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Numeracy and Popular Culture: *Cocker's Arithmetick* and the Market for Cheap Arithmetical Books, 1678–1787

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ABSTRACT

Cocker's Arithmetick was the most popular English-language arithmetic textbook from the late seventeenth to the mid-eighteenth century. Though well known to historians of popular mathematics, the reasons for its remarkable success remain largely unexplored. To explain why Cocker became a bestseller, this article identifies the economic, sociocultural, and intellectual conditions which spurred demand for arithmetical books, before considering the book's textual and material qualities, and finally its situation within the mass market for cheap print. The success of *Cocker's Arithmetick*, it is argued, demonstrates the means by which arithmetic became so embedded in early modern Anglophone popular culture.

KEYWORDS

Numeracy; arithmetic; chapbooks; popular culture; booktrade

In 1838 the bibliographer Thomas Frognall Dibdin published an account of his tour of Scotland, the highlight of which, he recalled, was a visit to the Hunterian Library in Glasgow. There he marvelled at the troves of antique volumes, taking particular delight in a copy of 'the *Aldine Anthology* of 1503, *upon vellum*, a treasure not previously known'. Yet his final remarks concerned 'a book-treasure . . . of humble title, and of humbler form and aspect; yet it is a work which has probably made as much stir and noise in the English world, as any – next to the Bible. I mean COCKER'S *Arithmetic*'.[1]

Dibdin was shown a copy of the first Glasgow edition of *Cockers Arithmetick, Being A plain and familiar Method Suitable to the meanest capacity for the full understanding of that incomparable Art as it is now taught by the ablest School-Masters in City and Countrey*. Based upon the manuscripts of the writing master Edward Cocker (d. 1676) and first published posthumously in London in 1678, this pocketsize manual of basic arithmetic quickly became the most popular book of its kind, remaining in print for over a century and seeing scores of impressions produced in London, Dublin, Belfast, Glasgow, and Edinburgh. Dibdin can hardly have been exaggerating in his estimation of the book's fame, nor was he alone in offering such inordinate praise. Arthur Murphy's play *The Apprentice* (1756) assured audiences that this was the 'best Book that ever was wrote', and it counted among its admirers such luminaries as Samuel Johnson and Benjamin Franklin.[2] This fame was immortalised in the popular saying, 'according to

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Cocker', meaning 'by the book'.[3] *Cocker's Arithmetick* was not merely a well-known textbook, it was a landmark of popular culture. By exploring the success of this particular work, this article asks how the subject of arithmetic as a whole was popularised.

Cocker's text has long interested historians of mathematics, with much nineteenth- and early twentieth-century scholarship advancing a Whiggish view of the development of mathematical texts in which *Cocker's Arithmetick* and its contemporaries were derided for their incomprehensible explanations and encouragement of rote learning.[4] Yet the last decade has seen renewed interest in popular arithmetical books, not only among historians of mathematics, but from cultural historians interested in contemporary meanings and experiences of numeracy. Jessica Otis has demonstrated that widening engagement with early modern arithmetic books, driven by rising literacy, helped to popularise written arithmetic with Hindu-Arabic numerals.[5] Benjamin Wardhaugh explores the ways in which eighteenth-century readers encountered popular mathematical texts, whether for education, entertainment, or practical benefit.[6] A growing corpus of scholarship assesses the literary value of such texts as a platform for ideological discourse and the establishment of social norms.[7] Arithmetic books are no longer viewed simply as didactic tools, but sites in which the contemporary meanings and values of numerical knowledge were negotiated.

Yet the precise means by which these books were popularised remains underexplored. What wider sociocultural conditions generated a burgeoning market for arithmetical books and how did particular texts such as *Cocker's Arithmetick* attain such dazzling success? Addressing these questions is necessary, not only in recovering a vital aspect of the mental worlds of contemporaries, but also in investigating the ways in which the popularisation of arithmetic contributed to wider cultural, social, and economic change through the early modern period. Recent debates among economic historians have considered the extent to which numeracy constituted a form of human capital that accompanied the rise of capitalism.[8] These studies are complicated by a paucity of evidence regarding the extent of early modern numeracy, relying on quantitative analysis of 'age-heaping' as a proxy measurement. If indeed numeracy played a key role in these crucial processes of change, then it is essential to more fully understand the sources of arithmetical knowledge and the extent of its diffusion in contemporary society.

This article argues that the success of *Cocker's Arithmetick* demonstrates the means by which arithmetic became so embedded in the popular culture of seventeenth- and eighteenth-century Britain. After an initial section outlining the book's characteristics and the extent of its popularity, the argument unfolds in three parts. The first considers the economic, sociocultural, and intellectual conditions that generated new demand for arithmetic skills. Amidst the expansion of commerce both as an economic force and cultural paradigm, the perceived uses of arithmetic expanded at all levels of society. Simultaneously, arguments in favour of its teaching proliferated and a burgeoning audience for arithmetic textbooks emerged among both the increasing numbers who learned arithmetic at school and those who relied upon self-teaching.

Attention then turns to specific textual and material characteristics which made for a successful arithmetic book. I suggest that the popularity of *Cocker's Arithmetick* owed much to similarities it held with chapbooks and almanacs, the cheap and highly popular prints which stimulated the reading habits of the largest audiences.[9] Cocker was no chapbook per se, numbering over 300 pages in early editions and costing a shilling at full

price, several times that of a single-sheet storybook. Yet its rudimentary content and appeal to rote learning held much in common with ABCs and catechisms, while its compact profile and layout gave the book similar material properties. Evidence of the ways in which readers encountered Cocker's text is drawn from contemporary testimony in diaries and memoirs, as well as marginalia in fifty-three extant copies across five libraries.[10] While we cannot assume this sample to reflect the extent of contemporary engagement with the text due to differing collection practices between these repositories, and particularly the preference of some for clean texts without annotations, marginalia in individual copies reveals much about their readership.

Finally, the place of *Cocker's Arithmetick* and its competitors within the booktrade is considered. Again I argue that it shared much in common with other forms of popular print, not only in form and content, but in its place within the mass market for such works. Cocker capitalised on the same avenues of sale and distribution that saw almanacs and ballads sell in hundreds of thousands of copies yearly.[11] It was sold wholesale by some of the foremost proprietors of cheap print nationwide, before being circulated across the country by chapmen, reaching the same mass audience as the most popular printed wares. Evidence of this process is drawn from the stock catalogues of booksellers who sold *Cocker's Arithmetick* alongside other popular titles. Although catalogue listings provide no evidence that a book was ever bought, nor can it be assumed that any book advertised was continuously stocked by the seller rather than simply being available for acquisition on demand, the evidence of life-writing and marginalia supports the conclusion that Cocker was a widely popular text.[12] Together these sections explain the means by which *Cocker's Arithmetick* and its competitors became so successful, shedding light on the extent to which the forms of numeracy propagated therein became pillars of contemporary popular culture.

Characteristics and extent of popularity

Cocker's Arithmetick belonged to a canon of vernacular English arithmetical texts that originated in the early sixteenth century, emulating a model already familiar on the continent.[13] While the earliest known English text appeared anonymously in 1526, the first to achieve significant renown was Robert Recorde's *Ground of artes* (c.1540). This book's popularity was such that Recorde's name became synonymous with arithmetic books and by the time Cocker appeared in 1678, 'Recorde's arithmetick' remained well known.[14] These early works established a template from which later authors hardly strayed. *Cocker's Arithmetick* was a pocketsize duodecimo publication, numbering between 183 and 334 pages in different editions. A frontispiece bore an engraving of Edward Cocker, followed by a preface from the book's editor, John Hawkins, explaining his desire to publish the work following Cocker's death.[15] The substantive text comprised chapters on the basics of numeration, addition, subtraction, multiplication, and division, followed by the 'rule of three' and its variants, and finally rules for commercial practice. The text was continually reissued by successive editors, but changes were generally restricted to the correction of errors.

In these characteristics Cocker was typical of popular arithmetic textbooks. Following the works of Recorde, Humfrey Baker (1562), and Edmund Wingate (1630), *Cocker's Arithmetick* assumed a position as the most popular title of its day.

Meanwhile, the works of James Hodder (1661), John Ayres (1693) and George Fisher (1726) comprised a supporting cast of textbooks popular from the late seventeenth to the mid-eighteenth century. Although these texts were often much alike, each achieving notable popularity, the scale of production and extent of popular recognition mark Cocker as somewhat unique. The book's success thus brings into particularly sharp focus the means by which the most successful arithmetic books became familiar sites on the cultural landscape.

It is therefore important to establish just how popular the book was. Scale of production is one barometer of success, but typically of a somewhat ephemeral text, exact figures remain a matter of speculation. The antiquarian Sir Ambrose Heal tentatively identified sixty-three editions, but popular estimates today often number as high as 112.[16] Yet this is likely to be an overestimate, perhaps including Cocker's earlier copybooks and his more advanced *Decimal Arithmetick* (1685). Sixty-eight impressions are listed in the *English Short Title Catalogue* and at least one further imprint absent from the *ESTC* is known to survive.[17] Many of the seventeenth-century editions were not numbered, so it is impossible to verify the claim of the 1700 edition to be the twentieth, given that only thirteen seventeenth-century impressions are now extant. Indeed, it is possible that some editions were numbered falsely, either to give the impression of greater popularity or simply in error, thus estimates based on title pages should be made cautiously. Even among later editions survival rates are poor, with some extant in only a single copy. While it is therefore possible that some editions are now lost, I have been unable to locate certain references to any no longer extant.[18]

The size of print runs is equally difficult to ascertain. Impressions of John Ward's *Young mathematician's guide* (1707), a larger and more expensive book, averaged roughly 1,700 copies.[19] The contemporary bookseller Thomas Rooks claimed that all 1,550 copies of his third edition of *Hodder's Arithmetick*, a popular alternative to Cocker, were sold in ten months.[20] Some estimates of the print runs of arithmetic books suggest that batches could number as high as 10,000.[21] Whatever the exact figures, it is certain that the work's popularity would have justified sizeable print runs. We can reasonably assume a minimum of 70 impressions and if print runs were comparable to other books of its genre, the total number of copies produced must have numbered at least 100,000.

Cocker was therefore by far the most widely produced arithmetic primer before the late eighteenth century. None of its chief competitors, including the arithmetics of Hodder, Ayres, and Fisher, nor the earlier works of Baker and Wingate, exceeded roughly thirty impressions, while Recorde's more popular text saw only around forty-six.[22] Only gradually in the second half of the eighteenth century were newer titles such as Thomas Dilworth's *Schoolmasters Assistant* (1743) and Francis Walkingame's *Tutor's Assistant* (1751) produced more widely. By its final edition in 1787, *Cocker's Arithmetick* had ceased to be the most sought-after arithmetic textbook, yet only then appeared the earliest known usage of the phrase 'according to Cocker', in a 1785 issue of *Town and Country Magazine*.[23] Such was the extent of Cocker's popularity that its assimilation with arithmetical matters outlasted its pre-eminence as a textbook. Subsequently, Edward Cocker and his text became a proverbial byword for arithmetic and exactitude, whether in Johnson's dictionary or the poetry of Byron.[24]

The popularisation of arithmetic

The popularity of *Cocker's Arithmetick* was occasioned by the emergence of social and cultural conditions that generated a burgeoning market for arithmetical books. Perhaps the most important development was the growth of commerce, not only in economic terms but as a stimulus for cultural change. The need for commercial arithmetic skills was a key selling point exploited by authors since the earliest vernacular textbooks. But with the cast of books that emerged from the late seventeenth century, the value of commercial skills assumed new significance. This was an age of financial and commercial revolution spurred by the expansion of empire, the progress of industrialisation, and the growing sophistication of financial institutions.[25] The need for arithmetic skills proliferated among all manner of tradespeople, shopkeepers, servants, and indeed anyone who participated in this increasingly commercialised economy.[26]

Edward Cocker was no exception in seeking a commercially-inclined readership, professing his intended audience to be 'the numerous Concords of the honoured Merchants'. On the value of his work to the reader, he boldly continued, 'let his own profitable experience be judge'.[27] These claims were reinforced throughout the book in chapters on the calculation of profits, the sharing of proceeds between business partners, and rules for barter and exchange. Lucrative commercial transactions provided the basis for example problems: 'A Merchant bought 436 yds of broad-cloth for 8s. 6d. per yd. and selleth it again at 10s. 4d. per yrd. now I desire to know how much he gained in the sale of the 436 yds?'[28] Alongside this practical utility, there was cultural value in pursuing commercial arithmetic skills. Reading constituted an active process of self-fashioning and to engage with arithmetical books was to locate oneself within a literary culture that exalted the value of commerce and sociability.[29] The many names proudly inscribed within extant copies of the text may be read as an attempt by their owners to situate themselves therein. The commercialisation of this period was nowhere more apparent than in the booktrade itself and if the popularity of *Cocker's Arithmetick* owed much to its ability to present itself as a point of entry to this world of commerce, then there was no greater advert for the book than its own commercial success.

The ways in which both the economic and cultural dimensions of commerce suffused society from the late seventeenth century were fundamental to the popularisation of arithmetic. Yet there were further developments that raised the stock of numerical skills. In this period emerged new modes of numeracy characterised by the popularisation of Hindu-Arabic numerals, the increasing prevalence of written arithmetic and accounting, and the spread of a newly quantitative mindset in matters ranging from the measurement of time to the calculation of national wealth.[30] Steadily rising literacy produced ever greater numbers of readers able to engage with arithmetic books. Previous textbooks such as Recorde's had included chapters on non-written calculation with counters. New books such as Cocker, however, omitted object-based methods, offering quick and simple calculation techniques to those who could write as well as read.[31]

The recognised uses of these skills proliferated in tandem with a number of significant developments through the seventeenth century. A new penchant for quantification was visible in a steadily emerging grass-roots culture of 'local arithmetic' as parish authorities placed ever-increasing emphasis on quantitative surveying to facilitate local administration.[32] These developments were typified by the schemes of 'political

arithmetic' of William Petty, John Graunt, and Gregory King, which aimed to express all manner of economic and demographic factors in the language of 'number, weight and measure'.[33] Realising this new quantitative spirit in practice required increasing ranks of local officials with the requisite numeracy.[34]

The household too was increasingly a locus for numerical tasks. Practices such as buying goods and following recipes necessitated a wide range of number skills, made ever more troublesome by the endless variation of weights and measures.[35] Household accounting became increasingly common among the middling ranks, inspired by a burgeoning literature in which arithmetic was synonymous with polite civility.[36] *The Ladies' Diary*, first issued in 1704, encouraged public discourse around the mathematical problems it contained.[37] This belonged to a raft of pocketbooks and almanacs that were published in hundreds of thousands of copies annually, impelling their readers to think numerically and annotate pages with their own sums and accounts.[38] Tables of weights and measures and celestial activity contributed to a rich plethora of numerical information in print. In turn, patterns of daily existence increasingly revolved around the quantitative terms of the clock and calendar.[39] Thus it was not merely the narrowly defined activities of business or administration but the very complexion of normal life that increasingly imbued the population with a sense of the utility of numbers.

This period of expansion in the uses of arithmetic was met by new arguments in favour of its teaching to the population at large. As early as 1648 Petty advocated the study of arithmetic 'for all Men in generall' for its 'Vast use in all Practical Arts'.[40] Having learned little or no arithmetic at school himself, progress in the subject came only during his spell at a Jesuit college in Caen.[41] In a similar vein Samuel Pepys, who knew Edward Cocker as 'the famous writing-master' found it necessary to wake early in the summer of 1662 to learn arithmetic from a ship mate.[42] The mathematician John Collins, another acquaintance of Cocker's, honed his arithmetical skills only during spells as a clerk in the Prince of Wales' kitchen and as a mariner.[43] Such educational shortcomings highlighted the importance of teaching practical subjects such as arithmetic.

Yet if belief in the importance of arithmetic was a notable aspect of the intellectual tenor of the Restoration era, the provision of schooling in the subject increased only gradually. Grammar schools, chiefly concerned with equipping boys with a humanist education in Latin and Greek, were slow to add arithmetic to their curricula.[44] Beyond these, circumstances varied by country. Scottish parishes were legally required to provide a school and by the late eighteenth century arithmetic was a standard curricular feature of parochial schools.[45] The Protestant authorities in Ireland introduced similar measures, though in practice most were taught at illicit 'hedge schools' provided by local teachers, in which arithmetic formed a central component of the curriculum.[46] Although classes were usually in Irish, this does not appear to have discouraged the use of manuals such as *Cocker's Arithmetick*, perhaps suggesting that the numerical examples were more useful than their written explanations. In England, church-funded petty schools sometimes offered arithmetical instruction, while in Wales much education depended upon charitable initiatives in which literacy was prioritised over numeracy.[47] Yet in both countries there were schools provided by the Society for Promoting Christian Knowledge from 1698, followed by those of its Scottish counterpart from 1709. Proficiency in arithmetic was a prerequisite of Society schoolmasters and such lessons were offered to those who had first mastered reading and writing.[48] Alongside these institutional avenues, there

were further settings in which arithmetic was taught, whether rural private adventure schools or the technical schools of urban writing masters, of whom Edward Cocker himself was one.

The provision of arithmetic in schools was evidently increasing and it was there that some students first encountered Cocker's text. The *Arithmetick* can be found on the book lists of schoolmasters in remote localities from Derbyshire to Aberdeenshire.[49] In a 1789 stock catalogue of the Leeds bookseller John Binns, Cocker was offered at the discounted price of 4s for six copies, perhaps encouraging bulk purchase for the classroom.[50] *Cocker's Arithmetick* is also known to have been used at hedge schools, with three editions listed in an 1825 report to the Commissioners of Education in Ireland.[51] An extant copy of the first Dublin edition of 1714 contains the autograph inscriptions of seven different users, suggesting that it was a schoolbook. Among its inscriptions are the words, 'Nicholas Farrell, Kilkeny', perhaps revealing its use at the Irish grammar school, Kilkenny College.[52] Another copy made its way to Essex, where it belonged to John Digby, Vicar of Harlington. Digby was previously a schoolmaster in Bedfordshire and seems to have acquired the book upon attaining his vicarage in 1693, perhaps intending to open a new school.[53]

Digby's copy was also somewhat unusual in baring the inscription of a female owner, one Elizabeth Digby. Just 12% of inscriptions in the present study were those of female owners, perhaps reflecting a male bias in the provision of arithmetic lessons in formal schools.[54] Yet the survival of many female-authored household account books and the ubiquitous presence of women in business demonstrates that advanced arithmetic skills were achieved by both men and women.[55] Furthermore, it has been suggested that a lack of annotations by women in early modern books may be the result of codes of behaviour that discouraged the practice, rather than the absence of female readers.[56] Inscriptions such as that of Elizabeth Digby may then offer glimpses of a substantial female audience for *Cocker's Arithmetick*, while also suggesting that schooling was not the most important means by which the subject was learned.

Indeed, while increasing provision of arithmetic in schools was one source of the market for arithmetical books, opportunities for schooling remained sporadic. Education was never compulsory and seldom free, the level of provision always dependent upon the ability of the schoolmaster. Moreover, the cheapest arithmetic books were usually less costly than quarterly arithmetic fees.[57] It was thus beyond the classroom that *Cocker's Arithmetick* came into its own. Benjamin Franklin, for example, recalled that 'being on some occasion made asham'd of my ignorance in figures, which I had twice failed in learning when at school, I took Cocker's book of Arithmetick, and went through the whole by myself with great ease'.[58] Both his failure to learn arithmetic at school and success in doing so via a textbook seem to have been common experiences. The mathematician Thomas Simpson received his first introduction to the subject courtesy of a copy of Cocker gifted to him by a pedlar.[59] At the end of the eighteenth century, Samuel Bamford, having only briefly attended grammar school, found that 'A copy of Cocker's Arithmetic … set me to writing numbers and casting accounts', although he admitted to making 'but slow progress'.[60]

Paradoxically, the shortcomings of institutional education were a particular source of Cocker's demand. Older books such as Recorde's were best suited as aids for teachers.[61] As one bookseller lamented, such works were 'of very little use to the *Learner*, without the

help of an expert *Tutor*'.[62] The heyday of *Cocker's Arithmetick* was one in which the demand for arithmetical instruction outgrew the provision of schooling in the subject. The subsequent success of titles such as Walkingame's *Tutor's Assistant* suggests that by the later eighteenth century demand once again favoured books more explicitly catered to the classroom, perhaps reflecting an increase in the provision of arithmetic in schools. From the late seventeenth to the mid-eighteenth century demand favoured textbooks composed with individual learners in mind and contemporary testimony suggests that Cocker's text was an effective tool of autodidacticism. Significant social change encouraging greater recognition of the value of arithmetic and the increasing desire to learn both within and beyond the classroom combined to generate a large reading public for arithmetical books. Their production more than doubled in the first half of the eighteenth century.[63]

Textual and material characteristics of popular arithmetic books

These developments no doubt played a key role in the popularisation of arithmetic books. Yet the question remains of why certain titles such as *Cocker's Arithmetick* achieved particular success. According to the testimony of John Cannon, a prospective excise officer in 1705, 'Record's arithmetick' was now 'mere obsolete & out of use'. He therefore purchased the works of 'newer or later authors much in request such as Ayres's, Wingate's, etc'., yet still found that 'all this yet availed but little'.[64] The fact that neither of those titles nor any other of Cocker's competitors matched its number of editions suggests that Cannon's opinions were commonplace. Even after the appearance of more classroom-oriented works such as those of Dilworth and Walkingame, Cocker remained popular. It was 'still much called for' according to John Mair, the well-known mathematics teacher who produced a new edition of Cocker in 1751.[65] Even at the end of the century the future poet John Clare tried several textbooks including those of Dilworth, Wingate, Hodder, and Ward, but found that Cocker was 'a favourite with me and I kept it'.[66] By the nineteenth century copies of the book had become scarce to the point that antiquaries were attempting to trace surviving impressions.[67] Yet owner inscriptions in five extant copies suggest that it was still being bought for its intended use in the first half of the nineteenth century.[68]

One explanation for this enduring appeal is the accessible manner in which Cocker was written, drawing on didactic methods familiar to readers in other forms of cheap print. More advanced topics were reserved for *Cocker's Decimal Arithmetick*, which tellingly saw only six editions. Further simplification was achieved by reducing the extent of written explanations in favour of demonstrative examples. Many arithmetic books contained only a small number of rudimentary examples, necessitating a tutor to provide their own to supplement the book. Cocker was among the first to include a great many exercises, developing a format that was expanded upon by later authors.[69] Particularly valuable was the way in which readers were guided through chapters step by step, beginning with a set rule followed by example problems. These became progressively more complex through successive variations, such that by the end of each chapter readers might find themselves performing complex calculations with aplomb.

The difference is demonstrated by comparing Cocker's chapter on multiplication with that of *Hodder's Arithmetick*, its closest predecessor. Hodder's chapter contained just two initial examples before offering a number of rudimentary practice questions, culminating in a simple one-stage calculation with a two-digit multiplier: 'If 1 pound cost 37 pence, what cost 475 pounds?'[70] By contrast, Cocker's multiplication chapter featured an initial succession of nine worked examples each trickier than the last, ending with the example of 7,864,371 × 20,604.[71] Practice questions then followed, the most complex of which demanded the calculation of the number of hours in a year.[72] Doubtless most readers never had to perform calculations of such magnitude, but Cocker's format ensured that all levels of ability were catered for.

Traditionally, historians viewed the lack of written explanations as detrimental to the educational capacity of the text, arguing that simply offering rules to be remembered rather than explaining their underlying principles prohibited readers from comprehending a unified system of mathematics.[73] Yet the unchanging and easily applicable rules offered by these arithmetic books were precisely what fitted the needs of the majority. None more so than the 'rule of three', which enabled the calculation of a fourth value in proportion to three known ones: 'If 4 yards of Cloth cost 12 Shillings, what will 6 yards cost'.[74] The endless repetition of different incarnations of the rule of three in early modern arithmetic primers demonstrates just how valuable is was seen to be.[75] The success of this approach to teaching by rote is evident in the marginalia of extant copies. Six bear inscriptions by the same owner over multiple years, suggesting that rather than being used once as a course in arithmetic, the book was kept for reference, its rules easily identified and applied on demand.[76] As much as the perceived utility of arithmetic was growing, for most it remained a task-oriented corpus of knowledge and textbooks such as Cocker offered an effective means to those ends.

Moreover, repetition of simple mnemonic devices was a common way of learning propagated in cheap print and educational literature.[77] The question-and-answer format of ABCs and catechisms was made familiar to learners from their earliest years and continued to be exploited in publications such as the *Ladies' Diary*.[78] The way in which *Cocker's Arithmetick* encouraged its lessons to be committed to memory was little different and it is probable that some readers spotted underlying patterns as they appropriated rules for their own ends. Even in later works such as Dilworth's *Assistant* in which the dependence on rote learning was reduced, a catechetical means of explanation endured. The phrase 'according to Cocker' thus appears not only to demonstrate the book's popularity, but also to hint at the way in which readers understood its lessons. Anything right 'according to Cocker' followed set rules assumed to be correct, whether or not they corresponded to any revealed universal truth. Conveying easy digestible lessons in a manner familiar to readers of cheap print was a popular format employed by many of the most successful books.

There were also material factors that made for a best-selling arithmetic book. One was size. Cocker's duodecimo format ensured that it never stretched the seams of its readers' pockets. Portability was a key selling point and its tables of weights and measures, conversions, and exemplar sums provided a useful source of reference. If the Kilkenny copy is anything to go by, multiple inscriptions requesting the book to be returned if lost suggest that it never merely sat on a classroom shelf. If size mattered, so too did price. A 1673 catalogue of English books printed since the Great Fire of London listed

a significant number of arithmetic books, but almost all were pricier quarto and octavo volumes. The duodecimo selection was limited to the less popular arithmetics of Hodder and John Johnson (1623), priced at 1s 4d and 2s respectively.[79] The gap in the market was clear.

Cocker appeared in 1678 priced at 1s, undercutting both these and enjoying immediate success. Two or three impressions appeared within a year and at least thirteen by 1700. Over time both the size and price of the book were further reduced. More economical typesetting saw it shrink from an original 334 pages to just 183 by c.1727. The price of new editions did not rise with inflation and by the late eighteenth century Cocker was appearing in booksellers' catalogues for as little as 6d.[80] Its resale value was even less. One extant copy of the 1769 Dublin edition bears the inscription, 'John Campbell Paid four pence for This Book in the year 1839'.[81] Even purchased new, Cocker was highly affordable, and second-hand copies were no costlier than some chapbooks and almanacs.[82] If the book's claims of educational and commercial benefit were at all accurate, it would have been a worthwhile investment even for those to whom a shilling was a considerable sum. Regardless of the educational merits of any textbook, these material attributes played a prominent role in determining their success. Like other forms of popular print, they were acquired cheaply and digested easily, allowing the world of arithmetic to enter the domain of popular culture.

Arithmetic books and the market for cheap print

Cocker's Arithmetick was certainly akin to other forms of popular print in terms of its textual and material properties. But perhaps the most crucial similarity was the place it shared with ballads, chapbooks, and almanacs within the market for such works. *Cocker's Arithmetick* may not have been a chapbook, but it was sold as one. The early London editions were printed first for Thomas Passinger and then members of the Tracy family at the Three Bibles on London Bridge, which since the mid-seventeenth century had been among the foremost print shops in the city, its central location attracting a high volume of foot traffic.[83] London Bridge lay at the heart of the thriving market for cheap print and several other of its shops counted Cocker among their stock. At least the first three editions were available at Charles Passinger's shop, the Seven Stars, another establishment that specialised in ballads and chapbooks. Editions of 1688 and 1694 were sold by the noted London Bridge ballad seller John Back.[84] *Cocker's Arithmetick* appears to have been the first arithmetic book to be sold in this way and it is powerful evidence of the popularity of its subject by the late seventeenth century that these business-savvy print mongers entered the trade for arithmetic books. The success of Cocker's early editions established it as a staple among the London Bridge sellers and from there its popularity only grew, enjoying at least twenty-two London editions from 1700 to 1725.

The place of *Cocker's Arithmetick* within the market for cheap print is more explicitly demonstrated by chapbook catalogues. Appended to the thirty-ninth edition of 1722 is a list of 'Chapmen's Books' sold by John Tracy at the Three Bibles. The catalogue lists dozens of chapbook favourites: *Aristotle's Masterpiece, Aesops Fables, the Seven Champions*; and there too is *Cocker's Arithmetick*.[85] The fact that this catalogue not only included Cocker, but was appended to the book itself, is powerful evidence of its status as one genuinely aimed at the mass audience of chapbooks. The popular works of

Ayres, Fisher, and William Pickering (1686) were also present in the catalogue and gradually as these texts were continually reissued, they seem to have become ever more synonymous with the market for chapbooks as opposed to works of mathematics.

This is evident in a catalogue of Richard Ware, a London seller whose name first appeared on the 1734 edition of Cocker. Among Ware's list were several of the most popular arithmetic books before Cocker including those of Hodder and Wingate. Yet only in a separate category of 'chap-mens books' were Cocker and Ayres to be found.[86] Ware was among a group of Stationers Company sellers who appear to have been arranged into a printing 'conger'. These informal agreements were an attempt by powerful booksellers to effectively monopolise the publication of bestsellers such as *Cocker's Arithmetick*, even after the lapse of the Licencing Act in 1695 had prohibited such practices.[87] Other conger members included Edward Midwinter, a key player in the chapbook trade, James Hodges of London Bridge, and Charles Hitch, who was master of the Stationers Company in 1758.[88] The succession of booksellers who capitalised on Cocker's success ensured that it continually held a place alongside the cheapest works and was sold wholesale to chapmen, thus allowing copies to be distributed in large quantities to even remote localities.

The commercial success of this approach was clear, and it is thus unsurprising to find Cocker situated within the chapbook trade beyond London. The Copyright Act of 1709 did not apply in Ireland, allowing printers to reproduce English titles with impunity.[89] The first Dublin edition appeared in 1714, bearing an advertisement for books sold by its publisher, Patrick Murtagh, in which Cocker was the sole arithmetic book among other staples of popular literature.[90] Samuel Fuller was selling Cocker's text from at least 1728 at his Meath Street shop, before producing his own editions in 1730 and 1735.[91] Meath Street was a centre for the distribution of chapbooks and schoolbooks, and four more editions of Cocker were sold by Fuller's successor Isaac Jackson.[92]

Likewise, the three Glasgow editions, beginning in 1749, were the work of a cohort of sellers gathered in the Saltmarket, which during the eighteenth century became the heart of the popular print market in Scotland.[93] By the final edition of *Cocker's Arithmetick*, which appeared 109 years after the first, in 1787, the gauntlet had passed to James and Matthew Robertson and Robert Farie. The Robertsons were responsible for a great many other cheap publications, becoming the foremost sellers of such material in Scotland by the turn of the nineteenth century.[94] In Edinburgh, Cocker was already a familiar text well before the first native edition of 1751. The records of an Edinburgh bookseller list five copies sold from 1715–16, more than any other arithmetic text in the same period.[95] At least seven impressions were produced in Edinburgh, and printed for sellers across Scotland in Perth, Dundee, Paisley, and Dumfries. Within the capital one of the book's most active sellers was Alexander Donaldson, who sold copies as early as 1758, before producing his own editions in 1762, 1765, and 1780.[96] In both Edinburgh and London, Donaldson was notorious for selling illicit reprints of English books, his editions of Cocker appearing under the title, *A Treatise of Arithmetic.*

In Edinburgh, as elsewhere, Cocker's work was a ubiquitous publication consistently aimed at the lower end of the market. Its circulation alongside chapbooks ensured that it was distributed widely via the vast network of itinerant chapmen from whose packs these books were sold.[97] The range of provincial localities named in inscriptions is testament to the book's reach: from Maidstone in the south of England to Wigton in the north;

Greenock on Scotland's west coast to Stonehaven on the east.[98] The copy that found John Campbell in 1839 was the final Dublin edition printed fully 70 years prior, and had made its way to Cumberland via at least two previous owners.

Such widespread circulation brought a self-perpetuating cycle of success. As with other forms of cheap print, the name attached to the publication was a crucial selling point. Famous almanacs such as Francis Moore's *Vox stellarum* continued to bear the names of their original authors long after their deaths for the sake of recognition, often containing a woodcut image of the author to further advance the brand.[99] *Cocker's Arithmetick* was no different, and so its author became the posthumous beneficiary of the same mechanisms by which the greatest almanac makers became household names. If, as Bernard Capp observed, 'the features of William Lilly, circulated annually in thousands of copies for forty years, were probably the best known of anyone in England after the king', those of Edward Cocker can scarcely have been less familiar.[100] A succession of well-known editors of the text made it yet more recognisable. Both George Fisher and John Mair were popular textbook authors in their own right, as well as producing longstanding editions of *Cocker's Arithmetick*. The names of these authors became synonymous with their textbooks and in the case of Cocker, with arithmetical matters more broadly. Viewed in this light it is clear why, after the books initial market success, it snowballed into the cultural phenomenon it was by the time its famous phrase was first coined.

Conclusion

The success of *Cocker's Arithmetick* was thus deeply connected to a wider process of cultural change that saw the popularisation of arithmetic. This process took place throughout the early modern period and Cocker was by no means the first nor last arithmetic book to achieve significant renown. But by exploring the reasons for its particularly remarkable success, this article has shed light on the means by which arithmetic books became bestsellers, and in turn how their subject became a vital component of contemporary popular culture. For historians interested in the cultural value of arithmetic, Cocker's example demonstrates just how ubiquitous such knowledge was by the end of the eighteenth century. Whatever the extent to which numeracy contributed to the economic developments of this period, books such as *Cocker's Arithmetick* and the cultural milieu in which they flourished warrant particular consideration in assessing such changes.

The commercialisation of economy and society in this period gave fresh impetus to books whose primary selling point was their commercial benefit. In turn, the range of daily tasks that required arithmetical skill became ever greater, echoing calls for more education of practical benefit. As such education proliferated, so too did demand for arithmetic books, whether used in or beyond the classroom. This demand was met by books such as Cocker which replicated much of the style and form of chapbook literature, conveying arithmetic as a set of easily digestible rules that were reinforced with a multitude of examples. These were contained within a pocketsize package comparable in price to other forms of cheap print, while also making use of the same mechanisms of sale and distribution. Thus *Cocker's Arithmetick* capitalised on the same characteristics that helped make cheap print a defining feature of early modern popular culture.

This success is an example of the way in which new forms of numeracy propagated by these arithmetic books entered popular culture across early modern Europe. In the English speaking world, that which was done 'according to Cocker' boasted the authority increasingly vested in numerical information. Such was also the case elsewhere. In the Netherlands anyone who performed a calculation did so 'according to Bartjens', in reference to the schoolmaster Willem Bartjens and his vastly popular *Cijfferinghe* (1604).[101] In French the name of François Barrême became a byword for numerical matters, while a similar German idiom recalled the mathematician Adam Ries, whose books saw over 100 editions in the sixteenth and seventeenth centuries.[102] The works of each of these authors were not simply books for learning arithmetic. They were a means of buying into a culture of quantification that was a defining feature of the age in which they were produced.

Notes

1. 1 Thomas Frognall Dibdin, *A Bibliographical, Antiquarian and Picturesque Tour in the Northern Counties of England and in Scotland*, vol. 2 (London: C. Richards, 1838), 726. The copy in question was not part of the Hunterian collection, but belonged to its Principal.
2. 2 Arthur Murphy, *The apprentice* (London: Paul Vaillant, 1756), 10.
3. 3 'Cocker, n.6', *Oxford English Dictionary*, online edn. (Oxford: OUP, 2019) [https://www.oed.com/view/Entry/35392, accessed 17 March 2020].
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22. Estimates based on impression listed in *ESTC*. Fisher's *The Instructor* (1727) did see a number of impressions similar to Cocker, but also contained lessons on literacy and other practical knowledge.
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24. Samuel Johnson, *A Dictionary of the English Language*, 2nd edn. (London, 1756). Johnson borrowed Cocker's definitions for terms including: 'addable', 'addition', 'division', and 'fellowship'. Lord Byron, 'Don Juan. Canto the sixteenth' in *The Works of Lord Byron* (London: John Murray, 1837), 759.
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71. Cocker, *Arithmetick* (1678), 70.
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74. Ibid., 155.
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