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Tracking Astronomical Instruments Through Ottoman World and Beyond Workshop, Istanbul, 28th November 2023

Astronomi Aletlerinin Peşinde: Osmanlı Dünyası ve Ötesi Atölyesi, İstanbul, 28 Kasım 2023

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An exceptional workshop entitled "Tracking Astronomical Instruments Through Ottoman World and Beyond Workshop" was held on the 28 November 2023 in the General Assembly Hall of the Faculty of Letters, Istanbul University. The workshop, meticulously organized by the Department of the History of Science at Istanbul University, served as an insightful "epilogue" to the preceding international congress titled "Channels of Transmission of Astronomical Knowledge in the Ottoman World (14th-18th Centuries), conducted a week prior.

1. Workshop Poster

The workshop aimed to delve into the history of astronomy through touchable examples of portable astronomical instruments, calendars, and volvelles, -mostly- within and beyond the Ottoman World. The workshop, led by distinguished conductors, including Prof. Jan Pieter Hogendijk, a retired Professor of Mathematics from the Department of Mathematics at Utrecht University; Assist. Prof. Taha Yasin Arslan from the Institute of History of Science at Istanbul Medeniyet University; and Assist. Prof. Gaye Danışan from the Department of the History of Science at Istanbul University, provided a platform for the sharing of knowledge and experiences in the field of the history of science. Participants were actively engaged through hands-on activities, contributing to a direct and immersive learning experience.

The workshop comprised four sessions: Session 1 - “Introduction: History-telling through Astronomical Instruments,” led by Professors Hoogendjik, Arslan, and Danışan; Session 2 - “Abjad Through Astronomical Tables and Instruments,” led by Hoogendjik; Session 3 - “Using Astrolabes,” led by Hoogendjik and Arslan; and the final session, Session 4 - “Experiencing Paper Instruments: Ottoman Volvelles and Their Construction,” led by Danışan. The entire workshop received valuable support from four training assistants: R.A. Eslem Günaydın (İstanbul University), Solmaz Ceren Özdemir (Istanbul University), Mar River Colomer (Universidad de La Laguna), and R.A. Kutsi Aybars Çetinalp (Istanbul Technical University). Attended by 47 participants ranging from academics to undergraduates across various programs, the workshop was conducted bilingually (Turkish and English) to accommodate the multinational origins of the participants, mostly from Egypt and Iran. The participants expressed particular appreciation for the bilingual organization of the workshop, acknowledging the thoughtful approach in accommodating both Turkish and English languages. The workshop was generously sponsored by the Department of History of Science at Istanbul University, Institut Français d'Études Anatoliennes, and the Turkish Academy of Sciences (TÜBA).

In the opening session, serving as an introduction, Professor Hogendjik provided a concise overview to the participants regarding the workshop’s objectives and its underlying philosophy, placing particular emphasis on the significance of “experiencing” the history of science through hands-on activities. This initial session predominantly centred around a 17th or 18th-century “world map” of Iranian origin, commonly referred to as the “Harvard world map” in scholarly circles. Originally part of a sundial, the map was employed for determining the qibla and calculating the distance to Mecca, thus mostly involving the Islamic world. Nevertheless, the handouts prepared by Professor Hogendjik encompassed a broader scope, encompassing the majority of the Eastern hemisphere. Participants were tasked with calculating the distance from London to Mecca, and the original ruler, indicating distances in *fersang*, was converted to a ruler calibrated in kilometres for the workshop’s purposes. The exercises further progressed to identifying the qibla and distances between Mecca and various locations, including Kolkata and Cape Town. The final and seemingly the most “trivial” exercise involved determining the distance between Mecca and Auckland, even though Auckland was not featured on the map. The workshop employed a teaching approach characterised by progressing from simple exercises to “arduous” ones. This approach aimed to provide a gradual and accessible learning experience for the participants, ensuring a balanced and effective approach.

2. Jan Pieter Hoogendjik with his hand-made astrolabe

The second session resumed following a brief coffee break, during which participants continued to discuss and reflect on the knowledge gained during the first session. This subsequent session was dedicated to the exploration of the abjad number system, a "must-have" for the upcoming third session centred on Islamic astrolabes. The session commenced with an explanation of the main principles of the abjad system. For those who are not versed in Arabic letters, the option to participate using Latin letters was accommodated, e.g., the abjad value of 44 (مد) was concurrently presented as *md*, the transliteration of the corresponding Arabic letters. After an introduction to abjad and a few exercises, the participants are now asked to read the abjad numbers of two astrolabes, the Lahore astrolabe (made in Lahore in 1047 H / 1637-38 AD) and an Andalusian astrolabe (crafted in 474 H/ 1081-82 AD in Guadalajara, Spain) respectively. The session concluded with a series of questions on the abjad system, and discussions on how participants intended to apply their understanding in the following session.

3. The participants with Prof. Hoogendjik's hand-made astrolabes during the third session

Following the luncheon held at the Istanbul University Rıdvan Çelikel Archaeological Museum, the third session took place at the General Assembly Hall of the Faculty of Letters. The third session, overseen by professors Hoogendjik and Taha Arslan, centres its attention on the subject of astrolabes. Prior to the initiation of the session by Arslan, during which he presented two authentic astrolabes crafted by himself, participants were instructed to divide into six groups. Subsequently, each of the two brass astrolabes was disassembled into three distinct components: rete, tympanums, and mater. These components were then allocated to the respective groups for examination and discussion. Each group was allotted a 15-minute period to discuss the specific piece they received. Following this initial discussion, groups rotated among the pieces to ensure that every group had the opportunity to examine and discuss each component. At the conclusion of the allotted time, Arslan, "employing a Socratic approach", proceeded to pose questions aimed at assessing the insights and observations gathered by the participants from their examination of the astrolabe components. Thereafter, Dr. Taha Arslan himself introduced the fully reassembled instrument, imparted his expertise to the participants and showed how to use the astrolabe. Following Arslan's lecture, Professor Hoogendjik distributed astrolabe kits composed of paper and plastic, modelled after the astrolabe originally crafted by al-Khujandi in Baghdad during the 10th century. Hoogendjik delivered a discourse on how astrolabes can be used to tell the local time and can also be used as a compass. Following the clarification of the functionality of the astrolabes, participants

were tasked with utilizing the provided astrolabe kits to find out their birthdays, respective zodiac signs, degree positions within the signs, the current date, and the length of the ongoing day. The session concluded with Professor Hoogendjik emphasizing the significance of hands-on activities within the workshop and encouraging participants to use the instructive materials he provided on his website.[1] Furthermore, he extended an invitation to utilize these resources in Turkey for future workshops focusing on the history of science.

4. Taha Yasin Arslan (Conductor), Kutsi Aybars Çetinalp (Training Assistant), and rete of the astrolabe crafted by Dr. Arslan

The fourth and final session commenced following a coffee break, during which participants continued to discuss the calculations they made with the astrolabe kits in the preceding session. The final session, led by Dr. Gaye Danışan, focused on paper instruments, specifically delving into the subject of volvelles. The session covered both the usage and construction of these intricate paper devices. Danışan's presentation about the origins and the usage of volvelles was accompanied by hand-made volvelles distributed to the participants. These instruments, delicately prepared by the undergrads of the Department of the History of Science at Istanbul University,[2] were almost identical to the original paper instruments in question. The participants actively engaged with the instruments to enhance their comprehension of Dr. Danışan's presentation. The practical interaction allowed a clearer understanding of the conversions

1 https://jphogendijk.nl/workshop.html (accessed on: 5.12.2023).

2 Once again, I express my gratitude to the undergraduate students -the invisible heroes- who willingly dedicated their time and efforts to contribute to both the congress and the workshop, despite their midterm exams.

between the solar and lunar calendars. Moreover, as Dr. Danışan discussed the comparative aspects between Ottoman and European volvelles, participants were able to draw meaningful comparisons using the paper instruments provided during the session. The entire session was highly interactive with frequently asked questions and feedbacks given to Dr. Danışan. The last 15-minutes had closing remarks by professors Hogendjik, Arslan, Danışan and the participants.

5. Gaye Danışan (Conductor) and the participants with their hand-made volvelles during the fourth session on paper instruments

In conclusion, the "Tracking Astronomical Instruments Through Ottoman World and Beyond Workshop" held at Istanbul University stands as a noteworthy and enriching endeavour in the exploration of the History of Astronomy. The workshop, organized by the Department of History of Science at Istanbul University, served as a captivating epilogue to the preceding international congress, seamlessly blending theoretical knowledge with practical engagement. The four sessions, led by distinguished scholars, Prof. Jan Pieter Hogendijk, Assist. Prof. Taha Yasin Arslan, and Assist. Prof. Gaye Danışan; each focusing on distinct aspects of astronomical instruments, provided a comprehensive understanding for participants. The hands-on activities, from deciphering abjad numbers to disassembling and examining astrolabes, offered a direct and immersive learning experience. The inclusion of paper instruments and volvelles, meticulously crafted by undergraduates, added a palpable approach. The event not only contributed to the participants' knowledge of astronomical history but also set a precedent for future interdisciplinary workshops bridging theory and practice.