The 2023 VGTC Visualization Significant New Researcher Award goes to Matthew Kay in recognition of his work on uncertainty visualization, the design of human-centered tools for data analysis, and visualization literacy.

Kay is an Associate Professor of Computer Science and Communication Studies at Northwestern University. Prior to Northwestern, he was an Assistant Professor in the School of Information at the University of Michigan.

Kay co-directs the Midwest Uncertainty Collective (https://mucollective.northwestern.edu/) along with Jessica Hullman. The lab works at the intersection of information visualization and uncertainty communication, and its mission is to combat misinterpretations and overconfidence in data by developing visual representations and tools that express uncertainty in ways that align with how people think.

He completed his PhD at the University of Washington under the supervision of Julie Kientz and Shwetak Patel. His dissertation focused on developing tools for communicating data—and its uncertainty—to end-users in various domains, including sleep quality data, weight tracking, and public transit. His work draws upon theories of human perception and uncertainty cognition to develop uncertainty visualizations that improve people's decision quality. In particular, he developed quantile dotplots, a discretized form of a density plot designed to communicate probabilistic forecasts in a way that improves decision-making.

He first described quantile dotplots in a widely-cited paper at CHI 2016, and followed up this work with a paper demonstrating quantile dotplots improve decision quality in transit scenarios at CHI 2018, which received an Honorable Mention. The visualization technique has also seen wider use outside the visualization research community, including by data journalists: FiveThirtyEight’s 2020 presidential forecast used a “ballswarm” variation on the quantile dotplot to communicate their forecast.

In addition to developing and studying the properties of uncertainty visualizations, Kay builds tools to help data analysts communicate uncertainty more effectively. He is the primary author of the tidybayes and ggdist R packages, which aim to make uncertainty visualization easier by better integrating it into the widely-used grammar of graphics implementation, ggplot2; his PhD student Abhraneel Sarma also developed the multiverse package for constructing Explorable Multiverse Analysis Reports, a method of communicating uncertainty in the data analysis process itself.

Tidybayes and ggdist are used (and cited) by researchers and data scientists in a variety of fields, including psychology, ecology, political science, and biostatistics. His work on integrating uncertainty into ggplot2 also led him, with PhD student Xiaoying Pu, to develop the Probabilistic Grammar of Graphics, an extension to the grammar of graphics which can construct a variety of distributional and uncertainty visualizations and prevent common errors in specification. This work received an Honorable Mention at CHI 2020.

More recently, Kay’s lab and students have pulled him in a new direction: visualization literacy. In recent work, led by PhD students Lily Ge and Charles Cui, they developed a method for assessing people’s susceptibility to poorly-constructed visualizations. This work expands the notion of visualization literacy by addressing the reality that not all visualizations people encounter are well-constructed (in fact, many on social media and in the news are not), so a comprehensive assessment of visualization literacy must include people’s ability to think critically about visualizations; hence the Critical thinking Assessment for Literacy in Visualizations (CALVI). CALVI received an Honorable Mention at CHI 2023.

Kay’s work has received Best Paper awards and Honorable Mentions at IEEE VIS 2015, 2020, and 2022; ACM UbiComp 2012 and 2013; and ACM CHI 2015, 2016, 2018, 2019, 2020, and 2023. In addition to research, he is tirelessly devoted to improving publication practices and open science in the field: he is a co-founder of the Transparent Statistics in HCI group, which organized workshops and meetups at CHI 2016, 2017, 2018, and 2019; he was co-chair of the Visualization papers Subcommittee at CHI 2021 and 2022; and he is a co-founder of the Journal of Visualization and Interaction (https://www.journalovi.org/), a diamond open-access journal focused on open science, open review, and experimenting with new review processes. More information on Kay and his work can be found at https://www.mjskay.com/.