 1205). Chicago, IL: University of Illinois at Chicago.

- Abrahamson, D., Chase, K., Kumar, V., & Jain, R. (2014). Leveling transparency via situated, intermediary learning objectives. In J. L. Polman, E. A. Kyza, D. K. O’Neill, I. Tabak, W. R. Penuel, A. S. Jurow, K. O’Connor, T. Lee & L. D’Amico (Eds.), *Proceedings of “Learning and Becoming in Practice,” the 11<sup>th</sup> International Conference of the Learning Sciences (ICLS) 2014* (Vol. 1, pp. 23–30). Boulder, CO: International Society of the Learning Sciences.
- Flood, V. J., Schneider, A., & Abrahamson, D. (2014). Gesture enhancement of a virtual tutor via investigating human tutor discursive strategies: Forms and functions for proportions. In J. L. Polman, E. A. Kyza, D. K. O’Neill, I. Tabak, W. R. Penuel, A. S. Jurow, K. O’Connor, T. Lee & L. D’Amico (Eds.), *Proceedings of “Learning and Becoming in Practice,” the 11<sup>th</sup> International Conference of the Learning Sciences (ICLS) 2014* (Vol. 3, pp. 1593–1594). Boulder, CO: International Society of the Learning Sciences.
- Flood, V. J., Neff, M., & Abrahamson, D. (2015). Boundary interactions: resolving interdisciplinary collaboration challenges using digitized embodied performances. In O. Lindwall, P. Häkkinen, T. Koschmann, P. Tchounikine, & S. Ludvigsen (Eds.), *“Exploring the material conditions of learning: opportunities and challenges for CSCL,” the Proceedings of the Computer Supported Collaborative Learning (CSCL) Conference* (Vol. 1, pp. 94–101). Gothenburg, Sweden: ISLS.
- Shayan, S., Abrahamson, D., Bakker, A., Duijzer, A. C. G., & Van der Schaaf, M. F. (2015). The emergence of proportional reasoning from embodied interaction with a tablet application: An eye-tracking study. In L. Gómez Chova, A. López Martínez, & I. Candel Torres (Eds.), *Proceedings of the 9<sup>th</sup> International Technology, Education, and Development Conference (INTED 2015)* (pp. 5732–5741). Madrid: IATED.
- Chase, K., & Abrahamson, D. (2015). Reverse scaffolding: A constructivist design architecture for mathematics learning with educational technology. In B. Shapiro, C. Quintana, S. Gilutz, & M. Skov (Eds.), *Proceedings of the 14<sup>th</sup> annual conference of ACM SIGCHI Interaction Design & Children (IDC 2015)* (Vol. “Full papers”, pp. 189–198). Tufts University, Boston: ACM.
- Abrahamson, D., & Sánchez-García, R. (2015). A call to action: Towards an ecological-dynamics theory of mathematics learning, teaching, and design. In T. G. Bartell, K. N. Bieda, R. T. Putnam, K. Bradfield, & H. Dominguez (Eds.), *Proceedings of the 37<sup>th</sup> annual meeting of the North-American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA)* (Ch. 12, “Theory and research methods: Research reports,” pp. 1261–1268). East Lansing, MI: Michigan State University.

- Abrahamson, D., Sánchez-García, R., & Smyth, C. (2016). Metaphors are projected constraints on action: An ecological dynamics view on learning across the disciplines. In C.-K. Looi, J. L. Polman, U. Cress, & P. Reimann (Eds.), *“Transforming learning, empowering learners,” Proceedings of the International Conference of the Learning Sciences (ICLS 2016)* (Vol. 1, “Full Papers,” pp. 314–321). Singapore: International Society of the Learning Sciences. [**Selected as Best Paper ICLS 2016**]
- Abrahamson, D., Shayan, S., Bakker, A., & Van der Schaaf, M. F. (2016). Exposing Piaget’s scheme: Empirical evidence for the ontogenesis of coordination in learning a mathematical concept. In C.-K. Looi, J. L. Polman, U. Cress, & P. Reimann (Eds.), *“Transforming learning, empowering learners,” Proceedings of the International Conference of the Learning Sciences (ICLS 2016)* (Vol. 1, “Full Papers,” pp. 466–473). Singapore: International Society of the Learning Sciences.
- Flood, V. J., Harrer, B. W., & Abrahamson, D. (2016). The interactional work of configuring a mathematical object in a technology-enabled embodied learning environment. In C.-K. Looi, J. L. Polman, U. Cress, & P. Reimann (Eds.), *“Transforming learning, empowering learners,” Proceedings of the International Conference of the Learning Sciences (ICLS 2016)* (Vol. 1, “Full Papers,” pp. 122–129). Singapore: International Society of the Learning Sciences.
- Flood, V. J., Neff, M., & Abrahamson, D. (2016). Animated-GIF libraries for capturing pedagogical gestures: An innovative methodology for virtual tutor design and teacher professional development. In *Gesture, creativity, multimodality – Proceedings of the 7<sup>th</sup> annual meeting of the International Society for Gesture Studies, Paris, July 18–22* (p. 79). Paris: Université Sorbonne Nouvelle.
- Abrahamson, D., Sánchez-García, R., & Trninic, D. (2016). Praxes proxies: Revisiting educational manipulatives from an ecological dynamics perspective. In M. B. Wood, E. E. Turner, M. Civil, & J. A. Eli (Eds.), *Sin fronteras: Questioning borders with(in) mathematics education - Proceedings of the 38<sup>th</sup> annual meeting of the North-American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA)* (Ch. 13, “Theory and research methods,” pp. 1565–1572). Tucson, AZ: University of Arizona.
- Rosenbaum, L. F., & Abrahamson, D. (2016). Back to the drawing board: On studying interaction with mechanical design. In M. B. Wood, E. E. Turner, M. Civil, & J. A. Eli (Eds.), *Sin fronteras: Questioning borders with(in) mathematics education - Proceedings of the 38<sup>th</sup> annual meeting of the North-American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA)* (Ch. 13, “Theory and research methods,” pp. 1612–1615). Tucson, AZ: University of Arizona.

- Rosen, D. M., Palatnik, A., & Abrahamson, D. (2016). Tradeoffs of situatedness: Iconicity constrains the development of content-oriented sensorimotor schemes. In M. B. Wood, E. E. Turner, M. Civil, & J. A. Eli (Eds.), *Sin fronteras: Questioning borders with(in) mathematics education - Proceedings of the 38<sup>th</sup> annual meeting of the North-American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA)* (Ch. 12, “Technology,” pp. 1509–1516). Tucson, AZ: University of Arizona.
- Palatnik, A., & Abrahamson, D. (2017). Taking measures to coordinate movements: Unitizing emerges as a method of building event structures for enacting proportion. In E. Galindo & J. Newton (Eds.), “*Synergy at the crossroads*” — *Proceedings of the 39<sup>th</sup> annual conference of the North-American chapter of the International Group for the Psychology of Mathematics Education* (Vol. 13 [Theory and research methods], pp. 1439–1442). Indianapolis, IN: Hoosier Association of Mathematics Teacher Educators.
- Abdullah, A., Adil, M., Rosenbaum, L. F., Clemmons, M., Shah, M., Abrahamson, D., & Neff, M. (2017). Pedagogical agents to support embodied, discovery-based learning. In J. Beskow, C. Peters, G. Castellano, C. O’Sullivan, I. Leite, & S. Kopp (Eds.), *Proceedings of 17<sup>th</sup> International Conference on Intelligent Virtual Agents (IVA 2017)* (pp. 1–14). Cham: Springer International Publishing.
- Flood, V. J., DeLiema, D., & Abrahamson, D. (2018). Bringing static code to life: The instructional work of animating computer programs with the body. In J. Kay & R. Luckin (Eds.), “*Rethinking learning in the digital age: Making the Learning Sciences count*,” *Proceedings of the 13<sup>th</sup> International Conference of the Learning Sciences* (Vol. 2, pp. 1085–1088). London: International Society of the Learning Sciences.
- Flood, V. J., DeLiema, D., Harrer, B. W. & Abrahamson, D. (2018). Enskilment in the digital age: The interactional work of learning to debug. In J. Kay & R. Luckin (Eds.), “*Rethinking learning in the digital age: Making the Learning Sciences count*,” *Proceedings of the 13<sup>th</sup> International Conference of the Learning Sciences* (Vol. 3, pp. 1405–1406). London: International Society of the Learning Sciences.
- Abrahamson, D., & Bakker, A. (2018). An ecological dynamics view on movement-based mathematics learning: on the emergence of sensorimotor schemes in sociocultural settings. In D. Abrahamson (Chair), O. Lindwall (Discussant), & A. Andrade (Org.), *Moving forward: In search of synergy across diverse views on the role of physical movement in design for STEM education* [symposium]. In J. Kay & R. Luckin (Eds.), “*Rethinking learning in the digital age: Making the Learning Sciences count*,” *Proceedings of the 13<sup>th</sup> International Conference of the Learning Sciences (ICLS 2018)* (Vol. 2, pp. 1243–1250). London: International Society of the Learning Sciences.

Pardos, Z. A., Hu, C., Meng, P., Neff, M., & Abrahamson, D. (2018). Characterizing learner behavior from high frequency touchscreen data using recurrent neural networks. In D. Chin & L. Chen (Eds.), *Adjunct proceedings of the 26<sup>th</sup> Conference on User Modeling, Adaptation and Personalization (UMAP '18)*. Singapore: ACM. 6 pages.

**c. Conference Presentations (refereed acceptance)**

- Fuson, K. C., Kalchman, M., Abrahamson, D., & Izsák, A. (2002, April). *Bridging the addition–multiplication learning gap: Teaching studies in four multiplicative domains*. Symposium conducted at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Abrahamson, D. (2003, April). A situational–representational didactic design for fostering conceptual understanding of mathematical content: The case of ratio and proportion. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.
- Abrahamson, D., & Wilensky, U. (2004, April). S.A.M.P.L.E.R.: Statistics As Multi-Participant Learning-Environment Resource. In U. Wilensky (Chair) & S. Papert (Discussant), *Networking and complexifying the science classroom: Students simulating and making sense of complex systems using the HubNet networked architecture*. Symposium conducted at the annual meeting of the American Educational Research Association, San Diego, CA.
- Abrahamson, D., & Wilensky, U. (2005, April). Collaboration and equity in classroom activities using Statistics As Multi-Participant Learning-Environment Resource (S.A.M.P.L.E.R.). In W. Stroup & U. Wilensky (Chairs), C. D. Lee (Discussant), *Patterns in group learning with next-generation network technology*. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada.
- Abrahamson, D., & Wilensky, U. (2005, April). The stratified learning zone: Examining collaborative-learning design in demographically-diverse mathematics classrooms. In D. Y. White (Chair) & E. H. Gutstein (Discussant), *Equity and diversity studies in mathematics learning and instruction*. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada.
- Abrahamson, D., & Wilensky, U. (2005, June) Piaget? Vygotsky? I'm game: Agent-based modeling for psychology research. In M. Mascolo (Chair) *Theoretical issues*, the annual meeting of the Jean Piaget Society, Vancouver, Canada. <http://ccl.northwestern.edu/research/conferences/JPS2005/jps2005.html>

- Abrahamson, D. (2006, April). Bottom-up stats: Toward an agent-based “unified” probability and statistics. In D. Abrahamson (Org.), U. Wilensky (Chair), and M. Eisenberg (Discussant), *Small steps for agents... giant steps for students?: Learning with agent-based models*. Symposium conducted at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Wilensky, U., & Abrahamson, D. (2006, April). *Is a disease like a lottery?: Classroom networked technology that enables student reasoning about complexity*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Abrahamson, D. (2006, April). Bottom-up stats: Toward an agent-based “unified” probability and statistics. In D. Abrahamson (Org.), U. Wilensky (Chair), and M. Eisenberg (Discussant), *Small steps for agents... giant steps for students?: Learning with agent-based models*. Symposium conducted at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Abrahamson, D. (2006, June). *The three M’s: Imagination, embodiment, and mathematics*. Paper presented at the annual meeting of the Jean Piaget Society, Baltimore, MD, June 1–3.
- Blikstein, P., Abrahamson, D., & Wilensky, U. (2006, June). *Minsky, mind, and models: Juxtaposing agent-based computer simulations and clinical-interview data as a methodology for investigating cognitive-developmental theory*. Paper presented at the annual meeting of the Jean Piaget Society, Baltimore, MD.
- Abrahamson, D., Wilensky, U., & Levin, J. (2007, April). Agent-based modeling as a bridge between cognitive and social perspectives on learning. In **D. Abrahamson (Organizer)**, U. Wilensky (Chair), & R. Lesh (Discussant), *Learning Complexity: Agent-based modeling supporting education research on student cognition in social contexts*. Paper accepted for presentation at the annual meeting of the American Educational Research Association, Chicago, IL, April 9–13.
- Blikstein, P., Abrahamson, D., & Wilensky, U. (2007, April). Multi-agent simulation as a tool for investigating cognitive–developmental theory. In **D. Abrahamson (Organizer)**, U. Wilensky (Chair), & R. Lesh (Discussant), *Learning Complexity: Agent-based modeling supporting education research on student cognition in social contexts*. Paper accepted for presentation at the annual meeting of the American Educational Research Association, Chicago, IL, April 9–13.
- Abrahamson, D. (2007, April). *The real world as a trick question: Undergraduate statistics majors’ construction-based modeling of probability*. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL, April 9–13.
- Abrahamson, D. (2007, June). *From gesture to design: Building cognitively ergonomic learning tools*. Paper presented at the annual conference of the International Society for Gesture Studies. Northwestern University, June 18–20.



- Abrahamson, D. (2007, September). *From intuition to inscription: Emerging design principles for mathematics education*. Presented at the annual meeting of the International Society for Design and Development in Education (ISDDE), Berkeley, CA, September 17–20.
- Abrahamson, D. (2008, April). Toward intuitive grasps of binomial distributions: A mixed-media approach. In A. Rubin (Chair) and P. Vahey (Discussant), *Contrasting perspectives on connecting important ideas in probability*. Symposium presented at the National Council of Teachers of Mathematics Research Pre-session, Salt Lake City, UT, April 7–9.
- Abrahamson, D., Bryant, M. J., Howison, M. L., & Relaford-Doyle, J. J. (2008, March). *Toward a phenomenology of mathematical artifacts: A circumspective deconstruction of a design for the binomial*. Paper presented at the annual conference of the American Educational Research Association, New York, March 24 – 28.
- Abrahamson, D. (2008, March). Fostering the emergence of an embodied cognitive artifact: The case of the number line in a design for probability. In **D. Abrahamson** (Chair), D. Earnest (Org.), & H. Bass (Discussant), *The many values of the number line—An interdisciplinary forum*. Symposium presented at the annual conference of the American Educational Research Association, New York, March 24–28.
- Abrahamson, D. (2008, March). From gesture to design: Building cognitively ergonomic learning tools. In S. Gerofsky (Chair & Org.) & M. Nathan (Discussant), *Math education meets gesture studies: How mathematics education adapts gesture studies to its own purposes*. Symposium presented at the annual conference of the American Educational Research Association, New York, March 24–28.
- Blikstein, P., Abrahamson, D., & Wilensky, U. (2008, March). *Groupwork as a complex adaptive system: A methodology to model, understand, and design classroom strategies for collaborative learning*. Paper presented at the annual conference of the American Educational Research Association, New York, March 24–28.
- Veeragoudar Harrell, S., & Abrahamson, D. (2008, March). *It takes a virtual village: Living and learning in online virtual reality*. In J. Mahiri (Chair & Org.) & C. D. Lee (Discussant), *Reversing underachievement: Digital media in teaching and learning with highly marginalized students*. Symposium presented at the annual conference of the American Educational Research Association, New York, March 24–28.

- Blikstein, P., Wilensky, U., & Abrahamson, D. (2009, April). *Towards a framework for cognitive research using agent-based modeling and complexity sciences*. In M. Jacobson (Symposium Chair), M. Kapur (Organizer), & N. Sibelli (Discussant). *Complexity, learning, and research: Under the microscope, new kinds of microscopes, and seeing differently*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, April 13–17.
- Abrahamson, D. (2009, April). *Appropriate tools: On grounding mathematical procedures in perceptual intuitions*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, April 13–17.
- Mauks–Kaupke, K. P., Buchanan, K., Relaford–Doyle, J., Sushkova, D., & Abrahamson, D. (2009, April). *The double-edged sword of constructivist design*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, April 13–17.
- Zolkower, B., & Abrahamson, D. (2009, April). *Studying paradigmatic didactical-mathematical situations: Design and implementation of an experimental graduate level course for pre-service mathematics teachers and doctoral students*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, April 13–17.
- Veeragoudar, S., & Abrahamson, D. (2009, April). *At-risk voices speak, theory is all ears: Toward an empirically-based model of agency for STEM learning*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, April 13–17.
- Abrahamson, D., & Howison, M. L. (2010, May). *Kinemathics: Exploring kinesthetically induced mathematical learning*. Paper presented at the annual meeting of the American Educational Research Association, April 30 – May 4.
- Abrahamson, D., & Howison, M. L. (2010, May). *Embodied artifacts: coordinated action as an object-to-think-with*. In D. L. Holton (Chair) & J. P. Gee (Discussant), *Embodied and enactive approaches to instruction: Implications and innovations*. Paper presented at the annual meeting of the American Educational Research Association, April 30 – May 4.
- Gutiérrez, J. F., Trninic, D., Lee, R. G., & Abrahamson, D. (2011, April). *Hooks and shifts in instrumented mathematics learning*. Paper presented at the annual meeting of the American Educational Research Association (SIG Learning Sciences). New Orleans, LA, April 8–12, 2011.
- Trninic, D., Gutiérrez, J. F., Lee, R. G., & Abrahamson, D. (2011, April). *Generative immersion and immersive generativity in instructional design*. Paper presented at the annual meeting of the American Educational Research Association (SIG Research in Mathematics Education). New Orleans, LA, April 8–12, 2011.

- Abrahamson, D., Gutiérrez, J. F., Lee, R. G., Reinholz, D., & Trninic, D. (2011, April). *From tacit sensorimotor coupling to articulated mathematical reasoning in an embodied design for proportional reasoning*. In R. Goldman (Chair), H. Kwah & D. Abrahamson (Organizers), & R. P. Hall (Discussant), *Diverse perspectives on embodied learning: Shat's so hard to grasp?* Symposium presented at the annual meeting of the American Educational Research Association (SIG Advanced Technologies for Learning). New Orleans, LA, April 8–12, 2011.
- Abrahamson, D., Trninic, D., & Gutiérrez, J. F. (2011, June). *Dialectical investigations of mathematical discovery: The emergence of disciplinary forms in an embodied-interaction design for proportions*. Paper presented at the annual meeting of the Jean Piaget Society, Berkeley, June 2–4.
- Visintainer, T., Little, A., & Abrahamson, D. (2011, May). *Pedagogical heuristics for teacher preparation: Reflections from CalTeach*. Paper presented at the annual UTeach Institute/NIMSI conference, UT Austin, Austin, TX, May 24–26.
- Charoenying, T., Trninic, D., & Abrahamson, D. (2012, April). *The choreography of conceptual development: Cognitive schemes meet cultural practice in instructional design*. Poster presented at the annual meeting of the American Educational Research Association, Vancouver, April 13–17.
- Abrahamson, D., & Charoenying, T. (2012, April). *Doing-for-seeing, seeing-for-doing: Demonstration and imitation as critical opportunities for schema development in embodied-interaction mathematics learning*. Paper presented at the annual meeting of the American Educational Research Association, Vancouver, April 13–17.
- Abrahamson, D., Negrete, A. G., & Gutiérrez, J. F. (2012, April). *Adding up to multiplicative concepts: The role of embodied reasoning*. Paper presented at the annual meeting of the American Educational Research Association (SIG Research in Mathematics Education), Vancouver, April 13–17.
- Abrahamson, D., Gutiérrez, J. F., Charoenying, T., Negrete, A. G., & Bumbacher, E. (2012, April). *Fostering mathematical discovery: One tutor's strategies for ushering the construction of proportional schemas via mediated embodied interaction*. In J. Radinsky (Chair) & J. Lemke (Discussant), *Emergent methods for studying spatial and embodied dimensions of learning*. Symposium presented at the annual meeting of the American Educational Research Association (SIG Learning Sciences), Vancouver, April 13–17.
- Abrahamson, D. (2012, May/June). *Discovery reconceived: Product before process*. Paper presented at “Rethinking Cognitive Development”—the 42<sup>nd</sup> annual meeting of the Jean Piaget Society, Toronto, May 31 – June 2.
- Trninic, D., & Abrahamson, D. (2012, May/June). *Body of knowledge: Rethinking mathematical concepts as signified embodied procedures*. Paper presented at “Rethinking Cognitive Development”—the 42<sup>nd</sup> annual meeting of the Jean Piaget Society, Toronto, May 31 – June 2.

- Lee, R. G., Hung, M., Negrete, A. G., & Abrahamson, D. (2013, April). *Rationale for a ratio-based conceptualization of slope: Results from a design-oriented embodied-cognition domain analysis*. Paper presented at the annual meeting of the American Educational Research Association (Special Interest Group on Research in Mathematics Education), San Francisco, April 27 - May 1.
- Abrahamson, D., & Chase, K. (2015, April). *Leveling algebra transparency: Giant steps towards a new approach to learning?* Paper presented at the annual meeting of the American Educational Research Association, Chicago, April 16–20.
- Flood, V. J., & Abrahamson, D. (2015, April). *Refining mathematical meanings through multimodal revoicing interactions: The case of “faster.”* Paper presented at the annual meeting of the American Educational Research Association, Chicago, April 16 – 20.
- Flood, V. J., Schneider, A., & Abrahamson, D. (2015, April). *Moving targets: Representing and simulating choreographies of multimodal pedagogical tactics for virtual agent mathematics tutors*. Paper presented at the annual meeting of the American Educational Research Association, Chicago, April 16–20.
- Abrahamson, D. (Co-Chair), Krajcik, J. S. (Discussant), Langbeheim, E., Levy, S. T. (Co-Chair), Peleg, R. (Organizer), & Zohar, A. (2015, April). *When chemistry education researchers met a new paradigm: a graduate seminar reflects on embodied cognition*. Symposium presented at the annual conference of the National Association for Research in Science Teaching (NARST), Chicago, April 11–14.
- Abrahamson, D. (Chair), D. H. Clements (Discussant), & K. Chase (Organizer) (2016, April). *Discovery-based STEM learning 2.0: Are we there yet?* Symposium presented at the annual meeting of the American Educational Research Association (Special Interest Group: Learning Sciences), Washington, DC, April 8–12.
- Trninic, D., & Abrahamson, D. (2016, April). *Making “direct instruction” and “discovery learning” play along: Restoring the historical educational role of practice*. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC, April 8–12.
- Chase, K., & Abrahamson, D. (2016, April). *Searching for buried treasure: Uncovering the discovery in discovery-based learning*. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC, April 8–12.
- Abrahamson, D., Shayan, S., Bakker, A., & Van der Schaaf, M. F. (2016, April). *Exposing Piaget’s scheme: Empirical evidence for the microgenesis of coordination*. Poster presented at the annual meeting of the American Educational Research Association, Washington, DC, April 8–12.

- Abrahamson, D., Sánchez-García, R., & Smyth, C. (2016, April). *Metaphors are projected constraints on action: An ecological dynamics view on learning across the disciplines*. Poster presented at the annual meeting of the American Educational Research Association, Washington, DC, April 8–12.
- Abrahamson, D., Shayan, S., Bakker, A., & Van der Schaaf, M. (2016, June). *Evidence for reflective abstraction: Seeing (eye-tracking data) is believing*. Paper presented at the 46<sup>th</sup> annual meeting of the Jean Piaget Society, Chicago, June 9–11, 2016.
- Zohar, R., Bagno, E., Eylon, B., & Abrahamson, D. (2016, July). *Dance, dance, revolution: From collective choreography to angular velocity via leveraging authentic discursive practices*. Paper presented at the annual meeting of JURE (Junior Researchers of EARLI), Helsinki.
- Abrahamson, D., & Bakker, A. (2016, Sep.). *More than hand waving: Rethinking embodied movement in mathematics education*. Paper presented at the workshop “From basic cognition to the philosophy of mathematical practice,” Institute of Mathematics, University of Seville, Seville, September 19–21.
- Hutto, D. D., Abrahamson, D., & Kirchoff, M. D. (2016, Sep.). *The enactive roots of STEM: Rethinking educational design in mathematics*. Paper presented at the workshop “From basic cognition to the philosophy of mathematical practice,” Institute of Mathematics, University of Seville, Seville, September 19–21.
- Rosen, D., Palatnik, A., & Abrahamson, D. (2017, April). *Constraints on embodiment: Iconicity may damage sensorimotor grounding*. In D. Uttal (Organizer & Chair) & N. Sinclair (Discussant), “On the interaction between embodied and symbolic mathematics knowledge: Implications for instruction”—symposium presented at the annual conference of the American Educational Research Association (AERA 2017), San Antonio, TX, April 27 – May 1.
- Abrahamson, D., & Palatnik, A. (2017, June). *Taking measures to learn mathematics: Rhythmic enactment of coordinated movements as a performance goal driving conceptual development*. Paper presented at “Technologies and Human Development,” the annual meeting of the Jean Piaget Society, San Francisco, June 8–10.
- Morgan, P., & Abrahamson, D. (2017, June). *Cultivating the ineffable: Supporting the contemplative emergence of mathematics reasoning*. Paper presented at “Technologies and Human Development,” the annual meeting of the Jean Piaget Society, San Francisco, June 8–10.
- Zohar, R., Bagno, E., Eylon, B.-S., & Abrahamson, D. (2017, July). *Motor skills, creativity, and cognition in learning physics concepts*. Paper presented at the 1<sup>st</sup> annual meeting of *Movement: Brain, Body, Cognition*. Oxford, UK, July 9–11.

- Abrahamson, D., & Shulman, A. (2017, July). *Constructing movement in mathematics and dance: An interdisciplinary pedagogical dialogue on subjectivity and awareness*. Paper presented at the 1<sup>st</sup> annual meeting of *Movement: Brain, Body, Cognition*. Oxford, UK, July 9–11.
- Shayan, S., Bakker, A., van der Schaaf, M. F., & Abrahamson, D. (2017, Aug.). *Eye-tracking conceptual development: The case of tablet computers for mathematics learning*. Paper presented at the 18<sup>th</sup> European Conference on Developmental Psychology (ECDP2017), Utrecht, The Netherlands.
- Shayan, S., Boven, L. M., Bakker, A., van der Schaaf, M. F., & Abrahamson (2017, Aug.). *Evidencing the emergence of sensorimotor structures underlying proportional reasoning*. Poster presented at the 19<sup>th</sup> European Conference on Eye Movements, Bergische Universität, Wuppertal, August 20–24, 2017.
- Shvarts, A., & Abrahamson, D. (2018, April). *Towards a complex systems model of enculturation: A dual eye-tracking study*. Paper presented at the annual conference of the American Educational Research Association (Special Interest Group: Learning Sciences), NYC, April 13–17.
- DeLiema, D., Abrahamson, D., Enyedy, N., Steen, F., Dahn, M., Flood, V. J., Taylor, J., & Lee, L. (2018). *Measuring debugging: How late elementary and middle school students handle broken code*. In Y. Kafai & D. A.-L. Lui (Chairs & Organizers), *Measuring making: Methods, tools, and strategies for capturing learning, participation, and engagement in maker activities*. Paper presented at the annual conference of the American Educational Research Association, New York City, April 13–17.
- Rosenbaum, L. F., Bakker, A., & Abrahamson, D. (2018, April). *Enculturating movement: From sensorimotor schemes to mathematical structures*. Paper presented at the annual meeting of the American Psychological Association's conference on Technology, Mind & Society, Washington, DC, April 5–7, 2018.
- Abrahamson, D. (Chair & Organizer). (2018, June). *A complex-dynamical-systems view on the situated emergence of coordinated activity: From single cells to human collectives*. Symposium presented at the annual meeting of the Jean Piaget Society, Amsterdam, May 31 – June 2.
- Alberto, R. A., Shayan, S., van der Schaaf, M., Bakker, A., & Abrahamson, D. (2018, June). *How to design for embodied dynamic development toward proportional actions, perceptions and descriptions?* Paper presented at the annual meeting of the Jean Piaget Society, Amsterdam, May 31 – June 2.
- Shvarts, A., & Abrahamson, D. (2018, June). *Vygotsky's psychological systems as complex dynamical systems: Theorizing multimodal data of student-tutor collaboration on an embodied mathematical task*. Paper presented at the annual meeting of the Jean Piaget Society, Amsterdam, May 31 – June 2.
- Abrahamson, D. (2018, June). *Design research as iterated cycles of cognitive-task ideation, implementation, and analysis*. Paper presented at the annual meeting of the Jean Piaget Society, Amsterdam, May 31 – June 2.

- Walker–van Aalst, O., DeLiema, D., Flood, V. J., & Abrahamson, D. (2018, June). *Peer conversations about refactoring computer code: Negotiating reflective abstraction through narrative, affect, and play*. Paper presented at the annual meeting of the Jean Piaget Society, Amsterdam, May 31 – June 2.
- Bakker, A., Abrahamson, D., & Alberto, R. A. (2018, August). *The interplay of theory and methods in embodied design research*. In A. Bikner-Ahsbals (Chair), R. Lehrer (Discussant), & A. Bakker (Organizer), How methodology and theory push each other forward [symposium]. Paper presented at “Dialogue between ontology and epistemology,” the annual meeting of the European Association for Research on Learning and Instruction (EARLI) Special Interest Groups 17 & 25. Cambridge, UK, August 27–28.
- Abdu, R., Abrahamson, D., Bakker, A., & Shayan, S. (2018, October). *Applying coordination dynamics to technologically-based embodied mathematics learning*. Paper presented at the annual meeting of the European Association for Research on Learning and Instruction (EARLI): Special Interest Group “Inquiry Learning” (20), Jerusalem, October 9-12.
- Bakker, A., Shvarts, A., & Abrahamson, D. (2019, Feb.). *Generativity in design research: The case of developing a genre of action-based mathematics learning activities*. Paper presented at the Eleventh Congress of the European Society for Research in Mathematics Education [TWG 17: Theoretical Perspectives and Approaches in Mathematics Education], Utrecht, The Netherlands, Feb. 6–10.
- Morgan, P., & Abrahamson, D. (2019, April). *Contemplative mathematics pedagogy: Report from a pioneering workshop*. Paper presented at the annual meeting of the American Educational Research Association (Special Interest Group: Holistic Education), Toronto, April 5–9.
- DeLiema, D., Dahn, M., Enyedy, N., Abrahamson, D., Steen, F., Flood, V. J., & Taylor, J. (2019, April). Debugging failure: 5<sup>th</sup>-10<sup>th</sup> grade students’ journal reflections, coding, and artwork about broken code. In D. A.-L. Lui, D. DeLiema, J. Ryoo, & Y. Kafai (Chairs & Organizers), *Failure in the learning process: How learners experience and overcome obstacles through resources and supports*. Structured poster session conducted at the annual meeting of the American Educational Research Association, Toronto, April 5–9.
- Ryan, Z., DeLiema, D., & Abrahamson, D. (2019, April). Understanding instructors’ reflections on conjecture maps and their impact on design-based research. In F. S. Azevedo (Session Organizer), *STEM Teacher Education and Cognition*. Roundtable session conducted at the annual meeting of the American Educational Research Association, Toronto, April 5–9.

#### **d. Refereed Conference Workshops and Demos**

- Blikstein, P., Abrahamson, D., & Wilensky, U. (2005). NetLogo: Where we are, where we're going. In M. Eisenberg & A. Eisenberg (Eds.), *Proceedings of the 4<sup>th</sup> International Conference for Interaction Design and Children (IDC 2005)*, Boulder, Colorado.
- Lindgren, R., Manches, A., & Abrahamson, D., Price, S., Lee, V. R., & Tissenbaum, M. (in press). Workshop: Embodiment and designing learning environments. In C.-K. Looi, J. L. Polman, U. Cress, & P. Reimann (Eds.), *“Transforming learning, empowering learners,” Proceedings of the International Conference of the Learning Sciences (ICLS 2016)* (Vol. 2, pp. 1353–1355). Singapore: National Institute of Education.
- Nathan, M. J., Ottmar, E. R., Abrahamson, D., Williams-Pierce, C., Walkington, C., & Nemirovsky, R. (2016). Embodied mathematical imagination and cognition (EMIC) workshop. In M. B. Wood, E. E. Turner, M. Civil, & J. A. Eli (Eds.), *Sin fronteras: Questioning borders with(in) mathematics education - Proceedings of the 38<sup>th</sup> annual meeting of the North-American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA)* (Ch. 13 [Working groups], pp. 1690–1697). Tucson, AZ: University of Arizona.
- Worsley, M., Abrahamson, D., Bumbacher, E., Schneider, B., Grover, S., & Tissenbaum, M. (2016). Workshop: Situating multimodal learning analytics. In C.-K. Looi, J. L. Polman, U. Cress, & P. Reimann (Eds.), *“Transforming learning, empowering learners,” Proceedings of the International Conference of the Learning Sciences (ICLS 2016)* (Vol. 2, pp. 1346–1349). Singapore: International Society of the Learning Sciences.
- Williams-Pierce, C., Walkington, C., Landy, D., Lindgren, R., Levy, S. T., Nathan, M. J., & Abrahamson, D. (2017). *Enabling and understanding embodied STEM learning*. Pre-conference workshop conducted at the biennial conference of Computer-Supported Collaborative Learning, Philadelphia.
- Nathan, M. J., Williams-Pierce, C., Abrahamson, D., Ottmar, E. R., Landy, D., Smith, C., Walkington, C., DeLiema, D., Soto-Johnson, H., Alibali, M., & Boncoddò, R. (2017). Embodied Mathematical Imagination and Cognition (EMIC) Working Group. In E. Galindo & J. Newton (Eds.), *“Synergy at the crossroads” -- Proceedings of the 39<sup>th</sup> annual conference of the North-American chapter of the International Group for the Psychology of Mathematics Education* (Ch. 14 [Working groups], pp. 1497–1506). Indianapolis, IN: Hoosier Association of Mathematics Teacher Educators.
- Abrahamson, D. (2017). *Methods: Design-based research*. Workshop facilitated at the “Cognitive Adventures” conference, Copernicus Science Centre, Warsaw, Poland, October 26–27.



Ottmar, E. R., Melcer, E., Abrahamson, D., Nathan, M. J., Fyfe, E., & Smith, C. (2018). Embodied Mathematical Imagination and Cognition (EMIC) Working Group. In T. H. Hodges, G. J. Roy, & A. M. Tyminski (Eds.), *Looking back, looking ahead: Celebrating 40 years of PME-NA*—Proceedings of the 40<sup>th</sup> annual conference of the North-American chapter of the International Group for the Psychology of Mathematics Education. Greenville, SC: University of South Carolina.

## 2. Non-Refereed Publications, Technical Reports, Workshops, Software, etc.

### a. Non-Refereed Journal Article

Abrahamson, D. (2006). What do we think about when we calculate? *Einayim* (<http://www.einayim.com/>). [children’s magazine published in Israel]

### b. Non-Refereed Conference Proceedings

Abrahamson, D. (2008). Writes of passage: From phenomenology to semiosis in mathematical learning. In T. Rikakis & A. Kelliher (Eds.), Proceedings of CreativeIT: Success factors in fostering creativity in IT research and education. Tempe, AZ: Arizona State University.

<http://13dswiki.cs.colorado.edu:3232/CreativeIT/247>

Trninic, D., & Abrahamson, D. (2010). A key problem: Pedagogical tradeoffs along familiar and generic dimensions. In C. Reading (Ed.), *Data and context in statistics education: Towards an evidence-based society.* Proceedings of the 8<sup>th</sup> International Conference on Teaching Statistics (ICOTS8). Ljubljana, Slovenia, July, 2010. Voorburg, The Netherlands: International Statistical Institute.

[www.stat.auckland.ac.nz/~iase/publications.php](http://www.stat.auckland.ac.nz/~iase/publications.php)

### c. Non-Refereed Invited Presentations

Abrahamson, D. (2003, March). *The role of gesture in the teaching and learning of ratio and proportion*. Presentation at the weekly meeting of the laboratory of Susan Goldin-Meadow, Department of Psychology, University of Chicago, March 19, 2003.

Abrahamson, D. (2003, March). *Learning probability and statistics by building agent-based computer models*. Presentation and NetLogo workshop at the 3<sup>rd</sup> Conference of the European Society for Research in Mathematics Education, Bellaria, Italy, Feb. 28 – March 3.

Abrahamson, D. (2006, May). *Mathematical intuition – what is it good for? Reflections from design research on young student understanding of the binomial function*. In P. Blikstein & R. Lerner, Colloquium Series at the School of Education and Social Policy. Northwestern University, Evanston, IL.

- Abrahamson, D. (2007, October). *From intuition to inscription: Designing learning experiences for deep mathematical understanding*. In N. L. Stein (Organizer), The Spencer Conference: Developmental and Learning Sciences Go to School: Implications for Education and Policy. Chicago, October 10–14.
- Abrahamson, D. (2007, November). *Agents, agency, equity: A complexity-studies perspective on classroom participation patterns*. In K. W. Fischer (President) and M. Schwartz (Chair), The Inaugural Conference of the International Mind, Brain, and Education Society (IMBES): The Nature of Human Learning and How Educational Policy Can Profit from Research, Fort Worth, TX, November 1–3.
- Abrahamson, D. (2007, December). *Weaving epistemic & material resources: An embodied-mathematics design-research perspective on situated problem solving*. Paper presented at the Research on Embodied Mathematical Cognition, Technology, and Learning (REMCTL) Workshop. Stanford, Palo Alto: Center for Advanced Study in Behavioral Sciences (CASBS), Dec 10–11.
- Abrahamson, D. (2008, December). *The abduction of Peirce: The missing link between perceptual judgment and mathematical reasoning?* Presentation at the Townsend Working Group in Neuroscience and Philosophy (A. Rokem, J. Stazicker, & A. Noë, Organizers), UC Berkeley.  
<https://www.youtube.com/watch?v=GbslZe1XMkI>
- Abrahamson, D. (2009, January). *Close listening to gesture - an embodied-design perspective on mathematical reasoning*. Presentation at Leonardo Art/Science Evening Rendezvous (LASER; P. Scaruffi, Chair), San Francisco State University, San Francisco.
- Abrahamson, D. (2009, February). *Promoting computational literacy: A view from mathematics-education research; or, What might it even mean to start with principles?!* Presentation at the National Academies—Computational Thinking for Everyone: A Workshop Series, Keck Center, Washington, DC, February 19–20, 2009.
- Abrahamson, D. (2010, May). *Complex systems in the study of ecologies of learning*. Chair of the Presidential Address at the annual meeting of the American Educational Research Association, Denver, CO, April 30 – May 4.
- Abrahamson, D. (2010, May). *Embodying proportion: More than hand waving?* Presentation at the Curriculum Studies and Teachers Education Departmental Colloquium Series (C. Goldenberg, Coordinator), Stanford, May 12.
- Abrahamson, D. (2011, January). *Dialectical investigations of mathematical discovery: The emergence of disciplinary forms in an embodied-interaction design for proportions*. In Y. Kali (Organizer), Humans, Education, and Technology, a seminar series hosted by the Innovative Technologies in Education Program in the Department of Learning, Instruction, and Teacher Education at the University of Haifa, Israel, January 5, 2011.  
<http://www.edtech.haifa.ac.il/Seminars/Archive/page>

- Abrahamson, D. (2011, May). *Build first, ask questions later*. Invited lecture in the course “Beyond Bits and Atoms” (P. Blikstein, Instructor). Learning, Design, and Technology program at the Graduate School of Education, Stanford, May 6, 2011.
- Abrahamson, D. (2012, September). *Some affordances of embodied-interaction for mathematics learning*. Presentation at the annual meeting of the International Society for Design and Development in Education (ISDDE 2012): “Unpacking design processes,” Freudenthal Institute for Science and Mathematics Education, Utrecht University, September 10–13.
- Abrahamson, D. (2012, September). *Some affordances of embodied interaction for mathematics teaching and learning*. Presentation at the colloquium of Center for Research in Mathematics and Science Education at San Diego State University (joint graduate program with University of California at San Diego), October 5, 2012.
- Abrahamson, D. (2013, January). *Learning is moving in new ways*. Invited presentation at the seminar of Dr. Tobin White, University of California at Davis.
- Abrahamson, D. (2013, November). *Learning is moving in new ways: Mathematics learning as motor problem solving in designed fields of promoted action*. Invited presentation in the joint colloquium series of the Technologies in Education graduate program at the University of Haifa (O. Golan & S. Barsilai, Coordinators) and the Learning in a Networked Society (LINKS) Israeli Center of Research Excellence (Y. Kali, Director), November 11, 2013.
- Abrahamson, D. (2014, January). *Toward a taxonomy of design genres: Fostering mathematical insight via perception-based and action-based experiences*. Invited lecture at the Forum for Educational Technology at the Graduate School of Education, Tel Aviv University, January 13, 2014.
- Abrahamson, D. (2014, January). *Toward a taxonomy of design genres: Fostering mathematical insight via perception-based and action-based experiences* (S. Kapon, *Organizer*; H. Alexander, *Respondent*). Invited seminar at the Faculty of Education, Haifa University, January 16, 2014.
- Abrahamson, D. (2014, January). *One project—many spotlights: Design-based research as an academic arena for dialectic discourse among theoretical approaches* (individual contribution to the closing panel). In B. Eilam & T. Goldberg (Organizers & Chairs), “The learning sciences: between teaching, learning, and design” (single day mini-conference and workshop). University of Haifa: Department of Education, January 29, 2014.
- Abrahamson, D. (2014, March). *Embodied cognition and the learning sciences* (webinar). International Society of the Learning Sciences: Network of Academic Programs in the Learning Sciences (NAPLeS), March 13, 2014.

- Abrahamson, D. (2014, March). *Toward a taxonomy of design genres: Fostering mathematical insight via perception-based and action-based experiences*. Invited seminar at the School of Education, The College for Academic Studies in Or Yehuda, Israel, March 25, 2014.
- Abrahamson, D. (2014, May). *Toward a taxonomy of design genres: Fostering mathematical insight via perception-based and action-based experiences*. Invited seminar at the Department of Science Teaching, The Weizmann Institute of Science, Rehovot, Israel, May 18, 2014.
- Abrahamson, D., & Sánchez-García, R. (2014, June). Learning is moving in new ways: An ecological dynamics view on learning across the disciplines. In A. Bakker, M. F. Van der Schaaf, S. Shayan, & P. Leseman (symposium Chairs), *Embodied design in education*. Freudenthal Institute for Science and Mathematics Education, University of Utrecht, The Netherlands, June 23, 2014.
- Abrahamson, D. (2014, June). *Toward a taxonomy of design genres: Fostering mathematical insight via perception-based and action-based experiences*. Invited seminar at the Freudenthal Institute of Science and Mathematics Education, University of Utrecht, The Netherlands, June 24, 2014.
- Abrahamson, D. (2014, Oct.). *Embodied design: Opportunities for deep learning across the disciplines*. Invited keynote at the Teaching and Learning Center Day 2014, University of California at San Francisco, October 9, 2014.
- Abrahamson, D. (2014, Dec.). *Developing embodiment theory of mathematics learning: Evolution of a design-based research project*. Invited presentation for the Taiwanese delegation to the Graduate School of Education. Berkeley, CA, December 4, 2104.
- Abrahamson, D. (2015, Feb.). *Developing embodiment theory of mathematics learning: Evolution of a design-based research project*. In B. Schneider (Instructor), “Beyond bits and atoms” (graduate seminar). Stanford: Transformational Learning Technology Lab (Blikstein, Director), Feb. 6, 2105.
- Abrahamson, D. (2015, Feb.). *A body of knowledge: Grounding mathematical concepts in embodied interaction*. Invited presentation at “Making lasting memories: Using brain science to boost memory, thinking and learning” (Learning and the Brain conference). San Francisco, February 13, 2015.
- Abrahamson, D. (2015, Oct.). *Cultivating mathematical concepts: Insights from ecological dynamics*. In A. Bakker, M. F. Van der Schaaf, S. Shayan, & P. Leseman (symposium Chairs), *Embodied design in education*. Utrecht University, October 16, 2015.  
[https://www.youtube.com/watch?v=sguGH7rqm\\_M&list=PLeplemKS2i3SmsDm651Uz-HOZwpPmpFea&index=7](https://www.youtube.com/watch?v=sguGH7rqm_M&list=PLeplemKS2i3SmsDm651Uz-HOZwpPmpFea&index=7)
- Abrahamson, D. (2016, Jan.). *Design by theory, theory by design: Evolution of a design-based research project*. Invited lecture in the course “Beyond Bits and Atoms” (P. Blikstein, Instructor). Learning, Design, and Technology program at the Graduate School of Education, Stanford, Jan. 28, 2016.

- Abrahamson, D. (2016, July). *The ecological dynamics of mathematics education: The emergence of proportional reasoning in fields of promoted action*. In W. van Dooren & G. Williams (Chairs, Topic Study Group 27: Learning and Cognition in Mathematics). Invited keynote lecture presented at the 13<sup>th</sup> quadrennial meeting of International Congress of Mathematics Education, Hamburg, Germany, July 24–31.
- Abrahamson, D. (2016, Oct.). *Learning is moving in new ways: Designing for guided emergence of mathematical concepts in interactive learning environments*. Invited talk given a BI Norwegian Business School delegation, hosted by UC Berkeley’s Principal Leadership Institute (Program for Visiting School Leaders, Learning Exchange Program). UC Berkeley, October 7, 2016.
- Abrahamson, D. (2016, Nov.). *Milestones and musing from movement to math: Attentional anchors, frames of reference, and grounding meaning*. Graduate School of Education, University of Wisconsin at Madison, November 30, 2016.
- Abrahamson, D. (2017, Feb.). *Giving back to theory: Attentional anchors as a case of ontological innovation in design-based research*. Invited lecture in the course “Beyond Bits and Atoms” (P. Blikstein, Instructor). Learning, Design, and Technology program, Graduate School of Education, Stanford, Feb. 16, 2017.
- Abrahamson, D. (2017, May). *Applying design research concepts from mathematics education to teaching procedural skills in medical education*. Invited keynote lecture at the MedEd Grand Rounds, UCSF Medical Center, Parnassus, San Francisco, May 8, 2017.  
<https://lecture.ucsf.edu/ets/Play/1e68c252baca471fba006907102858391d>
- Abrahamson, D. (2017, Oct.). *Enculturating movement: From sensorimotor schemes to mathematical structures*. Invited seminar on embodiment, Behavioral Studies Colloquia (M. Kapur, Host), ETH, Zurich, October 24.
- Abrahamson, D. (2017, Oct.). *Learning is moving in new ways: Designing for physical coordination of mathematical concepts*. Invited keynote lecture at the “Cognitive Adventures” conference, Copernicus Science Centre, Warsaw, Poland, October 26 – 27.
- Abrahamson, D. (2017, Oct.). *Embodied design: Developing a research program*. Invited keynote lecture in A. Bakker, M. v.d. Schaaf, S. Shayan, R. Alberto, & P. Leseman (Organizers), “Embodied design in interaction” conference. Utrecht University, October 30.
- Abrahamson, D. (2017, Dec.). *Designing for learning: A view from educational research*. Invited lecture at the New York Hall of Science, NYC, Dec. 18, 2017.
- Abrahamson, D. (2019, March). *A new world: Educational research on the sensorimotor roots of mathematical reasoning*. Invited keynote lecture at the inaugural annual meeting of the regional chapter of the International Group for the Psychology of Mathematics Education (PME) & Yandex. Moscow, Russia, March 18–21, 2019.

Abrahamson, D. (2020, July). *Coordination dynamics of mathematics education*. Invited lecture at the 14<sup>th</sup> International Congress on Mathematical Education (ICME-14), Shanghai, July 12–19.

#### **d. Non-Refereed Invited Workshops**

Abrahamson, D. (2018). Educational theory [5 x 2 hr. interactive presentations]. In I. Hówiecka-Tańska (Organizer). *Prototyping seminar for education practitioners*. Warsaw, Poland: Copernicus Science Center, June 28 – July 3).

#### **e. Non-Refereed White Papers, Technical Reports, and Educational Software**

Abrahamson, D. & Wilensky, U. (2003). Participatory Simulation Guide: *S.A.M.P.L.E.R.*

S.A.M.P.L.E.R., Statistics As Multi-Participant Learning-Environment Resource, is a computer-based probability-and-statistics networked classroom learning activity. The document, a user manual for S.A.M.P.L.E.R. facilitators, details the rationale, interface features, and suggested activities. Activity designed and programmed by author at the Center for Connected Learning and Computer-Based Modeling (Wilensky, Director).

<http://ccl.northwestern.edu/ps/guide/Computer%20Part%20Sims%20Guide.pdf>

Abrahamson, D., & Wilensky, U. (2002). *ProbLab*. The Center for Connected Learning and Computer-Based Modeling, Northwestern University, Evanston, IL.

ProbLab is a suite of 30 innovative, interactive, fully documented, computer-based activities designed and developed by the author, through iterated studies, for students learning probability and basic statistics. Activities include ‘Participatory Simulation Activities,’ in which an entire networked classroom collaborates, each student operating their own avatar, in a group inquiry into mathematical phenomena, within a shared virtual space. Most of these activities are also accessible online, in the form of guided activities with Java applets embedded in html <http://ccl.northwestern.edu/curriculum/ProbLab/index.html>

Abrahamson, D., & Howison, M. (2009). *Mathematical Imagery Trainer for Proportion (MIT-P)*. The Embodied Design Research Laboratory, University of California, Berkeley.

The Mathematical Imagery Trainer is an interactive technological system, wherein task-based physical inquiry activities shift into mathematical register. Students use a Natural User Interface, such as Wii remote control or tablet multi-touch, to discover bimanual coordination patterns that achieve, and then conserve, a target feedback. In the Mathematical Imagery Trainer for Proportion (MIT-P), users need to coordinate a bimanual proportional action pattern that

keeps a computer monitor green. Later, symbolic artifacts, such a grid and numerals, are overlaid on the screen, and student engage these, thus shifting into formal articulation of proportional relations. The system has been used successfully with individual and paired students in laboratories as well as in controlled experiments with whole classrooms in public schools.

Abrahamson, D. (2018). *Design heuristics for pedagogical artifacts: An introduction to embodied design*. White paper prepared for the Research Division at the Copernicus Science Center, Warsaw, Poland.

### 3. Book Chapters

- Fuson, K. C., & Abrahamson, D. (2005). Understanding ratio and proportion as an example of the Apprehending Zone and Conceptual-Phase problem-solving models. In J. I. D. Campbell (Ed.), *Handbook of mathematical cognition* (pp. 213–234). New York: Psychology Press.
- Abrahamson, D. (2011). Towards instructional design for grounded mathematics learning: The case of the binomial. In N. L. Stein & S. Raudenbush (Eds.), *Developmental cognitive science goes to school* (pp. 267–281). New York: Taylor & Francis / Routledge.
- Trninic, D., & Abrahamson, D. (2013). Embodied interaction as designed mediation of conceptual performance. In D. Martinovic, V. Freiman, & Z. Karadag (Eds.), *Visual mathematics and cyberlearning* (Mathematics education in the digital era, Vol. 1, pp. 119–139). New York: Springer.
- Abrahamson, D. (2014). Rethinking probability education: perceptual judgment as epistemic resource. In E. J. Chernoff & B. Sriraman (Eds.), *Probabilistic thinking: Presenting plural perspectives* (pp. 339–260). New York: Springer.
- Abrahamson, D., & Lindgren, R. (2014). Embodiment and embodied design. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (2<sup>nd</sup> Edition) (pp. 358–376). Cambridge, UK: Cambridge University Press.
- Fuson, K. C., Murata, A., & Abrahamson, D. (2015). Using learning path research to balance mathematics education: Teaching/learning for understanding and fluency. In R. Cohen Kadosh & A. Dowker (Eds.), *The Oxford handbook of numerical cognition* (pp. 1036–1054). Oxford, UK: Oxford University Press.
- Abrahamson, D. (2015). The monster in the machine, or why educational technology needs embodied design. In V. R. Lee (Ed.), *Learning technologies and the body: Integration and implementation in formal and informal learning environments* (pp. 21–38). New York: Routledge.

- Abrahamson, D., & Trninic, D. (2015). Working out: Mathematics learning as motor problem solving in instrumented fields of promoted action. In A. A. diSessa, M. Levin, & N. J. S. Brown (Eds.), *Knowledge and interaction: A synthetic agenda for the learning sciences* (pp. 212–235). New York, NY: Routledge.
- Shayan, S., Abrahamson, D., Bakker, A., Duijzer, A. C. G., & Van der Schaaf, M. F. (2017). Eye-tracking the emergence of attentional anchors in a mathematics learning tablet activity. In C. A. Was, F. J. Sansosti, & B. J. Morris (Eds.), *Eye-tracking technology applications in educational research* (pp. 166–194). Hershey, PA: IGI Global.
- Abrahamson, D. (2017). Embodiment and mathematics learning. In K. Peppler (Ed.), *The SAGE encyclopedia of out-of-school learning* (pp. 247–252). Thousand Oaks, CA: SAGE.
- Abrahamson, D. (2018). Teaching design research as a case of cultivating a community of professional practice. In A. Bakker (Ed.), *Design research in education: A practical guide for early career researchers* (pp. 153–171). Abingdon, UK: Routledge.
- Rosen, D. M., Palatnik, A., & Abrahamson, D. (2018). A better story: An embodied-design argument for generic manipulatives. In N. Calder, N. Sinclair, & K. Larkin (Eds.), *Using mobile technologies in the learning of mathematics* (pp. 189–211). New York: Springer.
- Abrahamson, D., Zolkower, B., & Stone, E. (in press). Reinventing RME at Berkeley: Emergence and development of a course for pre-service teachers. In M. van den Heuvel-Panhuizen, P. Drijvers, M. Doorman, & M. van Zanten (Eds.), *Reflections from abroad on the Netherlands didactic tradition in mathematics education*. City: Publisher.
- Murata, A., Fuson, K. C., & Abrahamson, D. (in press). A learning path framework to balance mathematics education: Teaching/learning for understanding and fluency. In E. Arias, J. Cristia, & S. Cueto (Eds.), *Promising models to improve primary mathematics learning in Latin America and the Caribbean using technology*. Washington, DC: Inter-American Development Bank.
- Abrahamson, D. (in press). Syntonicity and emergence: A design-based research reflection on the Piagetian roots of constructionism. In N. Holbert, M. Berland, & Y. Kafai (Eds.), *Constructionism in context*. Cambridge, MA: MIT Press.

### **Chapters Under Review / in Preparation**

- Abrahamson, D. (under review). Embodied perception as mathematics learning. In M.-C. Shanahan, B. Kim, K. Koh, A. P. Preciado-Babb, & M. A. Takeuchi (Eds.), *Epistemological conversations in the learning science: Emerging ideas in technology, cognition, design, and transdisciplinarity*. New York: Routledge.



Shvarts, A., & Abrahamson, D. (in preparation). *Dual-eye-tracking Vygotsky: A microgenetic account of a mathematics-tutorial case study as a teaching/learning collaboration*. In C. Krause & L. Edwards (Eds.), *The body in mathematics: Theoretical and methodological lenses*. Leiden, The Netherlands: BRILL.

#### 4. Non-Refereed Contributions to Educational Publications

McManaman, Y., Droujkova, M., & Salazar, E. (2013). *Moebius noodles: Adventurous math for the playground crowd*. Cary, NC: Delta Stream Media, an imprint of Natural Math. ISBN 978-0-9776939-5-5

VanHattum, S. (Ed.) (2015). *Playing with math: Stories from math circles, homeschoolers, and passionate teachers*. Cary, NC: Delta Stream Media, an imprint of Natural Math. ISBN 978-0-9776939-3-1

Droujkova, M. (in press). *Multiplication explorers*. Cary, NC: Delta Stream Media, an imprint of Natural Math.

#### Awards and Fellowships

Title: *Visiting Scholar: Anna Shvarts, Lomonosov Moscow State University*  
 PI: Dor Abrahamson  
 Agency: Barbara White Bequest  
 Date: 2018  
 Amount: \$2,360

Title: *Collaborative Research: Debugging Failure: Fostering Youth Academic Resilience in Computer Science (#1612660)*  
 PI: Melissa Chen, 9 Dots Community Learning Center, Los Angeles  
 Co-PI: Dor Abrahamson, Noel Enyedy, Francis Steen  
 Agency: National Science Foundation: AISL  
 Date: 2016 – 2019  
 Amount: \$645,314 (includes 2 REUs)

Title: *Bridges, Deepening Knowledge: Engaging Novices, Practicing Teachers, and Researchers in Inquiry Together (Award #201600105)*  
 PI: Dor Abrahamson  
 Co-PI: Elisa Stone  
 Agency: Spencer / National Academy of Education: Small Grant  
 Date: 2005 – 2006  
 Amount: \$50,000

Title: *Gesture Enhanced Virtual Agent Mathematics Tutor (#1320029)*

PI: Michael Neff, UC Davis  
 Co-PI: Dor Abrahamson  
 Agency: National Science Foundation: CyberLearning #1321042  
 Date: 2013 – 2017  
 Amount: \$558,000 (includes 2 REUs)

Title: *Three-Day Workshop With Karl Newell*  
 PI: Dor Abrahamson  
 Agency: Barbara White Bequest  
 Date: 2016  
 Amount: \$6,996

Title: *Scaling up the Mathematical Imagery Trainer Design*  
 PI: Dor Abrahamson  
 Agency: UC Berkeley Committee on Research Faculty Research Grants  
 Date: 2010-2011  
 Amount: \$9,000

Title: *Tacit–Cultural Synthesis in Mathematics Learning*  
 PI: Dor Abrahamson  
 Agency: UC Berkeley Committee on Research Faculty Research Grants  
 Date: 2009-2010  
 Amount: \$7,000

Title: *Embodied Mathematical Learning*  
 PI: Dor Abrahamson  
 Agency: UC Berkeley Committee on Research Faculty Research Grants  
 Date: 2008-2009  
 Amount: \$5,000

Title: *Statistics-Major Students' Probabilistic Intuitions*  
 PI: Dor Abrahamson  
 Agency: UC Berkeley Committee on Research Faculty Research Grants  
 Date: 2007-2008  
 Amount: \$6,000

Title: *Seeing Chance: Fostering Student Implicit Knowledge Towards Fluency in the Domain of Probability and Statistics*  
 PI: Dor Abrahamson  
 Agency: Spencer / National Academy of Education: Postdoctoral Fellowship  
 Date: 2005-2006  
 Amount: \$65,000

Title: *Research Opportunity Focused on Learning*  
 PI: Tom Griffiths

Co-PI: Dor Abrahamson, John Campbell, Anca Dragan, David Feinberg,  
Jack Gallant, Alison Gopnik, Geoffrey Lee, Tania Lombrozo,  
Michel Maharbiz, Terry Regier, Linda Wlbrecht

Agency: UC Berkeley Vice Chancellor for Research Opportunities

Date: 2017 – 2019

Amount: \$300,000

Title: *Investigation into the Perceptual Expertise of a Robotic Surgeon: How do we learn to feel what we see?*

PI: Courtney A. Green, MD Department of Surgery, UCSF 513

Co-PI: Patricia O’Sullivan, EdD

Co-investigator Dor Abrahamson

Agency: The Association for Surgical Education Foundation: (CESERT) Center for Excellence in Surgical Education, Research and Training

Date: 2017-2018

Amount: \$21,850

## Recognitions

- Outstanding Reviewer, *Journal of Research in Mathematics Education*, 2013
- Best Reviewer, *Journal of the Learning Sciences*, 2015
- Best Paper, *International Conference of the Learning Sciences*, 2016

## Editorials and Reviews

- Member of the Editorial Board / Panel of the following journals:
  - *Digital Experiences in Mathematics Education*
  - *Educational Designer* (Associate Editor)
  - *Frontiers in Education* (Review Editor for STEM Education)
  - *International Journal of Science and Mathematics Education*
  - *Journal of the Learning Sciences*
    - Reviewer of the Year 2015
  - *Journal for Research in Mathematics Education* (2018-2021)
    - Outstanding Reviewer 2013
  - *Mathematics Thinking and Learning*
  - *PLOS ONE*
  - *Technology, Knowledge, and Learning [2005 – 2013]*
  - *The Journal of Mathematical Behavior*
- Ad hoc Reviewer for the following journals:
  - *Behaviour & Information Technology*
  - *Canadian Journal of Science, Mathematics, and Technology Education*
  - *Cognition and Instruction*

- *Cognitive Development*
  - *Cognitive Science*
  - *Computers & Education*
  - *Computers in Human Behavior*
  - *Educational Evaluation and Policy Analysis*
  - *Educational Psychologist*
  - *Educational Psychology Review*
  - *Educational Researcher*
  - *Educational Studies in Mathematics*
  - *For the Learning of Mathematics*
  - *Frontiers Psychology*
  - *Human Development*
  - *Instructional Science*
  - *International Journal of Research in Education and Science*
  - *Journal of Learning Analytics*
  - *Journal of Mathematical Psychology*
  - *Journal of Numerical Cognition*
  - *Journal of Science Education and Technology*
  - *Journal of Statistics Education*
  - *Journal of Teacher Education*
  - *Learning & Instruction*
  - *Learning: Research and Practice*
  - *Mathematics Education Research Journal*
  - *Mind, Brain, and Education*
  - *New Ideas in Psychology*
  - *Phenomenology and the Cognitive Sciences*
  - *Psychology of Language and Communication*
  - *Research in Developmental Disabilities*
  - *Review of Educational Research*
  - *Science*
  - *Science Education*
  - *Statistics Education Research Journal*
  - *Synthese*
  - *Systems*
  - *Technology, Knowledge and Learning*
  - *Transactions on Computer–Human Interactions (ACM)*
  - *Transactions on Learning Technologies (IEEE)*
  - *Western Journal of Nursing Research*
  - *ZDM–The International Journal on Mathematics Education*
- Regular Reviewer or Senior Reviewer of conference proceedings proposals for:
    - AERA – American Educational Research Association
    - C&C – Cognition & Creativity
    - CHI – Computer–Human Interaction
    - CSCL – Computer-Supported Collaborative Learning (PC Member)
    - CSEDU – International Conference on Computer Supported Education

- CogSci (PC Member)
  - FabLearn – Digital Fabrication in Education
  - JPS – Jean Piaget Society
  - ICEduTech – International Conference on Educational Technologies
  - ICLS – International Conference of the Learning Sciences (PC Member)
  - IDC – International Conference for Interaction Design and Children
    - Co-Chair IDC 2017
  - iLRN – Immersive Learning Research Network
  - PME-NA – North-American Chapter of the International Group for the Psychology of Mathematics Education (“Technology” Strand Leader)
- Occasional reviewer (nominations, fellowship, grants, etc.) for:
    - Canada Research Chairs
    - France–Berkeley Fund
    - Israel Science Foundation
    - The National Academy of Education / Spencer
    - The National Science Foundation (e.g., Cyberlearning, DRK-12)
    - Spencer Foundation / National Academy of Education
    - Swiss National Science Foundation
    - United States–Israel Binational Science Foundation

### **Professional Memberships**

- AERA – American Educational Research Association
  - Special Interest Groups: Advanced Technology and Learning; Learning Sciences: Research in Mathematics Education; Semiotics
- BCNM – Berkeley Center for New Media
- BiD – Berkeley Institute of Design
- ICBS – UC Berkeley’s Institute of Cognitive and Brain Sciences
- ISDDE – International Society for Design and Development in Education
- ISLS – International Society of the Learning Sciences
- JPS – Jean Piaget Society
- PME-NA – North-American Chapter of the International Group for the Psychology of Mathematics Education

### **Advisory**

- *Advisory Board Member*: Title: “Advancing end-user programming with expertise sharing tools”; PI: Bjoern Hartmann (University of California, Berkeley), National Science Foundation: CAREER, 2012–2017.
- *Advisory Board Member*: “Embodied explanatory expressions for facilitating science reasoning and enhancing interactive simulations”; PI: Robb Lindgren (University of Illinois at Urbana–Champaign), National Science Foundation—Education Core Research, 2014–2018.

- *Participant*: “Move2Learn: Engaging preschool scientists through embodiment and technology” (Planning Grant); PI: Judy Brown, Frost Museum of Science; National Science Foundation—Science Learning + (Advancing Informal Science Learning) Program, 2014–2015.
- *Advisory Board Member*: “Local ground: a contextually grounded approach for learning data science skills”; PI Tappan Parikh (University of California, Berkeley); National Science Foundation: Cyberlearning, 2013–2016.
- *Advisory Board Member*: “Action geometry”; PIs: Mitchell Nathan & Peter Steiner (University of Wisconsin at Madison) and Candice Walkington (Southern Methodist University); Institute for Educational Sciences.
- *Advisory Board Member*: “Intelligent representations: How to blend physical and virtual representations by adapting to the individual student’s needs in real time”; PI: Martina Rau (University of Wisconsin, Madison), National Science Foundation: CAREER, 2016 – 2019.

### **Graduates (PhD)**

- Sneha Veeragoudar (2009)
  - Second chance at first life: Fostering the mathematical and computational agency of at-risk youth
- José Francisco Gutiérrez (2015)
  - Signs of power: A critical approach to the study of mathematics cognition and instruction
- Timothy Charoenying (2015)
  - Fostering embodied coherence: A study of the relationship between learners’ physical actions and mathematical cognition
- Dragan Trninic (2015)
  - Body of knowledge: Practicing mathematics in instrumented fields of promoted action
- Yu-Ting Siu (2015)
  - A virtual water cooler: The ecology of an online community of practice to support teachers’ informal learning
- Kiera Naomi Phoebe Chase (2106)
  - Building algebra one giant step at a time: Toward a reverse-scaffolding pedagogical approach for fostering subjective transparency through engineering levels of interaction with a technological learning environment
- Elizabeth K. Guneratne (2016)
  - From instrumental genesis to digital exodus: Supporting urban elementary teachers through technology-mediated systemic reform