Mathematics in Early Modern Portugal: The challenge of the sea

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Mathematical activities in Portugal during the 15th to 17th centuries, both theoretical and practical, were profoundly influenced by the country's maritime expansion: transformations in mathematics occurred across social, institutional, intellectual, and symbolic domains. While the effects of oceanic navigation were initially evident in Portugal, similar developments occurred in all nations engaged in large-scale maritime enterprises, particularly Spain, England, and the Netherlands.

Technological demands of oceanic navigation soon highlighted the need for close collaboration between university-trained mathematicians and practical professionals, such as pilots, mariners, instrument makers, and cartographers. A wide array of new questions in astronomy, cosmography, cartography, and instrument-making required the expertise of skilled mathematicians. As a result, mathematical talent was redirected toward solving the novel challenges posed by seafarers and cosmographers. The social landscape for the practice of mathematics was significantly altered due to these demands: circles of mathematical experts working with mariners emerged; new institutions were established to facilitate these collaborations; novel programs for the mathematical education of maritime personnel were implemented; and mathematical consultants were employed by the crown, the aristocracy, and commercial enterprises.

The influence of maritime exploration was also felt at the theoretical level. Long-distance voyages brought about considerable transformations and advancements in mathematics. A new, mathematically-based "science of navigation" had to be developed, a deeper understanding of the geometry of nautical charts was required, and substantial changes were made in mathematical cartography. The exploration of the Earth on a planetary scale gave rise to critical new problems in cosmography and cartography. Groundbreaking concepts, such as the loxodromic curve and Mercator's projection, were directly linked to this new maritime reality.

Perhaps the most profound impact was felt at even deeper levels. Mathematics gained a newfound prominence within the hierarchy of knowledge, and the awareness of its practical utility was significantly heightened.

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