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# Innovation, Temptation, and Mathematical Education – The Dano-Norwegian Lotto and the Struggle for Opinion

In the winter and spring of 1771, the Dano-Norwegian government sanctioned a wildly popular but also controversial Genoese lottery (hereafter mostly referred to as lotto), which lasted for eighty years until the government banned it in the mid-nineteenth century for moral and financial reasons. The lotto brought something entirely new to the lottery market. Although similar enterprises had already been operated for several years in many cities across Europe, the structure of the Genoese lottery was still unfamiliar to most Dano-Norwegian observers. Seen from the perspective of the consumer, the advantages of the game were many. It offered greater freedom to personalise risk-taking; it democratised access to participation through its low entry price; and it offered frequent drawings, allowing more people to play more often than what had been possible before.

Was this a wholly positive development, or something to be concerned about? This chapter explores the heated discussions that followed the public announcement of the lotto, by focusing on both promotional literature and censorious texts. Promoters emphasised the novelty and ingenuity of the game, highlighting its competitive advantages when compared with other lotteries, and in doing so, they relied heavily on appeals to fantasies of sudden wealth. Critics, however, warned that the new and enticing game might lead people into gambling addiction and ruin. They worried that vulnerable players were being led astray by the promotional campaign, which they argued obscured the small chances of winning. The campaign provoked a wave of mathematical expositions intended to expose what their writers saw as deliberate attempts by the lotto operators to deceive the public and tempt them into possible ruin. According to these critics, the unfamiliar and complicated structure of the game clouded people's judgment and enabled promoters to intentionally exploit their dreams for a better life. Through mathematical calculations, they intervened in an ongoing patriotic discussion about a supposedly dangerous game. The chapter thus sheds light on the inherently mathematical nature of the Genoese lottery, which has received comparatively little attention in the few extant studies of public deliberations over the game.

The implementation of lotto in Scandinavia is a neglected topic that deserves its own detailed study. For our purposes, it will suffice to point out that the Dano-Norwegian lotto was initially a state-sanctioned, but not state-owned or state-run, undertaking. It was soon nationalised (in April 1773), but at the time of implemen-

tation, it was set up as a joint-stock company, which meant that it was privately owned by shareholders and by the man who had been granted the lotto contract, the German banker Georg Ditlev Frederik Koës. When Koës had secured the contract, an official plan published by the operators, and an advertising brochure ascribed to Peter Nicolai Svensen (a seller of lotto tickets), publicly announced this new game of chance, providing detailed descriptions of the lotto's structure and rules, and highlighting its many advantages vis-à-vis competing lottery schemes.<sup>1</sup> This public announcement and promotion launched an avalanche of critique, which was later compiled and included in a larger collection of texts by civil servant and book collector Bolle Willum Luxdorph (1716–1788). The collection has been digitised and is available online.<sup>2</sup> These publications, and indeed any public criticism of the lotto, were enabled by an unprecedented albeit short-lived experiment with press freedom during the short reign of Johann Friedrich Struensee, which corresponded with the introduction of the Dano-Norwegian lotto. Under normal circumstances, the public response to the lotto would have been virtually unavailable for scholarly investigation, in an autocratic state characterised by strict censorship and a closed system of political communication. Press freedom, however, allowed writers to voice criticism on a range of social and economic issues, including the lotto.<sup>3</sup>

The “Luxdorph” lotto texts explored in this chapter are listed in the table below. The table is based on an exhaustive register of Luxdorph texts (the majority of which are concerned with other topics than the lotto), arranged by Henrik Horstbøll, Ulrik Langen, and Frederik Stjernfelt. Throughout the chapter, references to these texts will give the original Danish titles, followed in parenthesis by English translations and their respective numbers in the larger collection (for instance, 1.9.10 or 1.9.14). Only the texts discussed in this chapter are included

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1 *Plan til det under 12 Januar. 1771 allernaadigst privilegerede Tal-Lotterie, 1771–1773*, 347, Rentekammeret, Tyske Afdeling, Tyske kammer, Sager vedr. tallotteriet i Altona, D9.1, the Danish National Archives, Copenhagen; Peter Nicolai Svensen, *Tal-Lotterier, deres Natur og Beskaffenhed, som giver tydelig Oplysning om Spille-Maaden / Lottos, their nature and character, providing clear instructions on how to play* (Kjøbenhavns Adresse-Contoir, 1771), the Royal Danish Library, Copenhagen.

2 The collection is available from the following website: <https://tekster.kb.dk/pages/tfs-bibliografi>.

3 For a recent study of this collection and of Struensee's press freedom experiment, see Ulrik Langen and Frederik Stjernfelt, *The World's First Full Press Freedom: The Radical Experiment of Denmark-Norway 1770–1773* (De Gruyter Oldenbourg, 2022). For a study of the closed political system of communication prior to Struensee's experiment, see Jakob Maliks, “To Rule is to Communicate: The Absolutist System of Political Communication in Denmark-Norway 1660–1750”, in *Eighteenth-Century Periodicals as Agents of Change: Perspectives on Northern Enlightenment*, eds. Ellen Krefting, Aina Nøding, and Mona Ringvej (Brill, 2015), 134–152.

in the abridged version below. Some additional lotto texts are explored by Inga Henriette Undheim in the current volume, but for a complete list of Luxdorph lotto texts, see the register compiled by Horstbøll, Langen, and Stjernfelt.<sup>4</sup>

**Table 1:** Table of “Luxdorph” texts discussed in this chapter.

No.	Title	Publisher/ printer	Author	Advertised
1.9.10	Tanker over det alleene Privilegerede Lotterie til Landets almindelige Nytte, fattige Børns Opdragelse, og det fattige Væsens bestandige Underholdning i Kiøbenhavn / Thoughts concerning the privileged lottery for the general benefit of the country, the education of poor children, and the maintenance of the Poorhouse in Copenhagen	A.H. Godiches Efterleverske	?	08.03.71
1.9.11	Tydeligere Forklaring paa Tall-Lotteriet til Nytte for Lotteriet, og Oplysning for dem, som ey kan begribe dens Indretning / An exposition of the lotto for the benefit of the lottery, and to enlighten those who cannot understand its structure	A.H. Godiches Efterleverske	Johan Frie. Baumgarten	01.03.71
1.9.12	Aarsager til Tall-Lotteriernes Forvisning af alle Riger og Lande / Reasons why lottos should be banished from all realms and countries	N. Møller	Johan Frie. Baumgarten <sup>5</sup>	15.03.71
1.9.13	Afhandling om Gevinsterne Forhold imod Tabet, samt Lotteriets Kasses Fordeel udi Tal-	? nr. 5. på Børsen	Jens Reimert Schumacher	15.03.71

<sup>4</sup> See, *infra*, Inga Henriette Undheim, “Lottery Dreams”; Henrik Horstbøll, Ulrik Langen, and Frederik Stjernfelt, *Grov konfækt. Tre vilde år med trykkefrihed 1770–73* (Gyldendal, 2020). The bibliography is also available online: <https://tekster.kb.dk/pages/tfs-bibliografi>.

<sup>5</sup> In the register compiled by Horstbøll, Langen, and Stjernfelt, this anonymously authored text is without ascription, but another source names Baumgarten as the author: See Rasmus Nyerup, “Luxdorphiana, eller Bidrag til den danske Literairhistorie, uddragne af Bolle Willum Luxdorphs efterladte Samlinger, Første Deel” (J.F. Schuls’s Forlag, 1791), 516, in *Nettbiblioteket*, accessed 27.06.2025, <https://www.nb.no/items/769c6bad924b450b976db8683825ff02?page=525&searchText=luxdorphi+ana>.

Table 1 (Continued)

No.	Title	Publisher/ printer	Author	Advertised
	Lotterier / A treatise on the relationship between potential profits and losses, and the advantage of the lotto bank			
1.9.14	Patriotiske Tanker I Anledning af Tal-Lotteriet. Skrevet den 1ste Martii af Philoplebis / Patriotic thoughts occasioned by the lotto. Written on the 1 <sup>st</sup> of March by Philoplebis	J.G.Rothe. nr. 8 på Børsen	?	18.03.71
1.9.15	Upartiske Undersøgninger af Tal-Lotteriet, som vil sette enhver i Stand til at indsee, om han med Grund kan eller bør haabe Fordeel af samme. Forfattet af M. / Impartial exploration of the lotto, which will make anyone realise whether they should expect any advantage from the same. Authored by M.	N. Møller	Søren C. Malling	18.03.71
1.9.16	Underviisning for Elskere af Tal-Lotteriet hvorefter enhver kan udregne sit Haab til de store Gevinster / Instruction for lotto lovers, from which anyone can calculate his chances of winning the top prizes	? Mummes Boglade nr. 5 på Børsen	Jens Reimert Schumacher	07.05.71
1.9.17	Almuens Øine opklarede i Anledning af den Daarlighed at vove sine Penge i Tal-Lotterier. Oversat af B.J. Lodde / The eyes of the people opened, in relation to the disadvantage of risking one's money in lottos. Translated by B.J. Lodde	N. Møller	?	21.05.71
1.9.18	Tilforladelig Anviisning hvorledes man med en u-deblivelig Fordeel kan indsætte udi Tal-Lotteriet samt Underretning om hver Træknings-Stæds lykkelige og ulykkelige Tall / Reliable instruction on how to place successful bets in the lotto, with information about the lucky and unlucky numbers appearing in each of the drawing cities	P.H. Høecke	Christian Bagge	20.04.72?
2.15.8	Tanker om den nylig forefaldne Forandring ved Talotteriet. Oversadt af det Tyske / Thoughts on the recent adjustments to the lotto. Translated from German	J.R. Thiele	?	1773

Table 1 (Continued)

No.	Title	Publisher/ printer	Author	Advertised
2.15.9	Vort Tall-Lotteries Historie, med Efterretning om hvad der er vundet og tabt samt hvad der endnu kan tabes og vindes derved for de Kongelige Danske Undersaatter, som spiller og ikke spiller derudi, til Nyt-Aar 1773 / The history of our lotto, detailing what has been won and lost so far, and also what may still be won and lost for the Royal Danish Subjects, both those who participate in the game and those who do not, up until the New Year 1773	P.H.Høecke	?	05.02.73
2.15.11	Sende-Brev fra en tydsk Skolemester i Kiøbenhavn, til General-Administrationen for det i Kiøbenhavn og Altona oprettede Tal-Lotterie. I Anledning af en paa een Side og egenmægtig for falsk erklæret Original-Lotterieseddel og i Henseende til deres forandrede Planer og Original-Billetter. Af VirtVs Grata Fidesque VincVnt. Oversat af det Tydske, I Aaret 1773 den 1ste Martii / Letter from a German schoolmaster in Copenhagen, to the General Administration of the lottos established in Copenhagen and Altona. Occasioned on the one hand by an allegedly forged original lottery ticket, and on the other by the recent adjustments to the lotto plans and original tickets. By VirtVs Grata Fidesque VincVnt. Translated from German, in the year 1773 on the 1 <sup>st</sup> of March	J.R. Thiele	?	1773
2.23.5	Til Kongen! Om Tallotteriets onde Følger i de Danske Stater / To the King! Concerning the evils befalling the Danish states on account of the lotto	A.F. Stein	En Patriot [Dr. Nicolaus Friborg]	1773

A close reading of these publications reveals that the criticism took many forms. Much of it hinged on the fact that the lotto was privately owned, which meant that potentially enormous profits would fall on a few individuals. This was highly problematic in a society that idealised an Enlightenment concept of patriotism, which was not defined primarily by nationalist objectives, but rather by a publicly expressed concern for the fate of individuals and the wellbeing of the entire commu-

nity and the state. Patriotism was a common project for all the King's subjects to exploit their fullest potential for the benefit of the state, and this ideology was perceived to be threatened by selfish schemers seeking only their own private gain.<sup>6</sup> The focus here will not be primarily on the challenge of the lotto enterprise to the ideology of patriotism, which has been treated elsewhere.<sup>7</sup> The patriotic perspective rather serves as an important backdrop to this chapter, which is preoccupied primarily with issues relating to the fundamental *structure* of the Genoese lottery, which was entirely different from the more well-known lotteries organised with blanks and prizes. As was common in other European countries in the eighteenth century, several short-term and partly overlapping lotteries of this kind had been granted for a variety of purposes, most often to fund public infrastructure or charitable organisations.<sup>8</sup> Most notably, the Royal Reformatory (Det Kongelige Opfostringshus) had received a lottery monopoly in 1753, thus marking the start of what was to become the oldest still ongoing lottery in Denmark, and one of its oldest extant enterprises, namely the Dano-Norwegian class lottery.

Some viewed the alternative structure of the lotto as a source of excitement and promise, while others condemned it in the strongest language. An important clarification must be made before exploring these two opposite attitudes. In terms of textual output, there is no balance between the two; indeed, an overwhelming majority of the texts are strongly critical of the lotto. This chapter therefore refrains from using the term “debate” to refer to the two opposing views. It could at best be described as an exchange, although this term also implies a balanced discussion rather than the wave of objection that followed the public announcement. There seems to have been no published response to these objections. Svensen's above-mentioned lotto brochure does admittedly anticipate some of the criticism *before the fact*, by explaining that certain unpopular measures were necessary in order to secure both the lotto operators and the players against insolvency and a resulting inability to pay out rewards.<sup>9</sup> If arguing against claims that have not yet been made counts, then these two different views might perhaps

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6 For a recent study in English on Dano-Norwegian patriotism, see Juliane Engelhardt, *Sociability and Civic Spirit in Northern Europe: Practicing Patriotism in the Age of Enlightenment* (Voltaire Foundation, Oxford University Studies in the Enlightenment, 2024).

7 Langen and Stjernfelt, *The World's First Full Press Freedom*, 125–129, and Ulrik Langen, “‘The Worst Invention Ever’: The Number Lottery and its Critics During the Press Freedom Period in Denmark-Norway, 1770–1773”, *Cultural and Social History* 21, no. 1 (2023): 23–39, <https://doi.org/10.1080/14780038.2023.2256212>.

8 For a detailed account of these early eighteenth-century Dano-Norwegian lotteries, see Holger Hansen, “Fattigvæsenets lotterier”, in *Historiske Meddelelser om København, femte bind, hefte VII* (Københavns kommunalbestyrelse, 1915–1916).

9 Svensen, *Tal-Lotterier*, 35.

be seen as entering into debate with one another. The chapter will nonetheless refer to the opposing views as “promotion” versus “criticism”.

Why did so few write in defence of the lotto? Did they consider it a lost cause to argue against the claims put forward by critics, or did perhaps the enormous popularity of the game render such endeavours unnecessary? Tilman Haug suggests an intriguing possible reason for the silence, noting how it was challenging for lotto promoters to respond to criticism, because the obvious answer to much of this criticism was that certain unpopular measures were necessary to alleviate the risks involved (like Svensen had argued in his brochure). By drawing attention to such perils, however, the promoters ran the risk of revealing weaknesses in the system and losing public trust in the lotto’s ability to pay out rewards.<sup>10</sup> Haug’s observation is based on the German case, but the same logic can be applied in the Dano-Norwegian context. In any case, this chapter must base its discussion on the available corpus of texts, and if the discussion seems skewed towards the opinions of the critics, it is due to the imbalanced nature of the corpus.

This does not mean that the promoters were necessarily mistaken in their evaluations of the benefits of the game. Nor does it mean that the critics were always correct in their assessments of its disadvantages, or even in their mathematical calculations. The history of lotteries is typically linked with the history of mathematical probability: alongside other games of chance, lotteries could offer readily available examples for mathematicians to demonstrate complex theories and their potential for practical application.<sup>11</sup> However, Denmark-Norway was situated both geographically and culturally on the outskirts of eighteenth-century Europe, and unlike names such as Pascal, Fermat, and Huygens, the Dano-Norwegian writers hardly contributed any groundbreaking new ideas to the emerging theory of probability. Assuming that their calculations were correct, there is little reason to suspect that they went beyond the simple combinatorial counting commonly found in mathematical textbooks at the time.<sup>12</sup>

In any case, the purpose of this study is not to pass judgment on the advantages and disadvantages of the game that swept across Europe in the eighteenth century, or to assess the accuracy or originality of the calculations provided by

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<sup>10</sup> See, *infra*, Tilman Haug, “Selling Like a State”, section 5.

<sup>11</sup> Ian Hacking, *The Emergence of Probability: A Philosophical Study of Early Ideas about Probability, Induction and Statistical Inference* (Cambridge University Press, 1975); Lorraine Daston, *Classical Probability in the Enlightenment* (Princeton University Press, 1988), 114; John Egin, *The Gambling Century: Commercial Gaming in Britain from Restoration to Regency* (Oxford University Press, 2023), 17–18.

<sup>12</sup> Stephen M. Stigler, *Casanova’s Lottery. The History of a Revolutionary Game of Chance* (The University of Chicago Press, 2022), 156–157.

its critics. Rather, the objective is to discuss how the game of lotto was presented and examined in the Dano-Norwegian public sphere, and to demonstrate how the critics sought to educate their readers in issues of probability, to warn them against this allegedly deceitful and tempting game. Despite not adding much to the scientific development of probability theory itself, their explanations nevertheless highlighted the inherently mathematical nature of the popular new game. As lottomania swept across the land, they helped bring public attention to theories of probability and to their practical applications.

## 1 Promoting the lotto: innovation, agency, and flexibility

When the promoters of lotto announced the game in the winter and spring of 1771, much emphasis was placed on its innovative structure and perceived benefits when compared with the more familiar lottery with blanks and prizes. For the consumer, there were pros and cons to both forms. In a blanks and prizes lottery, only one lucky ticket won the top prize, although the winning ticket could be portioned into smaller shares held by several people. The lotto operated according to a distinctly different model, where top prizes were not only potentially much larger, but also not restricted to one lucky ticket. Everyone who had placed bets on certain combinations won if their numbers appeared in the draw. The size of prizes depended only on the nature of bets and stakes. Successful bettors were guaranteed to receive their reward according to a fixed payout rate regardless of the amount of winners, and they were not required to share their prize with others who had bet on the same numbers. On the other hand, the top prizes were restricted to bets with very high odds, which meant that the chances of winning them were infinitely small, statistically much lower than the chance of winning top prizes in a blanks lottery.

It was therefore entirely up to the individual authors and their motivations for writing to decide what advantages or disadvantages to highlight or disguise. Already in the opening paragraph, the official lotto plan alludes to the benefits of the lotto when compared with “every other form of lottery”.<sup>13</sup> The overall impression, however, is not one of exaggerated promotion. In a concise and mostly sober language, the plan explains how the different betting choices work, provides practical examples of what different combinations cost, and demonstrates what players could potentially win from each combination. Svensen’s advertising bro-

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<sup>13</sup> *Plan*.



chure, however, went much further in its descriptions of the advantages of the lotto. In a section entitled “On the Differences between the Lotto and other kinds of Lotteries”, it launched an attack on competing forms of lottery organised with blanks and prizes, presenting them as less favourable options. For instance, it pointed out the advantage mentioned above, namely that potential top prizes were much larger and not restricted to one winner. The lotto democratised access to large rewards, as opposed to the blanks lottery, where “half of the playing public will draw a blank, only for one lucky person to win the top prize”.<sup>14</sup> Moreover, it drew attention to the fact that the operators of blanks and prizes lotteries deducted a certain percentage of the income from ticket sales to cover administrative costs and secure a profit, instead of allocating all the money for prizes. No such percentage was deducted from the prize winnings of the lotto: if your bets were successful, you received your prize according to the agreed-upon and pre-determined stakes and odds.<sup>15</sup>

Significantly, the brochure also presented the blanks and prizes lotteries as passive endeavours. When participating in this type of lottery, players were slaves to arbitrary luck, since they were simply given a random sequence of numbers on a ticket that might or might not end up as fortunate during the draw. In contrast, the lotto afforded far greater *agency*: by giving players the opportunity to choose their own numbers, they could to a much greater extent take fate into their own hands. The lotto provided “perfect freedom”, and the chosen bets relied entirely on “your own free will”.<sup>16</sup> The official plan also pointed out this freedom, by noting that anyone had the right to “try their luck by playing one of the five mentioned bets [i.e. the simple extract, the determined extract, the ambe, terne, and quaterne], or by combining two or more of these”.<sup>17</sup> Later, it stressed that anyone could try their luck “in this advantageous lottery”; by a small stake, they could win “a considerable and respectable prize”, and this was “a clear advantage that no other lottery could match”.<sup>18</sup>

This focus on the fact that “anyone” could participate underscores the fact that lotto opened participation to a broader segment of the population. While the tickets for the blanks and prizes lotteries were typically quite expensive (a Dano-Norwegian class lottery ticket seems to have cost twelve rixdollars at this

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<sup>14</sup> Svensen, *Tal-Lotterier*, 32.

<sup>15</sup> Svensen, *Tal-Lotterier*, 4, 34.

<sup>16</sup> Svensen, *Tal-Lotterier*, 10, 12.

<sup>17</sup> *Plan*, art. x.

<sup>18</sup> *Plan*, art. x.

time), anyone with eight skillings to spare could purchase a lotto ticket.<sup>19</sup> Admittedly, it was possible to pool together and purchase shares in tickets for a blanks and prizes lottery, but there were other mechanisms in place to limit the social reach of the game. As opposed to the lotto, where there was an unlimited number of tickets, the class lottery tickets were finite, thus restricting the number of participants. The poor could in theory find ways to participate, but in practice, the game seems to have been dominated by wealthier players of a higher social standing. The plan stressed this new opportunity offered to players of a less wealthy station, by noting that they were “perfectly free to make their stakes as small or large as they preferred”.<sup>20</sup>

This last comment points to another significant advantage of the lotto, namely the greater ability to personalise risk-taking. To participate in other lotteries, players had to purchase a costly ticket set at a fixed price. This was a considerable sum to risk for a small chance of winning, a fact pointed out in Svensen’s brochure, which noted how “only those who could stand to lose twelve or more rixdollars” could venture into such a scheme.<sup>21</sup> However, since it was possible to purchase a share in a ticket, it *was* possible to personalise your bet to a certain extent even in the blanks and prizes system. But this was far more difficult to achieve, especially if the lottery in question was a popular one with a relatively limited number of tickets often acquired by wealthier consumers. Indeed, a contributing factor to the success of the Dano-Norwegian class lottery was the possibility to renew tickets, not only between classes but between each lottery, so that tickets could be monopolised by the same families for years.<sup>22</sup> It was therefore unquestionably easier to personalise risk-taking within the lotto structure, where you could play for as much or as little as you wished, as long as you kept your stakes between the minimum and maximum sum allowed for bets.

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<sup>19</sup> See *Plan*, art. ix, for the minimum stake allowed in the lotto. According to Kirstine Bjerre Bergholdt, a class lottery ticket cost ten rixdollars at the time of establishment in 1753. Svensen’s brochure claims that a class lottery ticket cost twelve rixdollars, so the price seems to have increased by two rixdollars between 1753 and 1771. See Kirstine Bjerre Bergholdt, “Det danske Klasselotteri. Det danske Klasselotteris historie fra 1753 til 1925” (Master diss., Københavns Universitet, 2004), 38; Svensen, *Tal-Lotterier*, 32.

<sup>20</sup> *Plan*, art. ix.

<sup>21</sup> Svensen, *Tal-Lotterier*, 33.

<sup>22</sup> Bergholdt, “Det danske Klasselotteri”, 15.

## 2 Concerns arise: were the people tempted into gambling addiction and ruin?

While the promoters celebrated the flexibility, availability, and agency provided by the lotto, the sceptics singled out precisely these qualities as reasons for the perceived danger of the game, because they feared they might tempt people into gambling addiction. Svensen's brochure demonstrates much faith in the ability of the bettors to make rational decisions when placing their bets. The assumption seems to be that no one would spend more than they could afford to lose. Surely, the brochure claims, *anyone* (be they ever so poor) would be able to spare eight skillings per drawing, without harm to themselves or their families.<sup>23</sup> Importantly, the official plan included an observation that players should not spend beyond their means (although one commentator later complained that this sentence was omitted in later versions of the plan).<sup>24</sup> Despite this seeming faith in consumer moderation, the promoters nevertheless clearly recommended betting with higher stakes. The official plan admittedly stopped at suggesting the possibility of playing several different combinations on the same ticket, but the brochure encouraged betting that went beyond a simple bet on a single or a few numbers. Indeed, it recommended playing as many combinations as possible, to increase the chances of winning. Moreover, it encouraged playing with high stakes, so that the reward would be greater if they happened to win.<sup>25</sup> The brochure appealed to the dreams and fantasies of the playing public, warning that a failure to play as much as possible, with as high stakes as possible, could cause your dream to slip between your fingers. It also encouraged players to attempt to cover losses by combining bets, so that the bets with the lowest odds could cover the money staked on the more unlikely outcomes.<sup>26</sup> Svensen reasoned in the following manner: that it was easier to win an extract than an ambe, and easier to win an ambe than a terne, et cetera. The fact that it was overwhelmingly probable that neither the extract, ambe, nor terne would appear in the drawing was not mentioned. The focus was always on the flexibility afforded by the lotto and the potentially enormous prizes, and not on how expensive it was if your bets

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<sup>23</sup> Svensen, *Tal-Lotterier*, 44.

<sup>24</sup> *Plan*, art. x; Anon., "Vort Tall-Lotteries Historie, med Efterretning om hvad der er vundet og tabt samt hvad der endnu kan tabes og vindes derved for de Kongelige Danske Undersaatter, som spiller og ikke spiller derudi, til Nyt-Aar 1773", digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 2.15.9, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 14.

<sup>25</sup> Svensen, *Tal-Lotterier*, 9.

<sup>26</sup> Svensen, *Tal-Lotterier*, 19.

failed. Naturally, due to the small chances of your numbers appearing in the draw, bets usually *did* fail.

This encouragement of the gambling impulse is perhaps not surprising given the fact that these publications were meant to advertise the lotto, but it is somewhat contradictory considering one commonly cited reason for establishing a state-sanctioned lotto in the first place, namely that the state needed to control the public rage for gambling. This was particularly problematic seeing as the promotional material explicitly targeted less affluent players. The critics worried that this might tempt vulnerable people into risking more than they could afford to lose (the young, the poor, and women were often included in this group). The lotto offered the individual consumer the option to choose the level of risk, and no one could force you to spend more than you were comfortable with. The critics nevertheless clearly viewed it as a far more hazardous game than the class lottery, likening it with gambling with cards and dice, which, the writers pointed out, the King had wisely prohibited in his realm.<sup>27</sup> Why, then, did he not prohibit the lotto, which was “nothing other than an authorised game of hazard”?<sup>28</sup> Indeed, the lotto was even more harmful than cards and dice, they claimed, because the state authorisation gave players free rein to gamble away their money. The perilous combination of catering to a vulnerable audience, holding frequent drawings (presented as a benefit by Svensen),<sup>29</sup> and providing endless opportunities to personalise your ticket (and spend money doing so), made lotto “the greatest game of hazard imaginable” in the eyes of its critics.<sup>30</sup> While the class lottery was priced beyond the range of the less well-to-do – with drawings held on a far less frequent basis – the lotto seemed like a dangerous snare for the credulous and impetuous. The critics thus turned the issue on its head: the very qualities typically highlighted *in favour* of the lotto were now marked as reasons for concern.

Were the critics justified in raising the alarm? In fact, research suggests that players might have been more discriminating than these paternalistic critics gave them credit for. In a recent study of the French lotto, Stephen M. Stigler has

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27 Philoplebis, “Patriotiske Tanker I Anledning af Tal-Lotteriet”, digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 1.9.14, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 7–8, 14–15; Dr. Nicolaus Friberg [En Patriot], “Til Kongen! Om Tallotteriets onde Følger i de Danske Stater”, digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 2.23.5, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 16.

28 Jens Reimert Schumacher, “Underviisning for Elskere af Tal-Lotteriet hvorefter enhver kan udregne sit Haab til de store Gevinster”, digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 1.9.16, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 54.

29 Svensen, *Tal-Lotterier*, 34.

30 Philoplebis, “Patriotiske tanker”, 7.

demonstrated that gamblers seemed to prefer the safer bets, and most of them bet only small stakes.<sup>31</sup> The fact that the French lotto paid out in prizes over seventy percent of the money collected every year between 1797–1828, attests to the fact that many of these bets were indeed successful.<sup>32</sup> Moreover, anecdotal evidence may give us a glimpse into how some players navigated the terrain of lotto bets in the period. For instance, the Enlightenment thinker Gotthold Ephraim Lessing wrote a letter to his friend and later wife, Eva König, revealing his strategy for minimising the risk of losing his stake in a lotto draw. Lessing had placed what he considered to be a safe bet on an extract; his chosen number appeared in the draw, and the payout covered the price of his other bets.<sup>33</sup> If this betting strategy seems familiar, readers are reminded that this is exactly the strategy proposed above, in Svensen's advertising brochure.

Indeed, the Luxdorph collection includes texts that seem to have tapped into a growing market for literature providing guidance on how to place the most advantageous bets, most conspicuously *Tilforladelig Anviisning hvorledes man med en u-deblivelig Fordeel kan indsætte udi Tal-Lotteriet* (Reliable instruction on how to place successful bets in the lotto, 19.18). This manual was written by the brewer Christian Bagge, who may seem to have also had some knowledge of gambling practices. Bagge adopts a rhetoric where patriotic apathy towards the lotto blends with a more pragmatic and probably also opportunistic discourse:

Since this ruinous lottery cannot be expected to be abolished any time soon [...] I would, out of love for my fellow citizens and fellow subjects, urge the public to abstain from participating in this tempting and addictive lottery [...]; but since this is unlikely to happen, I will rely on the reason and self-preservation of the playing public, and provide those who are capable of understanding with guidance on how to place the most favourable bets.<sup>34</sup>

In an alleged attempt to protect players from scheming lotto promoters, writers gave advice on which strategies to avoid and which to employ if one absolutely could not refrain from playing. Hiding beneath this rhetoric was probably also an attempt to capitalise on the public appetite for lotto instruction manuals. The reference to players who were “capable of understanding” suggests that

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<sup>31</sup> Stigler, *Casanova's Lottery*, 92, 132–136.

<sup>32</sup> Stigler, *Casanova's Lottery*, 90–91.

<sup>33</sup> Matthias Müller, *Das Entstehen Neuer Freiräume. Vergnügen und Geselligkeit in Stralsund und Reval im 18. Jahrhundert* (Böhlau Verlag, 2019), 76–77.

<sup>34</sup> Christian Bagge, “Tilforladelig Anviisning hvorledes man med en u-deblivelig Fordeel kan indsætte udi Tal-Lotteriet samt Underretning om hver Træknings-Stæds lykkelige og ulykkelige Tall”, digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 19.18, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 5–6.

these texts catered to a different audience than the dream books mentioned in the introduction to this volume, perhaps to players like Lessing.

Bagge's text, alongside others in the collection, typically warn against some betting combinations, while encouraging others. The writers particularly cautioned against the combinations that provided the most extravagant returns, in other words the *terne* and *quaterne* (the *quine* was not allowed in the Dano-Norwegian system).<sup>35</sup> One writer warned that one "should never bet on *ternes* or *quaternes*", while another claimed that "the least foolish players" avoided these two options.<sup>36</sup> The *quaterne*, in particular, was accused of functioning as bait for an ignorant public, due to its potentially enormous reward. The chances of winning, however, were correspondingly slight, almost non-existent. "One never hears of such a bet succeeding", as one commentator explained, and therein lay the great misfortune: "it is just the right bait for the aspiring crowd; they think to themselves that it is indeed possible, it could happen, so why not venture ten, twelve, or sixteen skillings for such a great hope?"<sup>37</sup> For the operator, this was precisely what made the *quaterne* so valuable, a fact frequently pointed out by the critics.<sup>38</sup>

This has also been pointed out by later historians. Manfred Zollinger argues that the *quaterne* was one of the most important *arcana* of the entire lotto system,<sup>39</sup> a trade secret based on the knowledge of its great allure combined with particularly poor odds (for the players). The payout rate for this highly unlikely bet was nowhere close to what it should have been for the reward to be fair, but this was difficult for the average player to calculate and expose (see discussion of this below, in section three). Combined with the allure of the *quaterne*'s potential reward, and the improbability of bets succeeding, there was money to be

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35 For examples, see Philoplebis, "Patriotiske Tanker", 17–20; Anon. [transl. by Barthold Johan Lodde], "Almuens Øine opklarede i Anledning af den Daarlighed at vove sine Penge i Tal-Lotteriet", digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 1.9.17, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 11–12, 55; Schumacher, "Underviisning", 38, 53; Bagge, "Tilforladelig Anviisning", 10; Anon., "Vort Tall-Lotteries historie", 39.

36 Schumacher, "Underviisning", 38; Anon., "Almuens Øine opklarede", 21.

37 Philoplebis, "Patriotiske Tanker", 17–18. Several other texts characterise the *quaterne*, and the lotto in general, as bait. See, for instance, Anon., "Tanker om den nylig forefaldne Forandring ved Tallotteriet. Oversadt af det Tyske", digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 2.15.8, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 16; Schumacher, "Underviisning", 26; Philoplebis, "Patriotiske Tanker", 20.

38 Philoplebis, "Patriotiske Tanker", 20; Anon., "Almuens Øine opklarede", 33; Schumacher, "Underviisning", 53.

39 Manfred Zollinger, "Entrepreneurs of Chance. The Spread of Lotto in XVIII Century Europe", *Ludica* 12 (2006): 89.

made for the operator. The quaterne was therefore shamelessly advertised in Svensen's brochure, where a "what if?"-scenario was constructed, demonstrating how the players' hopes of winning were being exploited for financial gain. What if you had chosen four numbers, all of which appeared during the draw, but you had only chosen to bet on four separate simple extracts? "How painful must it not be to feel the opportunities of the quaterne within your reach, only to have the reward of 60,000 slip between your fingers for the sake of ten or twenty skilings?"<sup>40</sup> Sales tricks like these were precisely what caused such violent reactions from the self-titled patriots, who all agreed that the quaterne was the least favourable bet for the players. Indeed, as one commentator phrased it, one could just as well drink oneself into a stupor and choose numbers in this state. When it came to the quaterne, this method provided just as great a chance of winning as any other.<sup>41</sup>

However, as pointed out above, players typically tended to opt for the simpler bets, which suggests that they were not as susceptible to the sales tricks as originally feared; perhaps the lotto manuals contributed to raising public awareness of the game, so that it was easier for players to make informed decisions. Indeed, knowledge of the game seems to have increased with time, at least if we consider the changing attitudes to the determined extract, where you bet on a single number to appear in a specified place within the sequence. Early reactions to the lotto placed the determined extract among the least favourable, while slightly later publications suddenly considered it to be the safest bet, alongside the simple extract.<sup>42</sup> One of the texts was especially vocal about recommending the determined extract, namely *Vort Tall-Lotteries Historie* (The history of our lotto, 2.15.9). This was advertised in February 1773, in other words two years after the lotto had been announced and created such heated discussions. The text was motivated by a recent adjustment of the lotto plan, including changes to the payout rate (from seventy-five to seventy) and allowed size of bets for the determined extract. According to the writer, the operators might just as well have proclaimed to the public that they had been forced to reconsider this particular aspect of their

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<sup>40</sup> Svensen, *Tal-Lotterier*, 43.

<sup>41</sup> Bagge, "Tilforladelig Anviisning", 10.

<sup>42</sup> For texts that warn against the determined extract, see, in particular, Philoplebis, "Patriotiske Tanker", 15–20, but also Søren C. Malling, "Upartiske Undersøgninger af Tal-Lotteriet, som vil sette enhver i Stand til at indsee, om han med Grund kan eller bør haabe Fordeel af samme. Forfattet af M", digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 1.9.15, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 11. For texts that recommend this bet, see Schumacher, "Underviisning", 38, but particularly Anon., "Vort Tall-Lotteries Historie", 12–13, 43, 48.

scheme: “But this very fact has opened the eyes of the more insightful players, that, from all possible bet combinations, they should choose the determined extract”.<sup>43</sup> Later, he characterises all combinations apart from the simple and determined extract as “snares for the simple-minded”,<sup>44</sup> and concludes with the following plea to the playing public:

My fellow citizens! Take my advice and play more carefully in the future, in honour of Danish wit. Let the contractor keep his Ambes, Ternes and Quaternes to himself! Bet on the only options that can promise some return on your money, namely the simple and determined extracts. If you would take this advice! [...] Then there is still hope of some gain, my dear players!<sup>45</sup>

The determined extract was in other words seen as a strategy employed by discerning players, because it represented a more structured approach, a way of potentially taming the randomness of the game. Christian Bagge’s previously mentioned manual distinguishes itself by providing such structured advice, by suggesting a betting strategy known as a martingale. Informed by the gambler’s fallacy, or the fallacy of the maturity of chances – i.e., the idea that the likelihood of a number appearing in the draw increased with every draw in which it had not appeared – Bagge advised his readers to bet one or more simple extracts on a few “mature” numbers, and to double or at least increase their stakes after every loss, so as to cover their previous losses in the event of a successful bet. Then, according to Bagge, you were guaranteed a profit in the end.<sup>46</sup> Svensen’s brochure encouraged the same strategy, referring to it as “undoubtedly the wisest way to play this lottery”.<sup>47</sup>

The strategies *actually* employed by lotto players are difficult to reconstruct, but based on surviving lotto tickets, Stigler has found intriguing evidence that such gambling practices might have been common in the period.<sup>48</sup> Indeed, when Lessing won his bet on the extract, he expressed surprise that the number nineteen was selected, since it had appeared numerous times in previous draws.<sup>49</sup> The belief in the maturity of chances seemed to be widespread and even adopted by an Enlightenment thinker of Lessing’s calibre. In summary, the writers advised players to forget ternes and quaternes, to focus on extracts, and, if they could af-

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<sup>43</sup> Anon., “Vort Tall-Lotteries Historie”, 12–13.

<sup>44</sup> Anon., “Vort Tall-Lotteries Historie”, 43.

<sup>45</sup> Anon., “Vort Tall-Lotteries Historie”, 48.

<sup>46</sup> Bagge, “Tilforladelig Anviisning”, 6–7; Stigler, *Casanova’s Lottery*, 112–114.

<sup>47</sup> Svensen, *Tal-Lotterier*, 40.

<sup>48</sup> Stigler, *Casanova’s Lottery*, 112–114.

<sup>49</sup> Müller, *Das Entstehen Neuer Freiräume*, 76.



ford it, follow an established plan where they bet on mature numbers and increased their stakes for each loss. The underlying message was that a small but certain profit was better than an extravagant one that could only be achieved in their dreams. Players were encouraged to “try the simple in order to reach the possible”.<sup>50</sup> In other words, they were warned against being carried away by their fantasies of sudden wealth.

But were bettors able to heed this advice? The fact that many knew what they were doing does not mean that there was no valid cause for concern about the spread of lottomania. As the critics pointed out, the attempts to tame chance could be a slippery slope into financial ruin, and were therefore only recommended for those who could afford such methods:

Those who cannot afford to continue this doubling of stakes at least ten times in a row or afford to lose a hundred rixdollars if the bet should fail, should refrain from following this approach, unless they happen to have an uncommon faith in the randomness of chance, believing that it is equally likely to win after only a few attempts as after many.<sup>51</sup>

Another writer noted rather condescendingly that the poor could only rely on blind luck, “because they have neither the patience to stay with a chosen string of numbers, nor ability to triple their stakes for each loss, like they have to do in order not to lose in the end”.<sup>52</sup> Lessing and other informed gamblers might have been shrewd enough to devise strategies to minimise their losses, and to focus on the bets carrying the best odds. Others were less able to do so, because they had neither the necessary means nor the acumen. They were consequently more vulnerable to the enticing promise of the bets with higher odds, especially the quaterne. A dispute between two women may serve as an example. Mrs. Bauer, the wife of a copyist, took legal action against Madame Boujou, the wife of a *fumiste* (an installer of fireplaces), because the latter had failed to repay money she had borrowed to participate in two Dano-Norwegian and two Swedish lottos in 1785 (Wandsbek and Altona, and Stralsund and Wismar). Between June and December of that year, Madame Boujou had bet as much as one rixdollar and twenty-six shillings per draw, suggesting that she had not settled for a few simple bets on one or two extracts. Her total debt amounted to forty-five rixdollars, a significant sum that she was not able to repay.<sup>53</sup> At the risk of adopting the paternalistic perspective of the eighteenth-century lotto critics: what opportu-

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<sup>50</sup> Bagge, “Tilforladelig Anviisning”, 9.

<sup>51</sup> Bagge, “Tilforladelig Anviisning”, 7.

<sup>52</sup> Anon., “Vort Tall-Lotteries Historie”, 39–40.

<sup>53</sup> Müller, *Das Entstehen Neuer Freiräume*, 89.

nities existed for Madame Boujou – or a poor servant girl or apprentice for that matter – to calculate and truly understand the probability for each bet? The critics certainly feared that the promises and attractions of the lotto campaign could lead such players astray.

Perhaps it was this type of reader the writers had in mind when they warned against the alleged danger of the game. Although this chapter makes several references to concepts like “the public”, “the people”, “fellow men” et cetera, it purposely does not delve into the complex issue of who exactly constituted this “public”; who might have read these texts; or whether the message had any practical effect on lottery participation. Such questions deserve a study of their own, although it is possible here to suggest – based on internal evidence in the texts themselves – who the intended audience might have been. The texts address readers ranging from elite readers among the governing authorities, who might have been able to stop the planned lottery (such appeals were customarily cloaked as humble addresses to the merciful king, who in reality was mentally unstable and at this time controlled by Struensee); to middle-class consortiums of players who clubbed together in the false belief that they might collectively be able to cover all possible bet outcomes; to the commoners, who were uncommonly literate as a result of widespread public schooling and religious confirmation inspired by the pietist movement.

Regardless of intended or actual audience, the critics reveal what seems to be a genuine fear that people might be ensnared by the promotional lotto literature. Of course, some may have had more vested interests in mind. Indeed, one of the writers – Johan Friedrich Baumgarten – clearly had ulterior motives for attacking the lotto promoters, as he was a leading administrator of the competing class lottery in this period.<sup>54</sup> Baumgarten authored two of the lottery texts in the Luxdorph collection, and these formed part of what Tilman Haug refers to as a “contested information sphere”, where interested parties advertised their own lottery by attacking potential competitors.<sup>55</sup> But even if some may have had narrower and commercial motives in mind, the concerns raised were in line with the broader and dominant patriotic ideology: the state would simply not benefit from a dissolute and financially ruined population.

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<sup>54</sup> Bergholdt, “Det danske Klasselotteri”, 45.

<sup>55</sup> See, *infra*, Haug, “Selling Like a State”, section 4. For Baumgarten’s two texts, see nos. 1.911 and 1.912 in the table of Luxdorph lotto texts.

### 3 “It is as if everything takes place under a closed lid”; or, the battle over transparency

Whether the lotto lured people into gambling addiction and ruin was an important point of contention between the lotto promoters and their critics. Another subject of dispute revolved around the issue of transparency, or the lack thereof. As the introduction to this volume points out, securing public trust was key if a lottery wished to succeed.<sup>56</sup> To gain trust, it was important that the lottery’s operation was transparent. Svensen’s brochure argued for the transparency of lotto when compared with the blanks and prizes lotteries. It claimed that, in the latter, players cannot know in advance the nature of their prize: this all depends on how your ticket is matched in the draw. With the lotto, on the contrary, “the poor and the rich, having placed their bets and staked their money, can say in advance of the draw: if my numbers appear, then I will win this specified amount of money”.<sup>57</sup> In this sense, the lotto was indeed transparent, because the odds for each bet were publicly known and easily available. The critics, however, objected to this portrayal, and argued that it was precisely the *lack* of transparency that made the lotto so questionable.

First, they took issue with the obscurity surrounding the organisation of the prize fund, specifically with how much money was invested by participants through ticket sales, and how much of this was paid out to winners versus retained in the lotto bank. In order for a lottery “to be deemed acceptable”, one commentator noted, “it must be arranged in such a way that the public can always know how much money has been invested, and how much will fall to the participants at each draw”.<sup>58</sup> This was not the case with the lotto, where, another observer points out, the public “is never informed about the size of the total collection for each drawing”.<sup>59</sup> In a blanks and prizes lottery, the fund was based on the income from the sale of a finite number of tickets set at a fixed price. This meant that the public could calculate its exact size. As Svensen’s brochure had pointed out, the operators of these lotteries typically deducted a certain percent-

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<sup>56</sup> See, *infra*, Johanne Slettvoll Kristiansen, Marius Warholm Haugen, and Angela Fabris, “A Cultural History of European Lotteries”.

<sup>57</sup> Svensen, *Tal-Lotterier*, 33.

<sup>58</sup> Johan Friedrich Baumgarten, “Aarsager til Tall-Lotteriernes Forvisning af alle Riger og Lande”, digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 1.9.12, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 7.

<sup>59</sup> Anon., “Vort Tall-Lotteries Historie”, 43. The same concern is voiced in Schumacher, “Underviisning”, 29.

age from ticket revenues, twelve percent in the case of the Dano-Norwegian class lottery. This sum went towards various useful projects, most importantly to the maintenance of the Poorhouse and the Royal Reformatory for young boys.<sup>60</sup>

It is slightly unclear whether this percentage also covered salaries for class lottery administrators. An anonymous writer of a text praising the advantages of the class lottery claimed that the necessary administrative costs and wages were kept to a minimum.<sup>61</sup> It is tempting to ascribe this text to the lottery director Baumgarten himself, but this hypothesis is as difficult to substantiate as the truthfulness of the claim. Kirstine Bjerre Bergholdt has studied the account books for a 1772 drawing, which reveal that only 300,000 rixdollars were set aside for prizes from a total of 434,836; in other words, approximately sixty-nine percent of the income was redistributed to the public. Nobody has yet attempted to calculate the sums or percentage paid out in prizes by the Dano-Norwegian lotto, but as previously mentioned, the French lotto paid out over seventy percent of the money collected every year, which was a little more than the Dano-Norwegian class lottery.

Furthermore, Bergholdt explains that 25,304 rixdollars were spent on administrative costs, 15,000 were transferred to the next lottery, and a profit of 56,708 was deposited in the bank.<sup>62</sup> She does not mention salaries or other expenditures, but these sums constituted only 397,012, which leaves 37,824 rixdollars unaccounted for. Perhaps this was set aside for wages, or perhaps these were included in the broader category of administrative costs. One of the lotto critics claimed that salaries for class lottery administrators were covered by the twelve percent deducted from ticket revenues, which, if this is true, means that wages would not cause a further reduction of the prize fund after the twelve percent had been publicly announced.<sup>63</sup> The point here is not to ascertain which lottery paid back the most to participators, but rather that critics took issue with the fact that the lotto lacked the same clarity as the class lottery in terms of how much money was invested by the public, and how much was redistributed in prizes after each draw.

Another problem rested in the rules of the game, which, according to the critics, were portrayed as deceptively simple and gave the impression that it was much easier to win than it really was. The critics considered even the relatively

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60 Anon., "Tanker over det alleene Privilegerede Lotterie til Landets almindelige Nytte, fattige Børns Opdragelse, og det fattige Væsens bestandige Underholdning i Kiøbenhavn", digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 1.910, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 5–7.

61 Anon., "Tanker over det alleene Privilegerede Lotterie", 13.

62 Bergholdt, "Det danske Klasseslotteri", 47.

63 Anon., "Vort Tall-Lotteries historie", 42.

sober and factual outline of the official lotto plan as problematic: the outline of the rules of the game might have been accurately delineated, but they argued that the plan understated the risks and potential pitfalls. This was possible not just because the game was unfamiliar, but also because its structure was perceived to be more complicated than the more familiar lotteries. This was a result of the freedom and creativity lauded by its promoters: while a participant in the traditional lotteries won if his or her ticket was matched with a prize, the many possibilities for combining numbers into different bets in the lotto meant that it could be difficult to keep track of potential outcomes. One commentator complained that so many were eager to participate despite the slim chances of winning, but nevertheless acknowledged that it did not surprise him, “since the unfamiliar structure of the lottery prevents many from calculating the hazard”.<sup>64</sup> If the critics took issue with the official plan, they were even more outraged by Svensen’s brochure, which was seen as an attempt to deliberately deceive the public in order to secure a profit.<sup>65</sup> According to the critics, the lotto entrepreneurs were false prophets, seeking only to show “the glimmering and alluring features” of the game, but they must surely “have their reasons for not also describing the opposite and unpleasant ones, which bring us loss and ruin”.<sup>66</sup> In general, the whole business was considered to be veiled in secrecy. As one commentator noted: “It is as if everything takes place under a closed lid”.<sup>67</sup>

The critics arrived at the conclusion that this secrecy stemmed from a fundamental imbalance in the relationship between operator and playing public, with the advantage being firmly on the side of the former. This asymmetry, or inequity, was at the root of the controversy. In accordance with the lotto contract, the owner of the lotto privilege – the previously mentioned Koës – had to pay an annual sum to the King of 25,000 rixdollars; ten percent annuities to shareholders; and six percent provision to the ticket sellers, while still retaining a personal profit sufficiently large to make the whole operation worthwhile.<sup>68</sup> Where

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<sup>64</sup> Schumacher, “Underviisning”, 54.

<sup>65</sup> See, for instance, Malling, “Upartiske Undersøgninger”, 3; Anon., “Vort Tall-Lotteries Historie”, 13, 39; Anon., “Almuens Øine opklarede”, 8–9, 11, 14; Jens Reimert Schumacher, “Afhandling om Gevinsterne Forhold imod Tabet, samt Lotteriets Kasses Fordeel udi Tal-Lotterier”, digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 1.913, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 4.

<sup>66</sup> Malling, “Upartiske Undersøgninger”, 3.

<sup>67</sup> Anon., “Vort Tall-Lotteries Historie”, 43.

<sup>68</sup> See the official lotto plan and Johan Friedrich Baumgarten, “Tydeligere Forklaring paa Tall-Lotteriet til Nytte for Lotteriet, og Oplysning for dem, som ey kan begribe dens Indretning”, digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 1.911, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 7.

would all this money come from? One writer noted how he could not reconcile the lofty promises to potential players with the large profits assured to shareholders: “it seemed to me an obvious contradiction, that both the stockholders and the players could win”.<sup>69</sup>

As we have seen, one of the advantages highlighted in Svensen’s lotto brochure was the fact that prizes were paid with no deduction, unlike the class lottery, where twelve percent was taken from the prize winnings to secure an income for the operator. If this was not the case with the lotto, what were they basing their income on? The answer to this rhetorical question was, according to the critics, the credulous public. One writer argued that the lotto’s profits “must undoubtedly come from cheating the public”.<sup>70</sup> Another noted that it was not from Koës’ own purse that the fee to the King would be paid, neither would the generous annuities for shareholders nor provision for ticket sellers come from this source; instead, “this money must come from the lottery, which means that the lottery must be very unfavourable for the players”.<sup>71</sup> As this commentator put it, the lotto was “an unquestionable fraud for the playing public”,<sup>72</sup> and similar notions permeate the lotto texts in the Luxdorph collection.<sup>73</sup>

This asymmetry was not in line with the patriotic ideology: it was simply not acceptable that the operator should cash in extravagant sums at the expense of the people. The writers pointed out the depravity of entering into a business where profits relied on fleecing one’s fellow citizens: “and so it will be my fellow citizens’ property and blood that will be sacrificed in order for the lottery to thrive”.<sup>74</sup> Another was willing to acknowledge that some of his Danish or Norwegian fellow countrymen might be led to *participate* in the number lotto, “but they could surely not be so depraved, as to buy stocks and thereby enter into a business that based its income on the ruin of their fellow citizens”.<sup>75</sup> In other words, the relationship between operator and playing public was perceived as gravely asymmetrical and unpatriotic.

This asymmetry, however, had been essential for the adoption of the lotto in the first place. Regardless of whether it was implemented as a joint-stock company or a state-owned venture, the lotto was a banking game that depended, like the

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<sup>69</sup> Anon., “Almuens Øine opklarede”, 8–9.

<sup>70</sup> Anon., “Vort Tall-Lotteries Historie”, 23.

<sup>71</sup> Anon., “Almuens Øine opklarede”, 7.

<sup>72</sup> Anon., “Almuens Øine opklarede”, 9–10.

<sup>73</sup> See, for instance, Schumacher, “Underviisning”, 38, 43; Baumgarten, “Tydeligere Forklaring”, 7; Philoplebis, “Patriotiske Tanker”, 25; Bagge, “Tilforladelig Anviisning”, 2.

<sup>74</sup> Anon., “Almuens Øine opklarede”, 7.

<sup>75</sup> Schumacher, “Underviisning”, 56.

modern casino, on a fundamental imbalance (a “house edge”) between players and operator.<sup>76</sup> To understand the basis of this asymmetry, and to help decide whether to take the leap and establish a lotto within their territories, European governments consulted with mathematical experts who could explain the system and calculate possible risks. The most well-known example comes from Prussia, where Frederick the Great contacted the mathematician Leonhard Euler to calculate risk and possible income from a proposed lotto scheme.<sup>77</sup> A similar initiative was made by Swedish authorities, who sought advice from the country’s leading mathematician Samuel Klingenskierna, because they realised it would be futile to attempt to implement it without first consulting with an expert on probability.<sup>78</sup>

The mathematicians were especially concerned with two issues, namely the law of large numbers, and the relationship between odds and payout rates for bets. The law of large numbers postulated that, if a sample of random events was large enough, a pattern of regular distribution would emerge. In other words, a single spin of the roulette wheel, or (more relevant in this case) a single lotto drawing, might lead to loss for the operator; but if you allowed for a larger sample, the numbers would even out, and the house would eventually win. In his study of the French lotto, Stigler has argued that the French state took on an unprecedented level of risk when they decided to adopt the framework of the Genoese lottery, and that they did so “with little more than a mathematical theory to protect it”.<sup>79</sup> Later governments, including the Dano-Norwegian, had the benefit of looking to France and other states and draw from their experience, but this did not prevent them from voicing concerns about the risks involved. Indeed, Frederick the Great had also been skittish about underwriting the risk of a Prussian state lotto, even as late as 1765, seven years after the French had commenced drawings.<sup>80</sup>

In addition to the law of large numbers, the mathematicians focused their attention on the relationship between the odds and the payout rates for bets, more specifically the mismatch between these. The payout rates for the simpler bets were acceptable; for instance, a successful bet on an extract returned your stake

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76 Manfred Zollinger, “Dealing in Chances – An Introduction”, in *Random Riches: Gambling Past & Present*, edited by Manfred Zollinger (Routledge, 2016), 4.

77 Victor J. Katz, *A History of Mathematics: An Introduction* (Addison-Wesley, 2009), 642, 659; D.R. Bellhouse, “Euler and Lotteries”, in *Leonhard Euler: Life, Work and Legacy*, eds. Robert E. Bradley and C. Edward Sandifer (Elsevier, 2007), 389.

78 Juno Boberg, “Nummerlotteriet och dess brudgåvofond” (Academic diss., Stockholms Universitet, 1983), 7.

79 Stigler, *Casanova’s Lottery*, 1.

80 Bellhouse, “Euler and Lotteries”, 387; Stigler, *Casanova’s Lottery*, 40–41.

times fifteen in most of the European lotto systems, including the Dano-Norwegian, while a fair return would have been eighteen, since the odds of winning was one to eighteen.<sup>81</sup> The higher the odds, however, the more unfair the return: a bet on a quaterne returned your stake times 60,000 in most systems, including the Dano-Norwegian, while a fair return would have been 511,038.<sup>82</sup> This difference between the odds of winning each bet and the payout rates offered was at the root of the structural inequality between operator and players; indeed, it was necessary in order to secure a sufficiently large profit to make the risky operation worthwhile. By pointing to the law of large numbers and the mismatch between odds and payout rates, the mathematical experts were able to demonstrate that the operator would ultimately always win to the detriment of the participants. Their calculations, however, were not meant for the public eye. Proceedings took place behind closed doors, on the inside of each state's political system, and the results were reserved as an arcanum for the few.<sup>83</sup>

The mismatch between odds and payout rates could, to a certain extent, be justified. Even if players engaged only in honest betting, the game entailed risks for the operator; obviously, the potential for fraud through forged tickets increased the hazard. When Euler counselled Frederick the Great about the possible implementation of a Prussian state lotto, he had advised him to use the higher-odds bets to conceal the unfair advantage. This was not only because the higher risk justified a larger discrepancy, but also because it was more difficult for the public to calculate and expose the mismatch. By contrast, unfair payout rates for simple extracts might repel potential players because they were too obvious. When Euler later revealed, in a presentation given to the Berlin Academy in 1763, that the payout rates should have been much higher if the lotto were to be equitable, Frederick was angered and accused him of having made “a scandal of it”.<sup>84</sup> Frederick and other lotto operators clearly preferred to keep this information out of the public eye.

This was a careful balancing act, though, and the discrepancy could not be too significant if the operator wished to retain public trust and survive in a competitive market. As demonstrated by Tilman Haug in this volume, small polities with an insufficient domestic market were forced to compete fiercely for foreign mar-

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81 Stigler, *Casanova's Lottery*, 57, 24; Roberto Garvía, “Syndication, Institutionalization, and Lottery Play”, *American Journal of Sociology* 113, no. 3 (2007): 618; *Plan*, art. iv.

82 Garvía, “Syndication”, 618; Stigler, *Casanova's Lottery*, 57. See Garvía, 618, for a useful table of payout rates for several European lottos versus the fair return, and note the discrepancy with the rising odds.

83 Zollinger, “Entrepreneurs of Chance”, 89.

84 Bellhouse, “Euler and Lotteries”, 389–390.



ket shares.<sup>85</sup> Zollinger refers to this as an “international competition for better chances”.<sup>86</sup> However, this was especially the case for the smaller German and Italian territories, and less so for larger polities. Zollinger highlights the case of Spain, where the state operators could keep the payout rates low because they were not exposed to the same foreign competition as the German and Italian states. Indeed, the rates were conspicuously low when compared with other European lottos.<sup>87</sup>

Where do we place Denmark-Norway on this scale? As Haug shows, the German states developed elaborate marketing strategies and produced an abundance of advertising material, in their fierce competition for players.<sup>88</sup> Although this chapter reveals that similar material was produced in the Dano-Norwegian realm, there was no comparable need for promotional literature. The lotto entrepreneurs were to a certain extent protected from foreign competition by the absolutist state and its royal prerogative to distribute licenses and issue repeated laws regulating the lottery market. In terms of domestic competition, the lotto admittedly had a strong competitor in the established class lottery, although – as suggested by Baumgarten’s criticism above – it seems that the latter had more to fear from the former, than vice versa.<sup>89</sup>

However, as opposed to the German case, the Dano-Norwegian lotto operators did not have to worry about internal competition within the lotto market. By 1774, there were drawings in three cities (Altona, Copenhagen, and Wandsbek), but regardless of this geographical spread, they formed part of the same lotto (“Tallotteriet”), owned by Koës and the shareholders until April 1773, when the state purchased all the shares (Wandsbek was added in 1774, i.e., after the state takeover). Altona and Wandsbek were both located in the duchy of Holstein, close to Hamburg, which formed part of the conglomerate Dano-Norwegian state at the time. Due to the distance from these cities to Copenhagen, there were local lotto administrations for Copenhagen on the one hand, and for the two Holsteinian cities on the other.<sup>90</sup> The drawings were also in a sense separate from one another, insofar as numbers drawn in one city did not apply for bets

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<sup>85</sup> See, *infra*, Haug, “Selling Like a State”.

<sup>86</sup> Zollinger, “Entrepreneurs of Chance”, 83.

<sup>87</sup> Garvía, “Syndication”, 618. The Spanish lotto offered 10, 50, 220, and 3,966 times the stakes for the simple extract, determined extract, ambe, and terne, respectively. The most common pattern elsewhere in Europe (with some variations) was 15, 75, 270, and somewhere between 5,300 and 5,400. See Stigler, *Casanova’s Lottery*, 57.

<sup>88</sup> See, *infra*, Haug, “Selling Like a State”.

<sup>89</sup> In her dissertation on the Dano-Norwegian class lottery, Kirstine Bjerre Bergholdt highlights the lotto as the greatest source of competition. See Bergholdt, “Det danske Klasselotteri”, 37.

<sup>90</sup> *Extract og Registratur over Kongelige Resolutioner, Lotto-Wæsenet angaaende, fra 1ste Martii til 1ste November 1789*, 399, Finanskollegiet, 4–6, the Danish National Archives, Copenhagen.

placed on a drawing in one of the others. This gave rise to the expression “det gælder til Wandsbek” (that only applies in Wandsbek).<sup>91</sup> In another sense, however, players likely did not differentiate sharply between the drawings, unless they themselves lived in one of these three cities. Players living in Wandsbek likely preferred drawings they could attend in person, but it was of less consequence for a player in, say, the Norwegian city of Trondheim, whether a drawing took place in Wandsbek or Altona. Indeed, newspaper advertisements from the period reveal that players were encouraged to collect rewards and place bets on “the next drawing” at their local collector’s office, regardless of where these drawings took place.<sup>92</sup> All this demonstrates that the operations in the three cities were part of the same system and consequently formed no threat to one another.

The challenge from foreign competitors was probably more substantial. Although the Dano-Norwegian state protected the lotto entrepreneurs through privileges and prohibitions, they were not immune to foreign competition; indeed, the Dano-Norwegian payout rates for bets suggest that this lotto was less cut off from competing foreign markets than the Spanish (more on these rates below). A law from 20 December 1771 repeated and strengthened an existing prohibition from 1735 against the “Collection to foreign lotteries”, which arguably would not have been necessary if such competition had not existed.<sup>93</sup> The Hamburg lotto was probably the greatest source of competition for the Dano-Norwegian lotto, due to its proximity to Altona and Wandsbek. It was established in 1770, in other words, only a year prior to the Altonian lotto.<sup>94</sup> However, as demonstrated by the example of the two women embroiled in a legal battle over money spent in foreign lotteries, geographical distance was not necessarily an obstacle to participation, if there were local collectors who could offer tickets to foreign lotteries in far-off places. Nevertheless, the proximity to the drawing itself probably added to the competitive edge of lotteries closer to home.

In any case, the Altona and Hamburg lottos offered the same payout rate for bets. Since the Hamburg lotto was already established when Koës received his con-

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91 *Salmonsens konversationsleksikon*, 2nd edition, vol. XXIV, “Wandsbek”, accessed 18.06.2025, <https://runeberg.org/salmonsens/2/24/0526.html>.

92 See, for instance, “Kiøbenhavns Kongelig alene privilegerede Adresse-Contoires Efterretninger”, February 22, 1773, in *Mediestream*, accessed 18.06.2025, <https://www2.statsbiblioteket.dk/mediestream/avis>.

93 Jacob Henric Schou, “Alphabetisk Register over de Kongelige Forordninger og Aabne Breve, samt andre trykte anordninger, som fra aar 1670 af ere udkomne”, 2nd edition (P. Poulsen, 1795), 212–213, in *Nettbiblioteket*, accessed 18.06.2025, <https://www.nb.no/items/14d90cc1b0cdc49cb7a2fc57f3c674ec?page=215#215>.

94 Stigler, *Casanova’s Lottery*, 57; *infra*, Haug, “Selling Like a State”, section 1.

tract for the Altona lotto, it seems likely that Koës and the shareholders decided to opt for the same rates in order not to price themselves out of the market. Although the Dano-Norwegian rate for the determined extract was soon reduced to seventy, it was originally set to seventy-five.<sup>95</sup> This reduction suggests that the entrepreneurs, backed by their state sponsorship, felt secure enough to risk a potential commercial disadvantage. Although a strengthening of the prohibition against foreign lottery tickets attests to the existence of cross-border gambling, the strict legal framework must have made it considerably less straightforward for Dano-Norwegian subjects to participate in competing foreign lottos. This left much room for the entrepreneurs to rig the game to their own advantage.

## 4 Mathematical education: removing the lid through numerical tables and pedagogical examples

If mathematical calculation had been crucial in the process of implementing the Genoese lottery across Europe, it now served an equally important role in potentially warning Dano-Norwegian players against participation. Indeed, this seems to have been a general European trend, with mathematicians writing learned articles and textbooks to demonstrate the poor odds of winning.<sup>96</sup> Such learned texts make up a significant share of the lotto texts in the Luxdorph collection, but they have not received any scholarly attention. The writers had characterised lotto operations as something that took place “under a closed lid”, in a deliberate attempt to deceive the public and make a profit. As we have seen, the critics were to some degree justified in making such claims, although the entrepreneurs could also to a certain extent defend their unfair payout rates by pointing to the risks involved in operating a Genoese lottery. In any case, the critics viewed it as no less than their patriotic duty to remove the lid and reveal the secrets of the lotto, so that their fellow citizens and the state itself would not be ruined.<sup>97</sup> They set out to expose

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<sup>95</sup> Stigler, *Casanova's Lottery*, 57; Plan, art. iv; Plan der Königl. Dänischen privilegirten und mit 250,000 Reichsthaler Dänisch Courant garantirten Zahlen-Lotterie, welche abwechselnd zu Copenhagen, Altona und Oldenburg gezogen wird, section 2, 15 April 1771, 1771–1773, 347, Rentekammeret, Tyske Afdeling, Tyske kammer, Sager vedr. tallotteriet i Altona, D91, the Danish National Archives, Copenhagen; Anon., “Vort Tall-Lotteries Historie”, 12–13.

<sup>96</sup> Katz, *A History of Mathematics*, 659; Stigler, *Casanova's Lottery*, 156–157.

<sup>97</sup> This motivation is expressed explicitly in several of the texts. See, for instance, Friborg, “Til Kongen!”, 21; Philoplebis, “Patriotiske Tanker”, 26; Anon., “Almuens Øine opklarede”, 10, 13;

the lotto enterprise: they wanted to “demask” it and “remove its make-up”, portray it in its “natural form”, in short, reveal the entire “disgusting corpus of which it was made”.<sup>98</sup> This was to a large extent done through mathematical calculations, to demonstrate the improbability of winning.

Establishing the identities of the Dano-Norwegian mathematical commentators is not an easy task. Many of the texts were published anonymously, and not all the authors have been identified. Two of the texts, however, were written by Jens Reimert Schumacher, a civil servant who had supervised the payment of the unpopular “Added taxation” (Ekstraskatten) and published several commentaries on financial matters in general.<sup>99</sup> These two texts are *Afhandling om Gevinsterne Forhold imod Tabet, samt Lotteriets Kasses Fordeel udi Tal-Lotterier* (A treatise on the relationship between potential profits and losses, and the advantage of the lotto bank, 1.9.13) and *Underviisning for Elskere af Tal-Lotteriet hvorefter enhver kan udregne sit Haab til de store Gevinster* (Instruction for lotto lovers, from which anyone can calculate his chances of winning the top prizes, 1.9.16). While existing sources ascribe the latter to Schumacher,<sup>100</sup> the discovery that he is also the author of the former is my own, based on information provided in the text already ascribed to him. Here, he himself explains that he has previously written a text on the same topic, and he is clearly referring to *Afhandling* (1.9.13).<sup>101</sup> Moreover, the two texts are sold by the same vendor (“no. 5 at the Stock Exchange”), and they are the only Luxdorph lotto texts sold by this vendor.

Another identified author, Søren C. Malling, is difficult to trace.<sup>102</sup> Despite allegedly lacking a formal education (he refers to himself as uneducated), he had sufficient confidence in his mathematical abilities not only to calculate the probability of winning, but also to communicate this to a broader audience.<sup>103</sup> Schumacher, Malling, and the others provide detailed calculations to demonstrate

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Schumacher, “Afhandling”, 12; VirtVs Grata Fidesque VincVnt, “Sende-Brev fra en tydsk Skolemester i Kiøbenhavn, til General-Administrationen for det i Kiøbenhavn og Altona oprettede Tal-Lotterie. I Anledning af en paa een Side og egenmægtig for falsk erklæret Original-Lotterieseddel og i Henseende til deres forandrede Planer og Original-Billetter”, digital edition from *Trykkefrihedens Skrifter (1770–1773)*, 2.15.11, the Royal Danish Library (<https://tekster.kb.dk/tfs>). Version 2.0, October 2021, 5.

<sup>98</sup> Malling, “Upartiske Undersøgninger”, 26.

<sup>99</sup> Harald Jørgensen, “Jens Reimert Schumacher”, in *Dansk Biografisk Leksikon*, accessed 18.06.2024, [https://biografiskleksikon.lex.dk/Jens\\_Reimert\\_Shumacher](https://biografiskleksikon.lex.dk/Jens_Reimert_Shumacher).

<sup>100</sup> Nyerup, *Luxdorphiana*, 516; Horstbøll, Langen, and Stjernfelt, *Grov Konfækt*, 473.

<sup>101</sup> Schumacher, “Underviisning”, 32.

<sup>102</sup> The text “Upartiske Undersøgninger” (1.9.15) is ascribed to him. See Horstbøll, Langen, and Stjernfelt, *Grov Konfækt*, 473.

<sup>103</sup> Malling, “Upartiske Undersøgninger”, 38.

the near impossibility of winning the highest bets to anyone capable of following their reasoning. The language employed is technical and often borrowed from the world of natural sciences. Malling, for instance, notes how he intends to “explain this lottery’s internal small particles and units”, and “anatomise its inner and outer parts”.<sup>104</sup> They disclose the statistical probability of winning on any of the five betting options, and calculate the percentage befalling the operator for each of these, which, according to one writer, varied from a little over sixteen per cent for the extract to a whopping eighty-eight and a half for the quaterne. As one commentator asked rhetorically: “In what other lottery does the entrepreneur have such a tremendous advantage?”<sup>105</sup> In general, these texts are characterised by numbers and figures, often arranged in the form of tables sprinkled with mathematical terminology.<sup>106</sup> A surprisingly large share of the lotto texts in the Luxdorph corpus are of this category. Readers are bombarded with facts, figures, and, it certainly seems, *every* potential outcome of *every* possible bet. In one of his texts, Schumacher contends that his explanation should be easy for anyone to understand: “The calculations presented here are so simple that anyone with little effort may check them to ascertain their correctness”.<sup>107</sup> A non-expert reader might be inclined to disagree: the endless figures and accompanying elaborate explanations might leave readers slightly overwhelmed, at least if they are not themselves mathematically inclined.

Regardless of the ease or difficulty for the average lotto player to calculate the probability of winning on the different bet combinations, Schumacher at least recognised the fact that there might be those who did not wish to spend time on such calculations.<sup>108</sup> Perhaps the experts themselves were fatigued by the details of their own demonstrations: one of them commented that he hoped he was excused from proceeding with any further calculations, since what he had already provided was more than sufficient.<sup>109</sup> Nevertheless, it was crucial to provide proof for their claims against the lotto. Their rigour is demonstrated for instance by an addendum to Schumacher’s *Underviisning for Elskere af Tal-Lotteriet* (1.9.16).<sup>110</sup> In

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<sup>104</sup> Malling, “Upartiske Undersøgninger”, 5, 24.

<sup>105</sup> Anon., “Almuens Øine opklarede”, 20.

<sup>106</sup> See, for instance, Malling, “Upartiske Undersøgninger”, 6–8, and Schumacher, “Underviisning”, 12–17, 37, 44–49.

<sup>107</sup> Schumacher, “Underviisning”, 53.

<sup>108</sup> Schumacher, “Underviisning”, 53.

<sup>109</sup> Anon., “Almuens Øine”, 55.

<sup>110</sup> By mistake, this has been placed with an unrelated text in the digitised collection (“Almuens Øine opklarede”, 1.9.17), accessed 20.06.2025, [https://tekster.kb.dk/text/tfs-texts-1\\_009-shoot-work-id1\\_009\\_017](https://tekster.kb.dk/text/tfs-texts-1_009-shoot-work-id1_009_017).

this postscript, Schumacher adds additional figures, to make sure that he has left no stone unturned. Malling, moreover, noted that his explanation ought to have been far more comprehensive for it to be exact, but he was trying to limit himself as much as possible.<sup>111</sup>

The fact that it could be difficult to understand, but also to explain, the minutia of the Genoese lottery is reflected by a staging of the very process of instruction, in the anonymously authored *Almuens Øine opklarede i Anledning af den Daarlighed at vove sine Penge i Tal-Lotterier* (The eyes of the public opened, in relation to the disadvantage of risking one's money in lottos, 19.17). This text was allegedly translated "from a foreign language" by Barthold Johan Lodde, who claimed to have received the text in manuscript form by someone who instructed him to translate and print it.<sup>112</sup> Mirroring the instruction taking place between author and reader, the text tells the story of a presumably fictional student (or perhaps one the author had met in real life), who intervenes when a seller of lottery tickets tries to ensnare two credulous burghers. The student "took pity on these poor fellows and took it on himself to instruct them; but this was no easy task with such people, who could not understand arithmetic".<sup>113</sup> He tried in vain to explain through laws of probability but soon resorted to pedagogical examples in an effort to warn them off. He is then approached by the character narrator, who implores him to explain the mathematics behind his "practical argument".<sup>114</sup> The student, however, replies:

What you request from me is not so easily performed as you seem to think. It would take considerable calculation, and this is not the appropriate place to do so. I will visit you tomorrow at your lodgings; we will explore that little book you mention, the one that has led so many people astray [Svensen's brochure], and I will reveal to you the true nature of this lottery.<sup>115</sup>

This story of the student instructor not only suggests the perceived complexity of the lotto, and the difficulty of both explaining and understanding how it all works; it also demonstrates the tendency to resort to simpler examples (or "practical arguments") to explain its inner workings to an audience not familiar with combinatorial probability. If the authors wanted to reach a large audience, warnings based on numbers and relatively complicated mathematical calculations may not have been the most fruitful approach. As Malling himself pointed out, it was precisely the many numbers that made the lotto so unfathomable in the

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<sup>111</sup> Malling, "Upartiske Undersøgninger", 21.

<sup>112</sup> Anon., "Almuens Øine opklarede", 3.

<sup>113</sup> Anon., "Almuens Øine opklarede", 11.

<sup>114</sup> Anon., "Almuens Øine opklarede", 13.

<sup>115</sup> Anon., "Almuens Øine opklarede", 14.

first place: “The name Number-Lottery [Danish: “Tallotteriet”] is a fitting one indeed; the large numbers and figures are precisely what obstruct our understanding”.<sup>116</sup> Malling felt he had explained the lotto adequately for those who could understand the mathematics behind it, but for those who were not able to follow this reasoning, it was “quite possible that much of it was still incomprehensible”.<sup>117</sup> Seeing as this last group constituted “a fairly large portion of the public”, efforts should be made to explain the lotto in a more accessible manner.<sup>118</sup>

Malling proceeded with a list of “Examples or Parables” that he thought might be more easily grasped.<sup>119</sup> In an attempt to explain the probability of winning a bet on an ambe, for instance, he asked readers to imagine a street in Copenhagen with four hundred windows spread across different buildings. One of these windows is randomly marked as lucky. If anyone can guess which of these four hundred windows is the lucky one, they will receive forty-five rixdollars. But in return, they must provide one Mark for each guess.<sup>120</sup> Next, suppose a person is asked to guess the location of a treasure buried under a pathway between Nørreport and Hirschholm, a distance of “three miles or 11,748 fathoms”.<sup>121</sup> If anyone can guess under which of these fathoms the treasure lay buried, they will be allowed to keep it. Again, they must pay a certain amount for each fathom explored. Malling implored his readers to consider the fact that, after 5,300 guesses, they would have spent more than the treasure was worth, and there would still be many fathoms left to check. He equated this with betting on a *terne*.<sup>122</sup> These are only a couple of the many examples provided by Malling and his fellow writers.<sup>123</sup> Through such practical arguments, they hoped to demonstrate how difficult it was to win, and, not least, how much it would cost to keep betting, a fact that seemed intentionally obscured in Svensen’s lotto brochure.

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116 Malling, “Upartiske Undersøgninger”, 23.

117 Malling, “Upartiske Undersøgninger”, 26.

118 Malling, “Upartiske Undersøgninger”, 26.

119 Malling, “Upartiske Undersøgninger”, 27.

120 Malling, “Upartiske Undersøgninger”, 28–29.

121 Malling, “Upartiske Undersøgninger”, 29.

122 Malling, “Upartiske Undersøgninger”, 29–30.

123 See, for instance, Schumacher, “Underviisning”, 43, and Anon., “Almuens Øine opklarede”, 25–27.

## 5 Conclusion

The term “lottery” is not immediately associated with the field of mathematics. It may therefore come as a surprise that mathematical issues played such a central role in the public deliberations of the lotto. More specifically, the attention was fixed on the calculation of chances and the improbability of winning, especially for the bets with the higher odds. This was an important point to make for the critics, because the promotional campaign depended on a downplaying of this crucial fact. It was true that the lotto could offer something completely new within the lottery market, and that it afforded greater agency for players to tailor their bets and decide for themselves how much risk to take. But when the chances of winning were so slight, what was the point of participating? If they could not understand the mathematics behind the game – specifically, the low probability of winning and the poor payout rates offered for successful bets – the players entered on false pretences.

However, the critics no doubt underestimated the playing public, and probably also the thrill of gambling despite the poor prospects of winning. In fact, historical research has suggested that many players preferred the simpler bets with more realistic odds. Aided by guidance literature, players used different strategies to increase their chances of winning. Many knew to a certain degree what they were doing, although, as with all games of chance, it was impossible to tame their inherent randomness and bring *alea* into the realm of *agon*.<sup>124</sup> The lotto probably offered many players some financial reward, but even if their bets should fail, they had been entertained in the process.

Nevertheless, there were arguably many who were incapable of such a structured and controlled approach to the lotto. The critics worried that vulnerable groups were being tempted into gambling addiction, which would be ruinous not only for the individual but also for the greater community, indeed, for the state itself. This was admittedly not a new argument against lotteries, but the lotto posed a particular threat because it specifically catered to a lower-class audience and held frequent drawings, which would “keep the people at play all the year round”.<sup>125</sup>

To counteract this development, the critics launched an attack on the lotto campaign by writing informative and didactic texts using mathematical calcula-

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124 Roger Caillois, *Les Jeux et les hommes* (Éditions Gallimard, 1967 [1958]), 47; Marius Warholm Haugen, “The Lottery Fantasy and Social Mobility in Eighteenth-Century Venetian Literature: Carlo Goldoni, Pietro Chiari, and Giacomo Casanova”, *Italian Studies* 77, no. 3 (2022): 255.

125 Zollinger, “Entrepreneurs of Chance”, 83.



tions and practical examples, in an effort to warn the people against participating. The mathematical warnings against the lotto were not a specifically Dano-Norwegian phenomenon but formed part of a larger European trend. According to Stigler, the Marquis de Condorcet wrote similar mathematical manuals to prove the folly of participating, noting that “perhaps mathematics, by demonstrating the ridiculousness of their speculations, will have more effect than a moralist in exposing the disastrous consequences”.<sup>126</sup> Condorcet apparently thought mathematical expositions could curb gambling frenzy, but the popularity of lotto across Europe in the late eighteenth century suggests otherwise. In Denmark-Norway, some readers may have been persuaded to stay away from the game, but the lotto enjoyed an immense popularity also in this realm, and it continued unabated into the nineteenth century, until the abolition of the state lotto in 1851. Clearly, many were not convinced by the mathematical warnings; indeed, scholars have claimed that the only “mathematicians” who were successful in attracting public attention were those who sold foolproof methods for choosing winning numbers.<sup>127</sup> Regardless of whether the texts explored in this chapter had any practical influence on contemporary lottery participation, the writers spent considerable time and effort on exposing the mathematical underpinnings of the game to readers beyond a specialist scientific circle. As lottomania swept across the land, they helped bring public attention to theories of probability, and to their practical applications.

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<sup>126</sup> Nicolas de Condorcet, as quoted in Stigler, *Casanova's Lottery*, 158.

<sup>127</sup> Katz, *A History of Mathematics*, 659; Daston, *Classical Probability*, 147.

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