



Hemispheric specialization and interhemispheric interaction - From perception to consciousness: Introduction to a special issue in honor of Eran Zaidel (1944–2021)

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Those of us who had the good fortune to work with Eran Zaidel can attest to his intense intellectual curiosity and wide range of interests. Zaidel truly embodied the spirit of academic exploration, always pursuing new questions with unfading enthusiasm. He had little regard for what was considered fashionable by the academic establishment. Rather than following trends set forth by academic journals and grant review panels, he was obstinate in his lifelong investigation of what he saw as the most intriguing feature of the brain: that it is made up of two cerebral hemispheres that can both interact seamlessly and work independently from each other.

The systematic study of functional differences between the two hemispheres was pioneered by Zaidel's graduate mentor and Nobel prize winner, Roger Sperry. Upon joining Sperry's lab in the early 1970s, Zaidel started investigating those differences by conducting a series of studies of individuals who had undergone complete commissurotomy ('split-brain' surgery) or hemispherectomy to alleviate drug-resistant epileptic seizures. Among his most original contributions is the invention of the Z-lens, a contact lens that stabilizes retinal images to allow active exploration of visual stimuli while restricting visual input to only one of the hemispheres. This novel technique led to the discovery of previously unknown linguistic capabilities of the right hemisphere. His trailblazing work in the 1970s helped reveal the complexity of the patterns of functional specialization across the two hemispheres, leading to a renewed wave of interest in the topic.

Never one to be tied to tradition, Zaidel boldly ventured into the field of cognitive neuroscience with foundational training in math, physics and computer science. This interdisciplinary STEM background would serve him well as he embarked on a career distinguished by both technical and theoretical breakthroughs. Over the course of his nearly fifty-year career, Zaidel explored not only the differences between how the

left and right hemispheres contribute to various cognitive operations, but also how they communicate to create a seemingly integrated conscious experience and sense of self. His work also helped characterize the anatomical organization of the corpus callosum and reveal its function. Leveraging diverse methods, ranging from behavioral paradigms to multimodal neuroimaging, research in his lab spanned topics from visual attention and bimanual coordination to high-level cognition, including language comprehension, social cognition, and conscious awareness, all from the perspective of hemispheric specialization and interaction (for a summary of his main contributions, see Zaidel, 2021). As a movie aficionado, Zaidel was also interested in how neuroscience and neuropsychological disorders are represented in film. He invited students to examine how cognitive neuroscience helps explain the experience of the viewer in his undergraduate course "Brain, Mind, & Motion Pictures" at UCLA.

Zaidel's colleagues and mentees remember him as a fierce debater, tough critic, and incisive thinker, with a blatant disregard for the scientific status quo. We will forever be inspired by his genuine and boundless enthusiasm for scientific inquiry, his collaborative approach, and his sense of adventure. These qualities were all evident during his weekly lab meetings, invariably catered with his favorite treats from Trader Joe's. Regardless of their stated scientific purpose – discussing a recent paper, helping a student prepare for a presentation, or taking stock of the different projects in the lab – to us these meetings often felt like joyous family gatherings. Zaidel cared deeply about the people around him – colleagues, students, university staff – and treated everyone as a personal friend. He has left a profound and lasting impact on so many of those who worked with him. We are all better scientists, mentors, and human beings for it.

After a Festschrift held in his honor in 2015 (Fig. 1), Zaidel remarked

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Fig. 1. Eran Zaidel with trainees and collaborators during the celebration of his Festschrift at UCLA in 2015.

Front: Emmy Goldknopf, Eran Zaidel, Leonardo Fernandino. Middle: Francisco Aboitiz, Marco Iacoboni, Luke Yuan Hang Li, Zohar Eviatar, Maital Neta, Lisa Aziz-Zadeh, Deanna Greene, Caroline Crump, Lucina Uddin, Steven Berman, Avraham Schweiger. Back: Benjamin Bendig, Jonas Kaplan, Eric Mooshagian.

“Thank you very much, one and all, for the fantastic Festschrift Meeting. I surprise myself by how moved I was by your personal comments. No less gratifying was the outstanding quality of all the presentations, be they detailed experiments or overviews of one’s extended research program. When all is said and done, I believe our main contribution to science is the investment we make into our students. There is nothing more rewarding than seeing you mature into creative, sophisticated, and eloquent scientists. Your presentations demonstrate that at the very least I did not prevent this maturation from happening. There is no doubt that your contributions have been crucial to the quality of my own research over the years. I particularly enjoyed our conversations and discussions about science and philosophy. To me, those have been the most important and exciting parts of doing science.”

In this Special Issue, many of the topics that were Zaidel’s favorites are revisited by scholars from across the globe who have been influenced by his ideas. The breadth of the work covered here is a testament to the impact he had on far-reaching corners of the field, from sensorimotor integration and attention to language and consciousness.

Several authors contributed empirical work on the topics of sensorimotor integration and interhemispheric interaction in neurotypical participants (Helmich et al., 2022; Markus and Eviatar, 2023), clinical populations (Fabri and Polonara, 2023; Voruz et al., 2022), and across the lifespan (Marcori et al., 2023). Laterality of visual (Arbel et al., 2023) and auditory (Kumar et al., 2023) perceptual responses were investigated by other contributors. The topic of attention and the cerebral hemispheres was examined by authors studying neurotypical individuals (Markus and Eviatar, 2023; Pollmann and Zheng, 2023; Wolski and Asanowicz, 2023) and callosotomy patients (Westerhausen et al., 2023). A study using transcranial direct current stimulation revealed laterality of prefrontal cortex involvement in memory encoding (Han et al., 2023). Laterality of language processing and gesture was the topic of contributions from several research groups (Bonandrini et al., 2023; Duque et al., 2023; Kann et al., 2023; Lausberg et al., 2023; Leckey et al., 2023). New methods for measuring anatomical and functional laterality are described and tested in another contribution (Coutanche et al., 2023). A neuroimaging study of social cognition in autism spectrum disorder (Butera et al., 2023), another of interoception in semantic

dementia (Hazelton et al., 2023), and a review of laterality of self-face recognition (Molnar-Szakacs and Uddin, 2023) round out the contributions to social and affective neuroscience in this Special Issue. Finally, the beloved topic of movies in neuroscience - neurocinematics - (Tikka et al., 2023; Zaidel, 2023) brings the Special Issue to a conclusion befitting its honoree.

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