UC San Diego
Cognitive Science

Ana Chkhaidze's Dissertation Defense

Individual Differences in the Format of Mental Representations and Their Cognitive Consequences

Wednesday, May 27th, 2026
9:00 – 11:00am
https://ucsd.zoom.us/j/99165354449

Abstract:

People differ greatly in how they experience their thoughts. Some report thinking in vivid pictures, others in words, and many struggle to describe their inner worlds at all. Because internal representations support cognition across domains, from remembering and planning to understanding language, this variation raises an important question: does this phenomenological diversity translate into cognitive diversity? In this dissertation, I ask whether people who experience thought in different formats also rely on o different mechanisms to perform similar cognitive tasks.

In Chapter 1, I ask whether visual and verbal thought tendencies shape how people maintain naturalistic images in working memory (WM). I found that visual imagery and verbal thinking tendencies were associated with different representational strategies when people maintained the same visual stimuli: stronger verbal thinking was associated with behavioral patterns consistent with semantic representations, whereas stronger visual imagery was associated with greater sensitivity to fine-grained visual similarity. While overall WM success was comparable across imagery profiles, these representational strategies carried different costs when WM faced competition from concurrent perceptual input.

In Chapter 2, I test whether imagery vividness shapes neural markers of perceptual simulation during language comprehension. Participants read sentences that implied a particular visual form, followed by pictures that either matched or mismatched that form. Behaviorally, participants across the imagery spectrum similarly distinguished matches from mismatches, but event-related potentials (ERPs) revealed diverging processing signatures: stronger visual imagers showed earlier sensitivity to shape mismatch, with temporal and topographic patterns consistent with visual perception and imagery, whereas weaker imagers showed the mismatch effect later, in a pattern more consistent with semantic integration. Together, Chapters 1 and 2 suggest that similar behavioral outcomes may be supported by different representational routes.

In Chapter 3, I ask whether imagery vividness predicts what people "see" during internally generated visual experiences. I analyzed free-text reports from over four thousand participants who viewed a rhythmic flicker that elicits hallucination-like visual experiences. I found that even weak imagers often reported visual hallucinations, but they described simple patterns and geometric forms, whereas strong imagers described complex naturalistic visuals, such as faces and scenes. These findings suggest that imagery differences are not only differences in vividness, but also differences in the content and complexity of internally generated experience.

In Chapter 4, I synthesize these findings within the broader imagery literature. As interest in imagery diversity and its role in cognition grows, findings about the cognitive consequences of imagery differences remain mixed. I argue that these inconsistencies partly reflect bottlenecks in how imagery is defined, measured, and linked to cognitive mechanisms, and propose ways forward.

Together, these studies suggest that imagery diversity is not merely a peculiar variation in private experience; it has tangible cognitive consequences. By showing how different minds can arrive at similar cognitive outcomes through different representational routes, this dissertation also shows how individual variation can serve as a tool for understanding cognitive mechanisms.

Committee members:

Dr. Lera Boroditsky (Co-Chair) - UCSD Cognitive Science
Dr. Anastasia Kiyonaga (Co-Chair) - UCSD Cognitive Science
Dr. Seana Coulson - UCSD Cognitive Science
Dr. Marta Kutas - UCSD Cognitive Science
Dr. John Serences - UCSD Psychology