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Using positions: Mathematical practices, accounting practices

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Artisans' Accounting Practices and Operative Skills in the 18th Century

At the beginning of the 19th century, along with the machinery question and the birth of political economy, a new discipline was forged, called technology. Technology was the science of the arts, it aimed to classify all productions into operations. This was clearly stated by the Cameralist Johann Beckmann in *Entwurf der allgemeinen Technologie*, in 1806 : "a wide range of crafts have to achieve work by following the same purpose : the work of a joiner with a plane, the polishing of glasses, the calendaring of linen fabrics are activities that derive from the same operative purpose, that is surfacing bodies". As a science of operations, technology would become the basis for the abstraction of work into labour. It has often been associated with the mechanization of work. In England, this expressed in the "economy of manufactures". Charles Babbage and Andrew Ure attempted to rationalize the manufacturing process, to reduce work into operations that could be mechanized, planned and combined by engineers. For Ure, the science of "operative industry" aimed to cut down production costs by standardising work – it was "human labour in the abstract".

For all these authors, the possibility to reduce any movement into an operation relied on the devising of a verbal language. The attempt run from Beckmann describing productive activities by means of verbs, to Babbage's *Method of Expressing by Signs the Action of Machinery* (1826) and eventually, to Taylorian codifications of movements. But practitioners were also soon involved, like the manufacturer Josiah Wedgwood in the 18th c., who accounted the process of making potteries, in his *Price book of workmanship*. The process was divided into 14 inputs, including fuel, materials and labor. Wegdwood's accounts have been central in the revision of cost accounting by historians (Rich. Fleischman), who stressed the part played by entrepreneurs of the first Industrial Revolution in costing techniques.

In this presentation, I would like to question further the part played by practitioners in promoting a verbal language and in calculating workmanship by focusing on artisans. This issue is to understand what meant an operative culture of work within an artisanal context. I will deal with a case study, the ledgers of a family of London watchmakers in the 18th c., the Grays and Vulliamys. Their account books attest that in the context of a rising demand for sophisticated goods, artisans rearranged the process of production according to operative skills and were ready to abstract work into labor in their daily accounting practices. This did not mean any attempt of cost reducing. The accounts were embedded into a merchant economy, the economy of the product, based upon the diversification or qualities by

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composing artefacts made up of mixed-medias, of different pieces and fittings that could be varied in size, in shapes and substituted according to fashion and the making of whole assortments by "comprehensive firms". Whereas assembling fixtures and components was the major principle giving coherence to these accounts, this topographical logic was challenged by an operative notation of actions. It revealed the existence of a "Smithian technology" in which skills were no longer associated with crafts but were not yet subsumed into engineers' "mental capital". These skills were not deriving from mechanization but from extreme specialization of work to contrive complex artefacts, fit to the desires of the users.

Watchmaking, like coachmaking and the "toytrade" were emblematic of the success of products assembled into pieces. They relied on the integration of networks of specialists, whose tasks were being carefully registered by entrepreneurs in their ledgers for calculating selling prices. Tasks, operations were accounted well before the rise of cost accounting in industry. On that sense, artisans involved in the development of market economy were the makers of the Industrial Revolution. It then seems then possible to consider artisans' commercial records as archives for the history of technological thought.

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