Personal Statement

Candidate: Prof. Dor **Abrahamson**
Action: Merit increase within Professor
Review period: 2020 – 2023

I was appointed to the Graduate School of Education (GSE) as Assistant Professor Step III (off-scale), with a decoupled salary, effective July 1, 2005. I was promoted to Associate Professor, Step II.5, with a decoupled salary, effective July 1, 2011, and advanced to Associate Professor, Step III.5, again with a decoupled salary, effective July 1, 2013. I received a merit advancement to Step IV.5, decoupled, effective July 1, 2015. I was then advanced to Professor, Step III, effective July 1, 2018; and Professor, Step IV, effective July 1, 2021. I am now requesting further merit advancement.

Research and Creative Activity
I am a cognitive scientist who investigates the possible futures of mathematics education. One way of predicting the future, it has been said, is to make it. Thus, I investigate the possible futures of education by building and evaluating my own solutions to current instructional problems, typically the problem that students do not understand the meaning of the mathematical concepts they are studying. In turn, I analyze data I collect in these empirical studies to develop theoretical models of conceptual learning.

Intellectually, I am intrigued by *embodiment*—an emerging philosophical paradigm that rejects 20th century conceptualizations of human knowledge as *amodal*, that is, as mental content that is separate from its sensory-motor input/output, as in computerized robots. Cognitive neuroscientists have not found any evidence for that epistemological theory. Instead, embodiment puts forth the evidence-based hypothesis that all mental activity is ecologically engaged sensory-motor enactment, and this includes thinking of so-called "abstract" ideas, such as algebra or calculus.

Axiologically, the ultimate objective of my research program, which I call "embodied design," is to draw on the embodiment paradigm so as to innovate instructional resources and transform educational practice world-wide. I therefore approach the study of human cognition through design-based research, a transformative learning-sciences praxis, where the development of theoretical models is vested in the applied context of ideating, building, and evaluating solutions to current educational problems.

Methodologically, my research generates empirical data that enable detailed monitoring of the whole body's alleged role in the mathematical teaching and learning process. In our experimental studies, participants who engage with our designed activities first interact with technological appliances that pose motor-control problems requiring them to move in a new way they have never moved before; then they formalize their movement solutions using available symbolic artifacts as frames of action and reference, thus arriving at mathematical structures and language.

As researchers we ask, How does this happen? What theoretical constructs capture the psychological processes we are witnessing? To analyze our data, we interleave principles of

embodiment with ideas and methods from cognitive anthropology, dynamic systems theory, ecological psychology, semiotics, conversation analysis, and sociocultural theory. Our theorization has increasingly foregrounded the psychological construct of *perception*. Namely, our mixed-methods analyses suggest that conceptual understanding is grounded when new perceptions of the environment emerge to enable the solution of motor-control problems. In turn, these perceptions, which are initially tacit, become available for reflection and elaboration through the process of “languaging,” that is, psycho-linguistic ontological reification enabling interpersonal multimodal communication. The thrust of the argument is that understanding mathematical concepts depends on developing new perceptions, and that these perceptions can be fostered through sensorimotor learning.

Our lab’s output contributes elaborations of cognitive theory, educational product prototypes, and heuristic frameworks for the design of educational resources. For example, using multimodal learning-analytics methodologies (MMLA) to analyze eye- and hand motions during tutorial sessions on mathematical concepts, we have been able to document the emergence, stabilization, and transformations of dynamically coordinated sensorimotor patterns; these data have served as the field’s first quantitative evidence visualizing seminal psychological constructs from the respective historical work of Jean Piaget, Lev Vygotsky, and Nikolai Bernstein. In turn, articulating our design methodology in the form of a heuristic framework has enabled research groups around the world to implement our methodology by way of building learning technologies for other mathematical concepts.

In sum, our research focus on the role of perception in cognition draws on diverse literatures from historically disparate disciplines: movement-science research on the relation between perception, action, and cognition; and learning-science research on the social cultivation of individual development. I have called this paradigmatic blend “coordination dynamics of mathematics education,” and it has been attracting interdisciplinary interest and collaborations. More broadly, I strive to play leading roles in global research on embodied mathematical learning. I do so by organizing and participating in international workshops, guest-editing special issues of academic journals, mentoring international students, reviewing widely for journals and conferences, and facilitating weekly meetings of an international reading group on embodiment.

Publications

During the period in question, I (co)-authored 17 journal articles (including 8 with student author[s]), 5 conference proceedings papers (including 2 with student authors), and 6 chapters (including 4 with student authors). These publications include conceptual, empirical, and review papers on the theory and practice of mathematics learning as well as reports on design-based research studies of adaptive technology innovations for students with cognitive and/or sensorimotor differences. Below I survey some of these publications by themes.

Theoretical Development Around Embodied Pedagogy

Embodied design is an educational research paradigm that includes a heuristic framework for developing and evaluating pedagogical activities centered on sensorimotor enculturation into STEM concepts. While empirical studies are gradually lending credibility to the paradigm,

theoretical arguments explicate its plausibility by situating the paradigm in the broad cognitive science literature. "Grasp Actually: An Evolutionist Argument for Enactivist Mathematics Education," which appeared in *Human Development* (Abrahamson, 2021), elaborates on the seminal contributions of Charles Darwin to propose that the tacit perceptual qualities of mathematical reasoning and learning draw on our species' atavistic capacity to perceive the environment so as to operate on it. Just as birds' wings evolved through their adaptation for flight yet later were coopted for other functions ('*exapted,*' per Stephen Jay Gould), such as for courting, so perception, I maintain, was coopted for grasping imaginary structures into ontological–discursive presence. The paper explains how my pedagogical architecture, the Mathematics Imagery Trainer, implements this evolutionist rationale. The Trainer is centered on an interactive technology that poses students with motor-control problems of manipulating virtual objects to receive a desired feedback. The process of solving the problem elicits targeted patterns of sensorimotor exploration, ultimately bringing forth new ontologies that ground the prospective mathematical concepts.

A Commentary paper, "Enactivist How? Rethinking Metaphorizing as Imaginary Constraints Projected on Sensorimotor Interaction Dynamics," that appeared in *Constructivist Foundations,* looks to clarify the unique qualities of embodied design by grounding the paradigm in enactivist literature (Abrahamson, 2021).

In "Taking Design to Task: A Dialogue on Task Initiation in STEM Activities," which came out in the journal *Educational Designer*, I teamed up with Dr. Harouna Ba, an educational researcher from the New York Hall of Science, to offer a comparative analysis of two activity-design architectures with respect to students' choices of inquiry situations (Ba & Abrahamson, 2021). The paper sought to offer design principles for building open vs. closed tasks as based on educators' instructional objectives and implementation contexts. To do so, we highlight tacit dimensions of students' agency, creativity, and insight as they explore for solutions to motor-control tasks.

A journal paper first-authored by a graduate student in my lab (Jessica Benally), and in collaboration with a colleague in the School of Information (Ryokai) and an international colleague (Palatnik) — "Learning Through Negotiating Conceptually Generative Perspectival Complementarities: The Case of Geometry" — appeared in *For the Learning of Mathematics* (Benally et al., 2022). The paper, which elicited a Commentary in the same journal, looks across three novel collaborative learning activities for geometry and spatial reasoning to draw out heuristic principles for educational design. The collaborative project described in this publication was a finalist for a Spencer Foundation grant (top 6% of hundreds of submissions).

Conceptual Integration of Dynamic Systems Theory and Sociocultural Theory

"Coordination Dynamics of Semiotic Mediation: A Functional Dynamic Systems Perspective on Mathematics Teaching/Learning" appeared as a target article in the journal *Constructivist Foundations* (Shvarts & Abrahamson, 2023). The paper extends our earlier conceptual efforts to model interpersonal educational interactions where one person's production of multimodal utterances, including gestural–verbal utterance and symbolic inscriptions, brings about change to

another person's actions. Examining eye-tracking data from tutorials centered on a Mathematics Imagery Trainer for parabolas, we take a sociocultural reading of ecological dynamics to argue that an instructor's utterance constitutes material constraints on the functional systemic organization of students' sensorimotor behaviors. In so doing, we look to the physical materiality of all semiotic productions to reject conceptualizations of symbols as abstract ontologies.

Empirical Investigations Into the Coordination Dynamics of Mathematics Learning

"Coordination Dynamics of Mathematics Learning," the inaugural Berkeley symposium I convened in 2018, was premised on the conjecture that mathematical learning and teaching processes could be demonstrably modeled as unfolding according to the strict scientific principles of dynamic systems theory, wherein "understanding" is manifestly evident as an empirically measured emergent transition of the enactive mind into a new, dynamically stable attractor. To evaluate this premise, I first sent doctoral student Sofia Tancredi to an advanced quantitative methodology workshop held by cognitive scientists in Ohio. Next, we teamed up with Dr. Ramesh Balasubramaniam of UC Merced, an ecological psychologist with expertise in science of Perception, Action, and Cognition (PAC). We also recruited Dr. Rotem Abdu, a Learning Scientist who had worked with our Dutch collaborators and was familiar with a relevant data corpus. In a series of studies, our team analyzed data of young Dutch students working with the Mathematics Imagery Trainer. Using the quantitative methodology of Cross-Recurrent Quantitative Analysis, we were able to first model students' hand movements (Tancredi et al., 2021a, 2021b), then their eye movements (Abdu et al., in press), and finally combining hand- and eye movements with verbal/gestural utterance (Tancredi et al., 2022) to model the micro-process of enactive learning as evincing a set of critical markers from the science of complex dynamic systems in flux. This was the field's first empirical quantitative modeling of the micro-process by which the enactment of prospective mathematical concepts emerges through multimodal sensorimotor explorative solving of motor-control problems. With that, we produced the first MMLA (multimodal learning analytics) support for arguments put forth 45 years ago by mathematics-education researchers who first considered the potential purchase of enactivist theory on educational practice (Susan Pirie & Tom Kieren). This analytic paradigm could enable artificially intelligent interactive tutors to anticipate, and thus support enactive learning processes through monitoring students' real-time multimodal behavior to optimize the quality and timing of intervention.

Consolidating the Embodied Design Paradigm

The research field of mathematics education is seeing an increase in publications reporting on studies inspired by embodiment theory. I have been attempting to play leadership roles in this effort through publishing review articles in journals and edited volumes. In particular, through these publications I intend to clarify and elaborate the embodied-design research paradigm. During this period, this form of output included "The Future of Embodied Design for Mathematics Teaching and Learning," a seven-author journal paper, published in *Frontiers in Education*, that reported on the collective work of colleagues who led an NSF-funded workshop (Abrahamson, et al., 2020), as well as chapters in MIT Press, Routledge, and Springer

handbooks. In particular, I will highlight the Springer Handbook of Digital Resources for Mathematics Education: the editors of this compendium commissioned me to write a chapter on embodied design — this, in addition to another review chapter on the history and future of digital media for mathematics education. Springer’s solicitation of a write-up about my lab’s paradigm appears to indicate the field’s sustained interest in this line of work. In 2014, and again in 2022, Cambridge Press commissioned from me a chapter on embodied design for their handbook of the Learning Sciences.

Expanding the Discipline of the Learning Sciences to Incorporate Theory and Methodology from Movement Sciences

In October 2018, I held on campus a Cal-funded international symposium, “Coordination Dynamics of Mathematics Education,” with the intention of bringing into inaugural dialogue, on the one hand, leading experts on dynamic-systems models of human movement and, on the other hand, educational researchers whose work has evaluated the application of embodiment theory to understanding and promoting processes of mathematics teaching and learning. The symposium instigated multiple lines of collaboration between our lab and researchers of movement sciences with interest in conceptual reasoning. A collaboration with German neuroscientist Franz Mechsner, who had published a groundbreaking paper in *Nature* back in 2001, resulted in a joint publication in *Educational Psychology Review*, “Toward Synergizing Educational Research and Movement Sciences: A Dialogue on Learning as Developing Perception for Action*”* (Abrahamson & Mechnser, 2022). This conceptual paper draws on empirical findings from two independent multi-year research programs, respectively mine and his, situated in disparate academic disciplines, learning-sciences research on mathematical learning and cognitive-psychology research on movement performance. Both research programs arrive at an implication of perception as the key mental capacity in learning to move in new ways and, therefore, think in new ways, including understanding so-called abstract concepts. We propose what integrating and synergizing these insights might mean more broadly for an intellectual reciprocity between our disciplines to inform educational practice.

Integrating and Applying Multi-Modal Bio-Sensing Quantitative Measures into Design-Based Research of STEM Learning

The field of the learning sciences has seen great progress in the quantitative analysis of learning processes, particularly in instrumenting experimental learning environments to gather study participants’ cognitive, emotional, and movement data and then to make sense of these data, integrate them, and visualize the integration for teachers, researchers, readers, and policy-makers. However, the technical sophistication of this burgeoning effort, multi-modal learning analytics (MMLA), often deters many established and rising learning scientists who focus more on qualitative methodology as well as those whose quantitative-methodology practice has not included multi-modal data. Consequently, an intellectual gap is developing among learning scientists, causing some scholars to assume they harbor theoretical differences. Moreover, graduate preparation by and large has yet to step up to meet the field’s rapid methodological innovations. Toward ameliorating this growing gap in the investigative practices of the learning

sciences, I have been seeking to bring the camps in dialogue. Consequently, I initiated and led the guest-editing of a special issue for the *International Journal of Child–Computer Interaction*, “Learning Analytics of Embodied Design: Enhancing Synergy” (Abrahamson et al., 2022). The issue included a paper from my lab (Tancredi et al., 2022), mentioned earlier, which demonstrated how the research field of coordination dynamics (dynamic systems theory applied to sensorimotor activity) enables learning scientists to model mathematical learning processes as phase transformations in dynamically stable systems, when students’ physical performance is perturbed via interactive technological mediation. One of the authors on this paper is the empirical cognitive scientist Dr. Ramesh Balasubramaniam of UC Merced, a world authority on the coordination dynamics of multimodal performance. He has been collaborating with our laboratory since the October 2018 international symposium.

An additional publication supporting this line of argumentation for applying MMLA to embodied design was Pardos et al. (2022). The paper reported on our use of machine-learning, an advanced quantitative methodology, to evaluate how, and to what extent, given the state of the art, artificially intelligent virtual pedagogical avatars could correctly interpret students’ real-time reasoning through analyzing (pattern-detecting) their hand movements.

Applying the Embodied Design Paradigm in Developing and Researching Educational Resources for Diverse Learners

Roughly a decade ago, my lab developed a research focus on developing empirically validated theoretical models guiding the design of technologies for students falling under the “special needs” label. This research focus was introduced into the lab’s scope through the advocacy of my advisees enrolled in the UCB–SFSU Joint Doctorate program on Special Education. The previous merit review report included description of a paper we published in *ZDM Mathematics*, in which we proposed new theoretical perspectives to enhance the work of Universal Design for Learning. The publication of that paper led to an unexpected new collaboration with laboratories across the United States, including PhET at the department of Science, University of Colorado Boulder, and CHROME at the Saint Louis University, who approached me with a request to adapt my general-education learning designs for atypical students. A number of joint projects, including the PhET adaptation of my Mathematics Imagery Trainer for blind and visually impaired students, resulted in the publication of Lambert et al. (2022a, 2022b). These papers describe stages in developing prototype mechatronic appliances for blind and visually impaired geometry students, based on principles of my embodied design paradigm and my basic mechanical prototype. The artifact in question is a manipulable quadrilateral with hinged vertices that sends information, via bluetooth, on measures of its lengths and angles, so that a computer simulacrum can show a 2D representation of the object and provide voiced explanations. Moreover, the device can send information to another quadrilateral to change its shape using actuators, so that remote synchronous blind students can study together, as if they are holding the same object. Both publications won our team Best Paper in the international conferences, which led to inclusion in journals as peer-reviewed articles in *The Journal on Technology and Persons with Disabilities* and in *Journal of Health Education, Sports and Inclusive Didactics*. Another journal paper reported on efforts of my lab’s graduate students enrolled in the Joint Doctoral program in Special Education (Tancredi, Chen, et al., 2021). Both computer-based applications for sensorially diverse students—one for the mathematical contents of ratio and proportion, one

for the content of quadrilaterals—are now available as freely accessible online PhET products, which have millions of annual downloads.

Mr. César Botetano, a mathematics education visionary, innovator, and teacher based in Lima, Péru, was a Research–Practice partner of our lab. (I write in the past tense because, sadly, he passed away during this review period.) In our communications, we sought to adapt instructional activities for poverty Indigenous populations in the Amazon basin, which Botetano’s team then implemented. In Botetano and Abrahamson (2022), “The Botetano Arithmetic Method: Introduction and Early Evidence,” I helped César frame and present his work on basic arithmetic for an international audience of mathematics-education researchers. The design uses low-cost, climate-appropriate materials to introduce the place-value system and support illiterate children in learning to mentally conduct multi-digit addition and multiplication. These students have been outperforming their urban cohorts.

As a Commentary on a target article by Simon Penny (UC Irvine) that appeared in the journal *Constructivist Foundations*, I wrote “Almost in Our Grasp: The (Slow) Digital Return of Multimodal Educational Resources” (Abrahamson, 2023). This short article responded to Penny’s lament of digital educational resources’ modal paucity, where the vast majority of instructional technology has students dragging two-dimensional objects on a flat screen. I offered a brief historical survey, beginning with Greek philosophy, on the role of manual interaction in pedagogical practice and ended with measured optimism, based on reporting my collaboration’s development of haptic mechatronic devices for sensorially diverse geometry students.

Finally, we published in *Cognition & Instruction* a paper summarizing results from our NSF grant investigating URM (under-represented monitories) youth’s computer-science and robotics learning in an after-school club in Los Angeles — “A Multi-Dimensional Framework for Documenting Students’ Heterogeneous Experiences With Programming Bugs” (DeLiema et al., 2023).

Research Recognition

During the review period, two papers from our lab’s collaborative project with researchers in UC Boulder and Saint Louis University won Best Paper awards at international conferences. The papers described results from evaluating our mechatronic educational appliances for blind and visually impaired geometry students to learn about quadrilaterals through haptic/tactile/auditory interactive modalities. These awards led to the following journal paper publications that included student authors:

> Lambert, S. G., Fiedler, B. L., Hershenow, C. S., Abrahamson, D., & Gorlewicz, J. L. (2022). A tangible manipulative for inclusive quadrilateral learning. *The Journal on Technology and Persons with Disabilities, 10*, 66–81.
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> Lambert, S. G., Tancredi, S., Fiedler, B. L., Moore, E. B., Gorlewicz, J. L., Abrahamson, D., & Gomez Paloma, F. (2022). Getting a grip on geometry: Developing a tangible manipulative for inclusive quadrilateral learning. *Italian Journal of Health Education, Sports and Inclusive Didactics, 6*(1), 1–21. https://doi.org/10.32043/gsd.v6i1.604

I was invited to submit chapters to several handbooks and other collected volumes on the theory and practice of designing educational technologies, including MIT Press, Routledge, Brill, and Springer. In particular, the editors of the Springer's "Handbook of Digital Resources in Mathematics Education" commissioned me to write two chapters, one explicitly on my paradigm, embodied design. The MIT Press book, "Movement Matters: How Embodied Cognition Informs Teaching and Learning," to which my lab contributed three chapters, was MIT Press's nomination to AERA for the Best Book 2023 award as well as the American Psychological Association (APA)'s nomination for the 'William James Book Award' 2023.

Otherwise, during this period I was invited to give 28 lectures and recorded seminars, including 3 conference keynotes. Several of these post-COVID talks were given via video-conferencing to audiences in Europe, the Middle East, and Asia.

Teaching

During the review period, I twice taught EDUC 203, "Cultivating Cognitive Development: From Sensorimotor Intelligence to Embodied Concepts" (I was on sabbatical leave during Spring 2023). This is a required course for BSE graduate students in the Learning Sciences cluster. It surveys seminal ideas from cognitive developmental literature, with a focus on themes of cognition, perception, and action as these pertain to learning curricular concepts. The course is yet quite new, and we are still learning greatly from student evaluations following the first full-class offering in Spring 2022. Whereas the evaluation scores were generally encouraging, a chief concern among students was the quantity and density of the assigned readings as well as a request for more instructor lecture, less group discussion. We have been seriously taking this input into consideration in adjusting the syllabus and increasing focused guidance in preparation for Spring 2024.

Otherwise, I taught my EDUC 222C course, "Design-Based Research Forum," every Fall semester. The course is a practicum introduction to conducting empirical research in the Learning Sciences through building and evaluating technological responses to current educational problems. Students each develop their own project, beginning from identifying, researching, and analyzing some educational problem of their choice, creating innovative material and/or digital resources to tackle the problem, implementing experimental trials, gathering and analyzing empirical data therethrough, and writing up reports. Readings include general Learning Sciences staples on theory, design, and methodology as well as individual assignments. Participants in this course later present their projects at the Berkeley School of Education's annual Research Day. Numerous past participants have gone on to develop their course project into Position Papers, conference and journal papers, and dissertations. The projects have often led to further courses, typically in qualitative methodology and Human-Computer Interaction.

Finally, every semester I teach two Research Groups (EDUC 223B) — one is the lab's "show and tell," in which my students and I offer each other feedback and support on ongoing projects, and the other is my international reading group, "Embodied Underground," which always hosts the authors of the papers we read. Paper topics cover a wide, at times eclectic gamut of

scholarship related to the function of the body in culture and cognition, ranging from neuroscience to philosophy, from anthropology to dance scholarship.

I advise 10+ graduate students, which usually includes 1–2 Masters students (one MA student transferred to the PhD program). During the review period, several students completed their PhDs: Alyse Schneider, Leah Rosenbaum, Amelia Farid, and Rachel Chen. My recent graduates have gone on to assume positions as Postdoctoral Fellows (Rosenbaum, MIT; Farid, Columbia University) and Assistant Professors (Flood, University at Buffalo; Chen, Nanyang Technological University, Singapore).

Through UC Berkeley’s undergraduate mentoring programs, the Fiat Lux and the Regents’ & Chancellor’s campaigns, I meet periodically with undergraduate students from diverse backgrounds, who are usually first-generation college students. I advise them on course choices, becoming involved in research, and considering graduate school. I am particularly pleased of the case of JS, of Richmond, CA. In August, 2021, he wrote to me:

> I am a first-generation college student and I grew up in the bay area (Richmond CA). Although I wasn't the best performing student in school, I found that my education was a way for me to escape my experience at home. I am the oldest of 3 children and my parents were immigrants struggling to support us financially. Because of this I took on a lot of responsibility and became a third parent for my siblings. Even though taking this role had a big impact on my goals, I still kept pushing for higher education seeking a bigger change. Now I am here at Berkeley trying to figure out who I want to become and what path is right for me. I am excited that you are my Mentor and I hope you will join my journey through Berkeley as a support system.

Following several months of periodic coffee chats, I brokered to JS the idea of joining my Research Group (EDUC 223B), which was already hosting several undergraduates as well as a high-school student who were all participating in our lab’s various research efforts. JS began attending our meetings. Gradually, he became interested particularly in the design-based research project led by PhD Candidate Sofia Tancredi, to develop Special Education Embodied Design (SpEED) activities for neuro-atypical sensory-seeking mathematics students (“Balance Board Math”). This project, supported by an AERA GRFP (American Educational Research Association Graduate Research Fellowship Program) award and recognized by an ISDDE (International Society for Design and Development in Education) prize for excellence in innovation, was just beginning to collect data with its state-of-the-art technology. JS joined the team and supported the study’s procedures, analyses, and writing. In April 2023, I used discretionary funds from my MOU with Danish universities to sponsor JS’s trip to the AERA annual conference, held in Chicago, where he co-presented an accepted poster, attended many sessions, and made new friends. At 19 years old, this was JS’s second time outside of California—the first being a one-night vacation trip to Florida with his parents several years prior—and certainly his first time flying alone. JS returned from the storied journey—regaled over best-ever enchiladas at Richmond’s Tacos El Tucan—highly stimulated to continue contributing to the project. I hope he will consider graduate studies, and I look forward to further supporting his journey.

Table 1: Summary of Course Evaluations, Abrahamson
7/2020-6/203 [Note: Spring 2023 academic leave (1-semester sabbatical)]

Service

Department level

During the review period, I served on the Personnel Committee.

Campus Level

During the review period, I served on FAC, UC Berkeley's Faculty Awards Committee. Over Fall 2022, I served as an External Member on a search committee (Charles Marshall, Chair) of the department of Integrative Biology for a LPSOE (Lecturer with Potential for Security of Employment. Also, I serve as a member of faculty instructor and advisor for students in the Graduate Division program, The Graduate Group on Science and Mathematics Education (SESAME).

Field Level
My greatest investment of efforts at the field level is through editing and peer-reviewing of articles submitted to academic journals. I am Associate Editor on 5 editorial boards and Member of another 6 editorial boards. These journals are well-regarded outlets within the fields of the learning sciences and mathematics education research, such as the *Journal of the Learning Sciences*, *Journal of Mathematical Behavior*, *Journal for Research in Mathematics Education, Digital Experiences in Mathematics Education, International Journal of Child–Computer Interaction*, and *Frontiers in Education*. I am also an ad hoc reviewer for 67 additional journals. All in all, I typically work on at least two journal papers per week. Statistical measures of my review efforts, per international indices such as the Clarivate Web of Science, repeatedly recognize my service as one of the top 1% of reviewers worldwide.

During the period in question I was invited by the Jean Piaget Society to plan the scientific program of their annual meeting, scheduled for June 2024, on the topic of embodiment. I located a collaborator from the field of cognitive development psychology to complement my expertise in the learning sciences, and together we authored a document that included an overview of the theme and our selections of plenary speakers and symposium organizers. This collaborative venture is underway and, in accord with the society's practice, should eventually include editing a special issue for the journal *Human Development* that will constitute a proceedings volume of papers evolving from the conference's selected plenary and symposia presentations. All going well, I hope to report on this project in my next merit review essay.