



Introducing ISCET - The International Society for Clinical Eye Tracking

Rasha S. Moustafa*
Dr.Rashasameer@gmail.com
University of Eastern Finland
Joensuu, Finland
Tampere University
Tampere, Finland

Siyuan Chen
siyuan.chen@unsw.edu.au
University of New South Wales
Kensington, NSW, Australia

Minoru Nakayama
nakayama@ict.e.titech.ac.jp
Tokyo Institute of Technology
Meguro, Tokyo, Japan

Frederick Shic
fshic@uw.edu
University of Washington School of
Medicine
Seattle, Washington, USA
Seattle Children's Research Institute
Seattle, Washington, USA

Matt J. Dunn
DunnMJ1@cardiff.ac.uk
Cardiff University
Cardiff, UK

ABSTRACT

The International Society for Clinical Eye Tracking (ISCET) serves as a global platform for promoting international consensus on open standards in the application of eye tracking to clinical areas of focus. Formed in March 2023, ISCET facilitates collaboration, knowledge exchange, and advancements in clinical eye-tracking applications, with the goal of fostering interdisciplinary research and improving clinical outcomes. Through collaborative and interdisciplinary efforts, ISCET aims to provide guidance on conducting eye-tracking tasks in clinical settings, unify clinicians' voices, and maintain reference datasets for normative comparisons. Convening during its latest meeting for the Europe/Africa region on January 24, 2024, ISCET established subcommittees to address specific needs. This paper outlines the rationale behind ISCET's formation, its mission, objectives, ongoing initiatives, and organizational structure. Ongoing work focuses on surveying current international clinical eye tracker usage to inform standards development.

CCS CONCEPTS

• **Social and professional topics** → **Medical records**.

KEYWORDS

eye tracking, clinical eye tracking, interdisciplinary collaboration, clinical applications, standards development, normative comparisons

*corresponding author

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1 INTRODUCTION

In recent years, the advent of eye-tracking technology has heralded a new era of possibilities within clinical applications, spanning diagnostics, interventions, and rehabilitation [Clark et al. 2019; Holmqvist et al. 2011]. This technology's capacity to capture the intricate interplay between eye movements and cognitive processes has proven invaluable for providing insights into human behavior, perception, and neurological function [Smith et al. 2018].

Despite its promising potential, the widespread adoption of eye-tracking technology across clinical specialties and sub-specialties has not yet occurred due to several existing challenges. These challenges encompass the diversity of eye-tracking techniques employed, variations in clinical settings, and the varying levels of expertise required to operate eye trackers effectively [González-Vides et al. 2023; Harezlak and Kasprowski 2018; Sqalli et al. 2023].

Furthermore, different approaches to both testing and data analyses currently render data obtained from different clinical centers incomparable. Recent studies [e.g. Clark et al. 2019] underscore these ongoing challenges, identifying key issues in eye tracking, and emphasizing the critical need for standardized protocols and unified representation within the clinical eye-tracking community.

Recognizing the transformative potential of integrating eye tracking into clinical practice, these challenges highlight the urgent necessity for an initiative within the clinical eye-tracking community that fosters seamless collaboration and maximizes the potential of eye-tracking technology in clinical settings. Addressing this need, the International Society for Clinical Eye Tracking (ISCET) was established in March 2023 to integrate eye tracking into clinical practice with standardized protocols and unified representation.

ISCET represents a vital nexus for collaboration, knowledge exchange, and advancements in clinical eye-tracking applications. By fostering interdisciplinary research and facilitating the translation of cutting-edge technologies into clinical practice, ISCET seeks to improve patient care, enhance clinical outcomes, and propel scientific discovery in the field of clinical eye tracking.

ISCET's commitment to addressing needs and fostering collaboration was evident during its recent meeting for the Europe/Africa region on January 24, 2024 (Figure 1), where dedicated subcommittees were established [ISCET 2024]. This paper provides an overview of ISCET's genesis, mission, objectives, and ongoing initiatives, highlighting its significance in advancing clinical eye-tracking research and practice.

2 ISCET

ISCET serves as a global platform for promoting international consensus on open standards in clinical eye tracking. Through collaborative and interdisciplinary efforts, ISCET endeavors to provide guidance on conducting and analyzing eye-tracking tasks in clinical settings, unify clinicians' voices, and maintain reference datasets for normative comparisons [ISCET 2024]. Ongoing work focuses on surveying current international clinical eye tracker usage to inform standards development.

2.1 Mission and Objectives

ISCET's mission encompasses three key objectives:

- (1) **Eye-Tracking Protocols:** ISCET aims to provide default minimal protocols for conducting and analyzing eye-tracking tasks in clinical settings, customized to address specific diagnostic conditions. This includes the creation of templates to develop domain-specific guidance, recognizing that requirements vary across different clinical contexts (e.g., concussion management, ophthalmology assessments, psychiatric evaluations). These protocols are collaboratively developed by focus groups within the international eye-tracking community, ensuring comprehensive coverage and relevance to clinical practice [ISCET 2024].
- (2) **Unified Representation:** ISCET serves as a unified voice for clinicians utilizing eye-tracking technology. It addresses issues such as certification and fee codes for clinical use, while also fostering translational pipelines and industry partnerships to facilitate dissemination into practice and navigate commercialization challenges. Recognizing the importance of clinical innovation, ISCET focuses on bridging the gap between research and industry [ISCET 2024].
- (3) **Reference Datasets:** ISCET endeavors to maintain reference datasets to facilitate normative comparison and provide databases of comparative function within these norms for specific applications and eye-tracking platforms. These datasets are essential for accurately interpreting deviations in clinical eye-tracking data [ISCET 2024].

2.2 Organizational Structure

ISCET operates with an organizational structure comprising an organizing committee of dedicated volunteers tasked with coordination, collaboration facilitation, and representation of diverse

perspectives within the international eye-tracking community [ISCET 2024]. Led by a general coordinator and three regional vice presidents responsible for overseeing different regions and time-zone meetings (Asia/Australasia, Europe/Africa, The Americas), this committee ensures that decisions are made through inclusive processes involving the wider membership. While the organizing committee handles administrative tasks, decisions regarding ISCET's aims or standards are made collectively by the wider group or by subcommittees established during main meetings. Additionally, ISCET appoints a designated spokesperson, also a volunteer, who serves as the primary liaison between the organization and external stakeholders, ensuring effective communication and representation of the society's objectives and initiatives. As ISCET progresses towards establishing a formal membership structure, new positions, including a Membership Secretary role, will be introduced to further support the organization's growth and development.

2.3 Operating Approach

ISCET conducts its meetings virtually and online, acknowledging the global reach of its community and striving to accommodate members worldwide [ISCET 2024]. Given the time zone differences, these meetings are organized in three regions: Asia/Australasia, Europe/Africa, and The Americas, with each region hosting on a rotational basis to ensure inclusivity, aiming to foster broad participation and consensus-building among members. Subcommittees are formed during these meetings to address specific issues, offering members the opportunity to participate voluntarily, contribute to projects, and publish group work. To ensure transparency and accessibility, all general, committee, and subcommittee meetings are recorded and made publicly available on our website, providing access to up-to-date information and fostering an environment of openness and collaboration within the ISCET community and the larger eyetracking community.

3 PROGRESS AND FUTURE DIRECTION

3.1 Members & Membership

While ISCET anticipates direct stakeholders in membership structure, at the moment, professionals who are keen to join can engage with the society by "joining the mailing group" and participating in meetings. To become a member, an interest in clinical eye tracking is the only prerequisite. As of February 29th 2024 there are 80 members, from diverse representations across the three geographic regions and representing various disciplines, including Ophthalmology, Neuro-ophthalmology, Optometry, Vision Rehabilitation, ENT, Neuropsychology, Neurology, Rehabilitation, Technology, and more [ISCET 2024].

3.2 Meeting Output Summary (to date)

Decisions made at meetings thus far encompass several key areas:

3.2.1 General.

- Establishment of a society (ISCET) to provide guidance on clinical eye-tracking test/analysis protocols.
- All individuals with an interest in clinical eye tracking are welcomed to join ISCET and contribute to decision-making processes, with consideration of conflicts of interest.

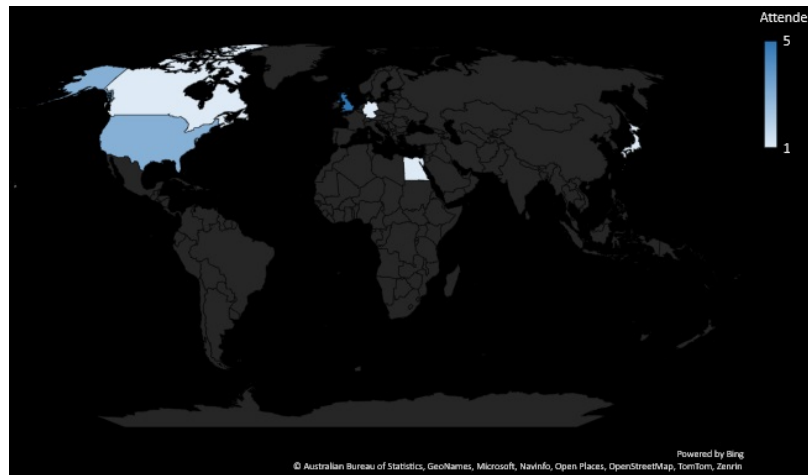


Figure 1: Countries of the attendees in the ISCET meeting at January 24th 2024

- Although some sub-disciplines already have published guidance available, ISCET aims to keep guidance up-to-date, especially in sub-disciplines lacking current published guidance.
- Advocacy for demonstrating demand to manufacturers for clinical certification of eye-tracking equipment is a priority.
- ISCET is responsible for the maintenance of reference ('normative') datasets.

3.2.2 ISCET Standards.

- ISCET standards will cover both test protocols and analysis pipelines.
- Separate ISCET standards will be developed for different clinical conditions; only where deemed appropriate will a single standard cover several conditions. Some overarching guidance will also be provided (e.g. general eye-tracking data quality guidance as synthesized with prior efforts [EDQ 2019]), but the specifics will differ based on the use case.
- ISCET is not a regulatory body and its standards are guidance only, intended to be used as defaults in the absence of a reason/preference for performing tasks another way. Clinics that fully adopt ISCET standards would benefit from comparable data.
- For each clinical condition, ISCET standards also define minimum requirements for eye tracker technology (e.g. sampling frequency) as well as display hardware/other hardware, as appropriate.
- Although it is hoped that manufacturers will eventually provide ISCET protocols natively via their equipment, ISCET will also provide and host open source code to perform and analyze eye tracking tasks via standard protocols using common eye tracking hardware.
- ISCET standards will be determined by subcommittees with relevant expertise. Where a subcommittee cannot agree on an aspect of a standard, the published standard will provide flexibility on that aspect.
- All contributors to a standard will be required to declare conflicts of interest.

- ISCET standards will be periodically updated.
- Prior to defining the first ISCET standard, a survey study will be undertaken to understand how eye trackers are currently being used internationally in clinical settings. The results of this survey will determine which clinical condition(s) ISCET should first focus on.

3.2.3 Organizational Development.

- The current organizational structure, as described in Sections 2.2 (Organizational Structure) and 2.3 (Organizational Approach), was developed through early meetings as the scope and aims of ISCET became more defined.
- The organizational structure of ISCET continues to evolve through continued discussions among ISCET membership as the community expands in size and breadth and specificity or Subcommittee activity.
- Methods, standards, and specific areas of work and inquiry continue to be shaped by the diversity of perspectives within the ISCET membership, providing foundations for ongoing outreach with other organizations that have intersecting or aligned goals, such as those focused on vision science [VSS 2024], medical conditions of the eye [AAO 2024], eye-tracking technology and applications [ETRA 2024], among many other domains [for a list of eye-tracking relevant venues, see SR Research 2023].

3.3 Ongoing Work

In 2024, ISCET's focus lies in characterizing international clinical eye tracker usage patterns to understand how the technology is currently being used in clinics worldwide, and therefore inform priority setting and standards [ISCET 2024]. Additionally, ISCET is actively working towards formalizing its membership structure to enhance its organizational framework and facilitate broader participation, while also increasing its presence in scientific and professional events to promote awareness and engagement. The seventh meeting, scheduled for March 21st, 2024, will be hosted in the Americas region. It's slated to delve deeper into standards and

further discussions on community development and membership applications.

4 DISCUSSION

The formation of ISCET was prompted by a growing awareness within the international eye-tracking community that performing similar clinical tests in subtly different ways produces data that is not directly comparable. ISCET's primary aim therefore is to enable patients to receive equivalent care across different test centers, facilitating freedom of movement, accurate monitoring of disease progression, and greater agreement amongst clinicians on what constitutes abnormal oculomotor behavior. Access to clear guidance will benefit new clinicians entering the field, and internationally-agreed default protocols set the stage for large-scale multicenter research studies.

Seemingly minor steps in data processing, such as the choice of low-pass filter or method of calculating eye velocity, can affect metrics that characterise oculomotor behavior such as the saccadic main sequence – an indicator of neurological disease. ISCET's survey of international clinical eye tracker usage will determine which clinical areas are most in need of guidance, and standards will be developed based on this priority-setting exercise.

5 CONCLUSION

ISCET plays a crucial role in advancing clinical eye tracking through the establishment of standardized protocols, unified representation, and collaborative initiatives. By fostering global collaboration and consensus-building, ISCET contributes to the growth and development of the field, ultimately enhancing clinical outcomes and patient care [ISCET 2024].

In summary, ISCET's commitment to open standards, unified representation, and collaborative endeavors positions it as a leading force in shaping the future of clinical eye tracking [ISCET 2024].

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This introduction to ISCET is the result of an ISCET subcommittee focused on broader outreach and does not represent the many moving pieces that comprise ISCET's ongoing work, nor does it capture in totality the exceptional diversity of perspectives within its membership.

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