The role and benefits of cognition and perception in medical imaging

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Abstract

In an era of unprecedented technological advances across the field of medical imaging, it is critically important to understand the cognitive and perceptual functioning of the “human in the loop,” the clinicians who make the final decisions on detection, diagnosis, and treatment. However, research on the cognitive and perceptual processes underlying clinician performance is chronically understudied. In September 2019, the National Cancer Institute (NCI) convened the “Cognition and Medical Image Perception Think Tank” in order to advance research on medical image perception[^1] and cognition. The Think Tank brought radiologists and pathologists together with researchers working in medical image perception and adjacent fields of cognition and perception, along with representatives from interested federal government agencies (including NCI, National Institute of Biomedical Imaging and Bioengineering, U.S. Food and Drug Administration, U.S. Department of Homeland Security) to address the Think Tank’s key objectives (see Table 1) through panel discussions, constructive discourse, idea generation, and problem-solving. Panel discussions were guided by critical questions generated by the participants themselves in advance of the meeting. Here, we report on the Think Tank’s deliberations and highlight opportunities to expand the research in medical image perception and cognition. Table 1. Think Tank Objectives

+——————————————————————————-+ | Objectives | +==+ | 1. Identify research gaps and critical unsolved problems in | | pathology and radiology, from the perspective of clinicians. | +——————————————————————————-+ | 2. Discuss ways to address these clinically-informed questions | | through cognitive and perceptual research. | +——————————————————————————-+ | 3. Identify barriers that hinder collaborations between researchers | | and clinicians and identify potential solutions. | +——————————————————————————-+ | 4. Identify and discuss ways to elevate psychology’s profile within | | the medical image community and broader communities. | +——————————————————————————-+ | 5. Identify future goals and identify strategies to evaluate | | progress. | +——————————————————————————-+ [^1]: We use the term “medical image perception” to cover a wide range of imaging techniques from images of individual cells used in pathology to whole-body radiological images, from glass slides to 3D computer renderings. In addition to detection and diagnosis, medical imaging can also be used to guide surgical interventions. We also extend to term beyond artificially created images; a dermatologist examining your skin, for example, is engaged in a medical image perception task.

References