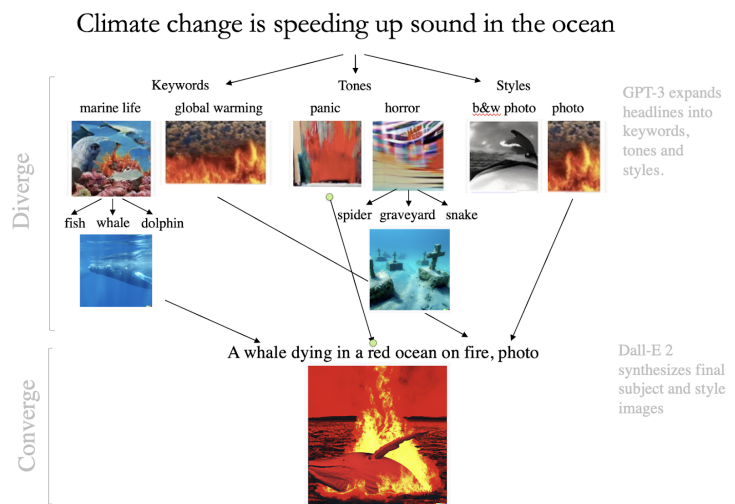


Creativity is often considered magical – something that cannot be logically explained. However, my research has shown that whereas it is indeed complex, and cannot be reduced to a simple formula, it can be decomposed into an understandable process that eliminates the need for magic. Some of the steps are cognitively demanding, but I show how AI tools can support the most demanding tasks and enable anyone to solve creative problems. My systems are based on the psychological model of creativity known as divergent and convergent thinking. In the divergent process, the goal is to generate many diverse ideas; in the convergent process, those ideas are selected and synthesized into a coherent solution. Although this theory helps decompose the creative process, it lacks a precise mechanical model of how this can be done. **My work has discovered clear processes for creative tasks and presents systems that combine human and AI capabilities to generate creative outcomes 10 times more effectively than people on their own.**

I focus on helping small newspapers produce creative illustrations for their articles. Images are crucial to capturing attention on social media, but the challenge is to find ways to visually represent the headline that can be produced quickly. In my first system [1], the approach was to first find two concepts to connect (such as medicine and technology for telehealth stories) and create graphics that visually blended them. The divergent step is to find multiple diverse symbols of both concepts, and the convergent step is to blend the symbols in different ways. Although a person can do this, it is cognitively taxing to brainstorm hundreds of symbols and then Photoshop all their combinations. Thus, we provide AI tools to automatically present hundreds of diverse symbols [2] and to quickly synthesize blends [3].



My most recent system [4] uses even more powerful AI to create a broader range of illustrations. For the divergent step, it uses a large generative language model (GPT-3) to generate keywords, tones, and styles related to the headline. The convergent step combines those components to represent the headline and synthesizes images with Dall-E 2 (a large text-to-image model). This demonstrates a more general model of AI and human creativity - **that creative challenges can be broken into their conceptual components, and AI can help explore options for each component then compose the options into a final solution.**



In my current and future work, I am **applying my model of computational design to domains that are critical to democracy, social equality, and education.** We help journalists “read between the lines” to explore controversies buried in the positive bias of government press releases. We help educators redesign middle school science activities to be more culturally relevant, and connected to their everyday life. We help social workers sift through millions of online comments to find implicit expressions of racial bias and discover the root causes of mental health crises in marginalized communities. All these problems rely on human and AI intelligence to solve difficult problems that need to be explored in multiple ways before a solution can be found.

[1] LB Chilton, S Petridis, M Agrawala. VisiBlends: A Flexible Workflow for Visual Blends. CHI 2019.

[2] S Petridis, HV Shin, LB Chilton. SymbolFinder: Brainstorming Diverse Symbols Using Local Semantic Networks. UIST 2021.

[3] LB Chilton, EJ Ozmen, S Ross, V Liu. VisiFit: Structuring Iterative Improvement for Novice Designers. CHI 2021.

[4] V Liu, H Qiao, LB Chilton. Opal: Multimodal Image Generation for News Illustration. UIST 2022.