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Research article

Llullaby

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Abstract

This is one of five essays that extend, to the current moment of digital infrastructure transformation, musings on synthetic intellect generation put forth by Jorge Luis Borges in one of his lesser-known essays from 1937. "Ramon Llull's Thinking Machine" showcases an instrument for analytical enhancement, devised in the 13th century, to settle theological conflicts between the three monotheistic world religions (Judaism, Christianity, Islam). Borges observes that delegating intellectual agency to automated routines fails to fortify reason per se – but succeeds in other respects, namely in quickening concept proliferation and lateral associations. Borges treats Llull's "thinking machine" as an object lesson that conveys a core historiographical insight concerning the prosthetics of mind in general: New idea-generating technologies entail unintended cogito-cultural ramifications. This essay sees itself as an addendum to Borges' commentary. With reactionary politics once again on the rise, it recalls two thinking machines of a more recent vintage along with their respective cultural reverberations – the Chess Player (a late 18th century automaton), for one, and the Portable Bettmann Archive (a mid-20th century image search tool), for another. The commercial picture library Otto Bettmann founded in 1936, the year before the Borges essay appeared, articulated a critique of totalizing thought like the critique that Borges extracted from Llull. By the 1960s, Bettmann's pictorial logic had entered mainstream US-advertising culture from whence its distinctive visual grammar continued to spread. To this day, the Bettmann/Borges vision of combinatorics informs the functional layout of the graphical user interface. This idiom of search and retrieval, first consolidated in the 1930s, has come to permeate online signposting and intuitive wayfinding. A few sample plates from the Bettmann Portable Archive conclude this essay-update of Borges' remarks on Llull's thinking machine. They are tendered as an invitation to follow a visual argument for the broader claims here advanced.

Keywords: Thinking Machine; Ramon Llull; Jorge Luis Borges; Kantian AI; Bettmann Portable Archive; Totalizing Knowledge

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Научная статья

Колыбельная Луллия

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Аннотация
Это одно из пяти эссе, которые проецируют на текущий этап трансформации цифровой инфраструктуры размышления о генерации синтетического интеллекта, изложенные Хорхе Луисом Борхесом в одной из его малоизвестных работ 1937 года. В эссе «Мыслящая машина Рамона Луллия» рассматривается созданный в XIII веке инструмент аналитического упорядочения, призванный разрешить теологические конфликты между тремя монотеистическими мировыми религиями (иудаизмом, христианством и исламом). Борхес замечает, что делегирование интеллектуальной агентивности автоматизированным процедурам не укрепляет разум как таковой, однако оказывается успешным в других отношениях — а именно в ускорении пролиферации концептов и латеральных ассоциаций. Борхес трактует «мыслящую машину» Луллия как наглядный пример, выражающий фундаментальную историографическую идею относительно ментального протезирования в целом: новые технологии генерации идей влекут за собой непредвиденные когнитивно-культурные последствия. Настоящее эссе позиционируется как дополнение к комментарию Борхеса. В эпоху очередного подъема реакционной политики оно обращается к двум мыслящим машинам более позднего периода и их соответствующему культурному резонансу: во-первых, к «Шахматисту» (автомату конца XVIII века), и во-вторых, к портативному архиву Беттманна (инструменту визуального поиска середины XX века). Коммерческий фотоархив, основанный Отто Беттманном в 1936 году — за год до публикации эссе Борхеса, — содержал в себе критику тотализирующего мышления, подобную той, что Борхес вычленил у Луллия. К 1960-м годам изобразительная логика Беттманна проникла в мейнстрим американской рекламной культуры, откуда началось дальнейшее распространение ее специфической визуальной грамматики. По сей день беттманно-борхесианское видение комбинаторики определяет функциональную структуру графического пользовательского интерфейса. Этот идиоматический стиль поиска и извлечения данных, окончательно оформившийся в 1930-е годы, пронизывает современную систему онлайн-навигации и интуитивного ориентирования. Несколько образцов таблиц из Портативного архива Беттманна завершают данное эссе, актуализирующее замечания Борхеса о мыслящей машине Луллия..Они предлагаются в качестве приглашения проследить за визуальной аргументацией в пользу выдвинутых здесь более широких положений.

Ключевые слова: Мыслительная машина; Раймунд Луллий; Хорхе Луис Борхес; Кантианский ИИ; Портативный архив Беттманна; Тотализирующее знание

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INTRODUCTION

As I was tidying up my office, an alarm-red book surfaced that broke my stride. The volume was still shrink-wrapped. *Dia-Logos. Ramon Llull's Method of Thought and Artistic Practice* (2018) edited by Amador Vega, Peter Weibel and Sigfried Zielinski. The cover features astronomical abstractions, an orbital graphic of Chinese hexagrams, and bold white lettering. I recall Weibel, as he gave it to me, declaring it to be "probably my most important book" and lamenting that nobody will read it because "contemporary readers aren't interested in 13th century monks." He then contended that Ramon Llull "could hardly be a timelier figure." Llull had devised a volvelle of divine attributes to integrate the three major world religions, amending the system over time. More importantly, so Weibel, Llull's devotional disk of multi-layered rotating parts, the multi-tab browser of the Renaissance period, could be likened to a "paper computer."

At the time, a small team that included Weibel, artist-director of the Zentrum für Kunst und Medien in Karlsruhe, and me was planning installations in commemoration of Immanuel Kant, the epochal architect of reason. There was to be a streaming festival on the 300th anniversary of the philosopher's death as well as an exhibition dedicated to the Kantian roots of Weibel's media archaeology and digital art practice. We aspired to reframe the Königsberg cosmonaut of uncharted mind as a sociotechnical constructivist, no mere system-builder. Sadly, Weibel died. And so did the effort to reboot Kant reception for the year 2024.

Weeks later, the red book still lay on the corner of my desk sealed in plastic, suspended in a limbo of indecision, when I received an email from *Technology and Language*. The editors were soliciting riffs on a short essay by Jorge Luis Borges, "Ramon Llull's Thinking Machine." I read the essay straight away. Had this storyboard monk not in fact existed, Borges might have made him up. The magical realist from Buenos Aires turned the divining wheel of this beatified saint from Palma de Mallorca into a prop with which he elucidates, by ekphrasis, the workings of absolutist thought.

For Borges, the combinatorial is not solely determinist, it is also associative. Feeling encouraged, I ripped the plastic off the *Dia-Logos* tome. Embossed on the red book's paperboard cover, rendered in tactile immediacy, was a binary sign system, the effect of which was to sensualize the ecosystem of digital gadgetry by means of which I promptly proceeded to write this essay.

KANT'S CATALYST

Kant broke with the teachings of continental rationalists like Gottfried Wilhelm Leibniz (and before him Ramon Llull) after radically questioning the nature of causality. Experience alone can never yield logical certainty with respect to empirical phenomena. Felt cohesion originates in the interstices of an evolving hive mind, ever reliant on the architectonics of human affiliation. Kant's shorthand for this complex nexus of reason/language/understanding was *Gemüt*, for him a technical term but originally a word from Christian mysticism to which he ascribed a novel, secular meaning advanced in his post-critical writings. Kant credits David Hume with waking him from his "dogmatic slumber."

But we know Kant to be an unreliable narrator. And the historical record supports another reading that will ring more true to anyone conversant with the tradition of machine thinking. On this alternate account, Kant's consequential conversion tracks back to a dramatic staging of automated mind that disrupted period conceptions of human agency.

Wolfgang von Kempelen (1734-1804), an Austro-Hungarian builder of contrivances, assembled machines of uncanny human verisimilitude, which caused a furor in his day. He famously fabricated a puppet dressed in Oriental garb and sporting a turban that appeared to move chess pieces on a board while making strategic decisions. This mechanoman, styled "Mechanical Turk," regularly beat human opponents. Said marvel – a perfect display of artificial intelligence – captured the public imagination. Historical illustrations show the puppet sitting behind a box that serves as the table holding the chess board. A secret player, hidden inside the box, used a system of levers and magnets to push the puppet's arm and this moved chess pieces on the board. There was a mishap one day when two teenage boys saw a hidden player escape from the box. The next day's headline in the Baltimore *Gazette* trumpeted that this "ingenious contrivance ... has at length been discovered by accident to be merely the case in which a human agent has always been concealed, when exhibited to an audience."[1] But shock and awe continued to win out. Such revelations did not noticeably impact how this iconic device was perceived by publics at large. Spectators, specialist and non-specialist, beheld an inanimate object that seemed to reason, autonomously. Some suspected it to be a hoax. Most everyone deemed it "to be one of the most ingenious, & completely successful contrivances, which has ever been offered to the public" (Bradford, 1826, p. 22). Contemporary information technologists tend to dismiss this byway of mind-automation as irrelevant to the digital turn because the mechanical agency on view was fake. However, the more salient take-home message is this: It took more than eighty years for the demystification of the Chess Player to land.

Defining tropes of contemporary proxy-cognition are rooted in the lifeworld of the late 18th century. Showmanship was central to the fascination unleashed by von Kempelen's chess playing gimmick. His dramatic staging involved opening the doors of the box to show that it was empty inside. Long before the arrival of desktop computing, internet, and online commerce, this 18th century automaton prefigured the competitive match of Garry Kasparov against IBM's Deep Blue. First presented to Empress Maria Theresa in 1770, its technical design became known only in 1857 when the puppet perished in a fire and its owner's son published a wry obituary:

> One of the most famous personages of the last hundred years has passed away, and it would, indeed, be neglectful to omit some notice of one whose long life has been a series of such strange vicissitudes and changing fortunes. A constitution of iron enabled him to endure with patience long voyages, changing climates, and many sad reverses. His paradoxical existence has at last come to a close, and we are now called upon to allude to the incidents of a career more than usually eventful. (Mitchell, 1857, p. 3)

[1] The chess-player discovered. *Gazette* [Baltimore] (1827, June 1), cited in (Evans, 1939).

This final unmasking of the "Veteran Chess Player" undersells the weighty metaphysical implications of this parlor trick.

Johann Erich Biester, a close friend and correspondent of Kant, explained what all the excitement was about. His essay "Chess-playing and Voice-generation Maschines" appeared alongside Kant's epochal essay from 1784, "Answering the Question: What is Enlightenment," in the same issue of the *Berlinische Monatsschrift*. Clearly in conversation with each other, the two texts, composed to be of a piece, were placed side by side. Kant's prose picks up on the contrivances detailed in Biester's text (Schaffer, 1999). He famously summons a vision of the human as *"more than a machine"* – italics in the original – and relates this elevated condition of being to the expression of human dignity. Two collaborating authors, one argumentative aim; one text supplies the evidentiary basis for the ethico-speculative arabesks by the other. Taken together, they mount an argument for why the human-machine relationship as exemplified in von Kempelen's chess playing and voice-generating machines is key to the prospects of progressive enlightenment as a collective historical achievement.

The mind is an emergent phenomenon. It forms in conversing: language carried by vocalization. Linguistic exchange, inseparable from sociality, intimates a vast realm of reciprocal rights and obligations. This may explain why intelligent artefacts veritably seem to invite a vocal modality. Today's automated assistants speak constantly through phones, in cars, at checkpoints. A related urge absorbed von Kempelen. He wanted his Chess Player to converse. But, despite its creator's best efforts, it remained mute to the end of its days. The puppet master resented the success of his storied creation,[2] which overshadowed what he felt to be his more significant invention – a synthetic voice-generating device capable of pronouncing "some thirty words and a few phrases" (Mitchell, 1857, p. 5; Figure 1). All the same, these anthropotechnic provocations have proven massively influential in the long run. Even if synthetic voice and instrumental mind did not develop in perfect synchrony, their speculative emergence may have prodded Kant to formulate the revolutionary new system of thought put forward in the *Critique of Pure Reason* (1781). Indeed, it seems more credible that the "Chess-playing and Voice-generation Machines" afforded the conditions of possibility for Kant's "revolution of thought" than that said paradigm shift appeared out of nowhere. Assuming that Kant learned of the Mechanical Turk through reports of the 1770-performance for the Empress, which is likely given the culture of letters of the day, then he had a good decade to work out a satisfying answer to the question of how human and machine intelligence differ. This pressing question, sparked by von Kempelen's instructive demonstration, calls for renewed consideration now that the mass-harm capabilities of thinking machines have acquired unparalleled urgency. By this alternative account of the origins of Kantian thought, transcendental idealism might be an excellent guide to understanding the systemic effects of a wholesale merger of mechanical and embodied modalities of decision-making. Given that Kant likely grasped the categorical imperative while wrestling with the implications of non-human agency among other things, his

[2] The entangled allure of automatic writing and speaking in technological contexts has been explored to resonant effect in Link (2007).

methodical arguments about rights, duties, and regulative principles can surely speak to many current debates over social platforms, intelligent simulation, machine learning, and so on.

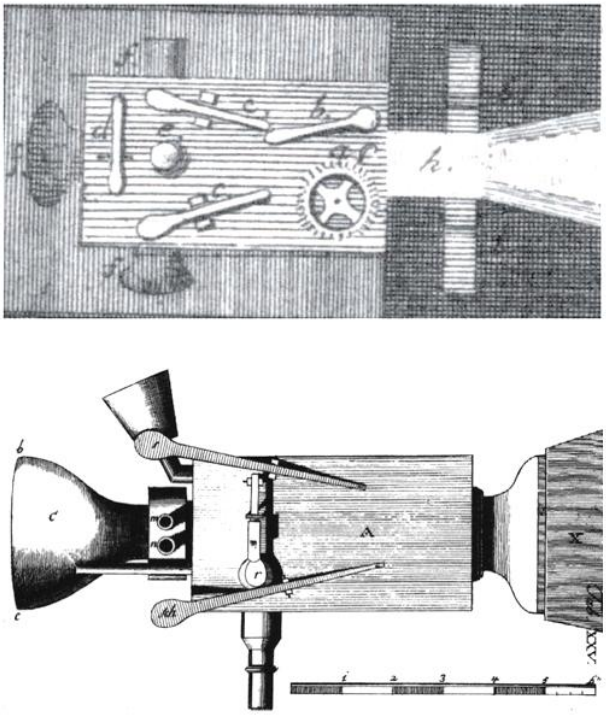

Figure 1. Two illustrations of Kempelen's "chatterbox:" the first appeared in 1784, the second in 1791 (Brackhane, 2015)

Amazon's Mechanical Turk service was launched in 2005; it is being discontinued at the time of this writing, in 2026. Bezos named this crowdsourcing marketplace for microtasks, known as Human Intelligence Tasks, after the 18th century original. What both instantiations have in common is enlisting human capacities to improve the functionality of machines (Figure 2). By contrast, the opening paragraph of Walter Benjamin's *On the Concept of History* (written in 1940) disparages the machinic dimension of human thought. He specifically equates the "hunchbacked dwarf" hidden in the chess playing puppet to those core articles of ideological faith that, to speak with Borges, are "incapable of engendering an appreciable revelation" (Benjamin, 1940/2005).

Figure 2. Modern rendering of the Mechanical Turk (Roth, 2012)

INFORMATION TECHNOLOGIES

The *Bettmann Portable Archive* (1966) opens with the image of a monk sitting at a book wheel (Figure 4). Elsewhere this trade catalogue muses on computers and electronic picture delivery. Otto Bettmann had conceived a novel picture service in 1934 and founded his commercial picture library in 1936. By the mid-60s, Bettmann's archive in New York, a private business venture, was perceived to be a cultural institution with the authoritative heft of the Smithsonian. It was frequented by leading lights of the pop art movement such as Andy Warhol and Peter Max. When Bettmann abstracted the workings of his situated, real-world archive with a postal box and zip code into a handheld miniature and visual equivalent, he cast himself as a multiple of Arcimboldo's librarian (circa 1566), a book professional composed of books (Figure 3). This gesture unequivocally identified the combinatorial tradition in which Bettmann located himself.

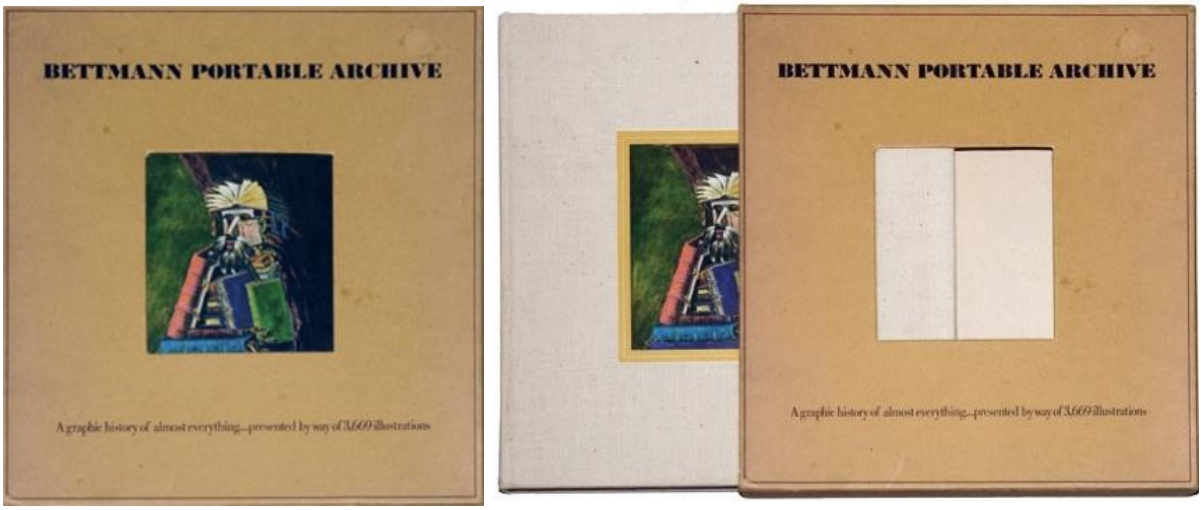

Figure 3. Bettmann's trade catalogue, book cover & slipcase (Bettmann, 1966)

He was a Leipzig-trained librarian employed at the Prussian State Art Library in Berlin where he worked in the late 1920s and early 1930s. Having briefly studied with Edmund Husserl, Bettmann moved in the intellectual circles around Aby Warburg and Ernst Cassirer. Early in his professional career, he curated an exhibition with Eduard Fuchs, bestselling author known for his illustrated visual chronicles on prostitution, sexual mores, poverty, and antisemitism. Walter Benjamin would publish a portrait of publicist Fuchs who pioneered a new literary genre, namely *Sittengeschichte*, using antiquarian graphics to thematize taboo subjects and sentiments: "Eduard Fuchs: Collector and Historian" (1937) was the sequel to Benjamin's "The Work of Art in the Age of Mechanical Reproduction" (1935). These texts, written during his exile in Paris, diagnose new modes of semiosis brought about by the sudden influx of mass media and communications technologies. Modes of urban literacy had been expanded – and so had opportunities for spreading disinformation. Modernism and its reactionary backlash were coeval.

Easy access to the rare books room allowed Bettmann to acquire photonegatives of the iconographic heritage in his stewardship. He used the Leica camera as his copying device. In association with his father's medical practice, one of few German physicians to operate his own x-ray machine, Bettmann came to have an incisive gaze. Visualization was a revelatory tool for the patients in his father's care, a means of bringing concealed morphologies to view. The librarian transferred this sensibility to his conception of the body politic, which he treated as an organism composed of words and pictures. His ambition was to work out a system of classification that would allow him to launch a commercial picture-lending library in Berlin. In 1933, the Nazis came to power. He fled with a camera and two trunks of negatives.

Traditional library science held that art-historical images should be classified by markers of provenance: who was the artist, when did the piece in question appear, where

was it published, what materials were used? Such details were still relevant, but the more vital question concerned the “use value” of an image. What concepts could it convey and how might it be deployed in vying for the favor of consumers? I have described the archive’s functionalist taxonomy elsewhere. Suffice it to say that Bettmann outfitted his image collection with streamlined metadata optimized for targeted search and retrieval (von Xylander, 2007; 2017; Figure 4).

Bettmann’s commercial picture library was a runaway success. His modernist venture defined usage rights for a market sector that has come to dominate today’s publishing industry in print and online communications. Small wonder that Steve Jobs and Bill Gates both laid claim to Bettmann-style visual content management in the early days of trying to envisage personal computing and graphical signposting (von Xylander, 2026). The maverick librarian promoted a distinctive elision of words and images whereby he also commodified an associative hypertext of meta-visuality. Amidst this functionalist configuration of referential pointers, Bettmann arguably formulated the virtual search practices driving anonymous navigation in the world wide web across continents and language barriers, today.

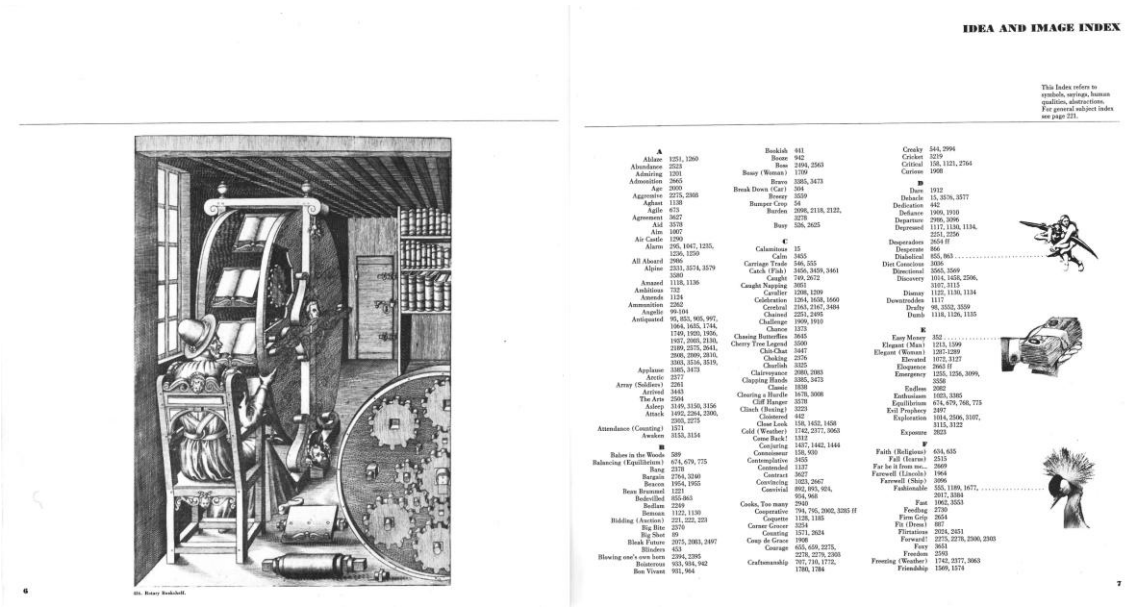

Figure 4. Opening illustration of a monk sitting at a book wheel, exposing its elaborate mechanism, and facing the Idea and Image Index (Bettmann, 1966, p. 6-7)

TWO LIBRARIANS

Authoritarian systems eventually yield their own refutations. It was 1937 and another librarian in distant Buenos Aires found himself grappling, aesthetically and ethically, with world historical developments to which he was stridently opposed. Jorge Luis Borges reflected on reactionary politics in several short essays. These pieces

manifest a striking intellectual proximity to and congruence with the visual output of the Berlin librarian in New York. Borges' reading of Llull's fallacious project both jettisoned and redeemed putative intelligent automation: "As an instrument of philosophical investigation, the thinking machine is absurd. It would not be absurd, however, as a literary and poetic device."

Uni sono Bettmann. He touted the *Bettmann Portable Archive*, his trade catalogue, to be an "idea stimulator and image finder" – that is to say, a Borges-inflected Llullian thinking machine. Its remedial quality resided in the "offer of beginnings, starting points, for the artist and writer who might otherwise stumble blindly or stare in frustration at that blank sheet of paper." When customers perused his image bank, Bettmann heard "the meshing of the cerebral gears starting the free association process." To elucidate "How to Use This Book," the "typical page spread" of the *Portable Archive* that he chose to single out was an entry on "Sleep/Sound/Radio." A lucid point of departure, this page abridges highs and lows drawn from experience. Propaganda transmitted via the airwaves had contributed to Bettmann's German compatriots' sleepwalking towards an authoritarian apocalypse while the sound of one penetrating voice whipped up Fascist populism. Prominently displayed on the same page is an image of sound architecture by the Renaissance polymath Athanasius Kircher. Bettmann persuaded CBS (Columbia Broadcasting System) to use this antiquarian graphic for a nationwide marketing campaign in 1938, which put his archive on the map of US-business dealings (Columbia Broadcasting System, 1938). This ambivalent collage of acoustic transmission and surveillance, which could make or break fates and fortunes, captured the tool dialectics of communications technology across centuries (Figure 5).

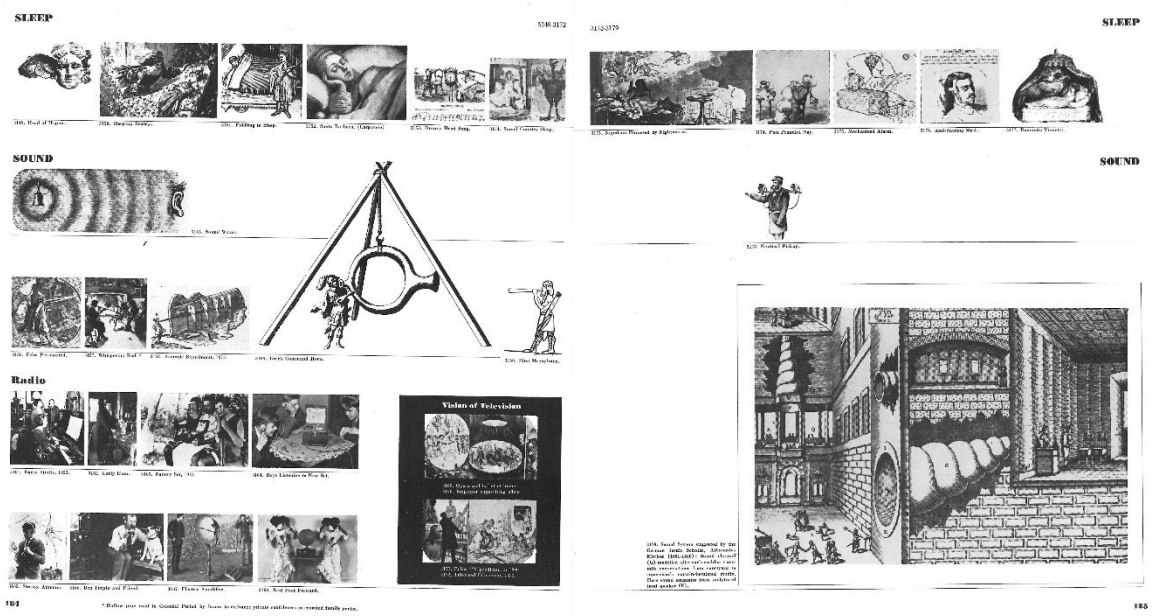

Figure 5. S as in "Sleep/Sound" – exemplary sample page from the front matter shown in full size (Bettmann, 1966, p. 184-185)

Every spread contains multiple layers of decipherable, semiotic code. Many pages in the *Portable Archive* chronicle in intimate detail, though covertly, Bettmann's experience as a German Jew, in US-exile, illustrating in commercial pictures his own unstable place within the volatile dynamics of the geopolitical order. These same collages also cite a plethora of combinatorial traditions. Beyond Arcimboldo and Kircher, Bettmann's visual thinking machine draws on Quintilian oratory, Leibnizian library science and scholasticism, Kantian moral aesthetics, Wittgenstein's theory of language, varied cosmologies from around the world, the I Ching, and more. The page layouts consolidate a long history of knowledge-making into dense hermeneutic hallucinations by way of ordinal taxonomies, conjuring a multitude of picture-puzzles that toy with the brain. These assemblages have a suggestive force that is at once revelatory and, somewhat paradoxically, finds itself confined within the strictures of an alphabetical sequence. The argument for the manifold connections in Bettmann's mulitdimensional metaverse is in the plates themselves, which take the place of a detailed narrative (Figures 6–8).

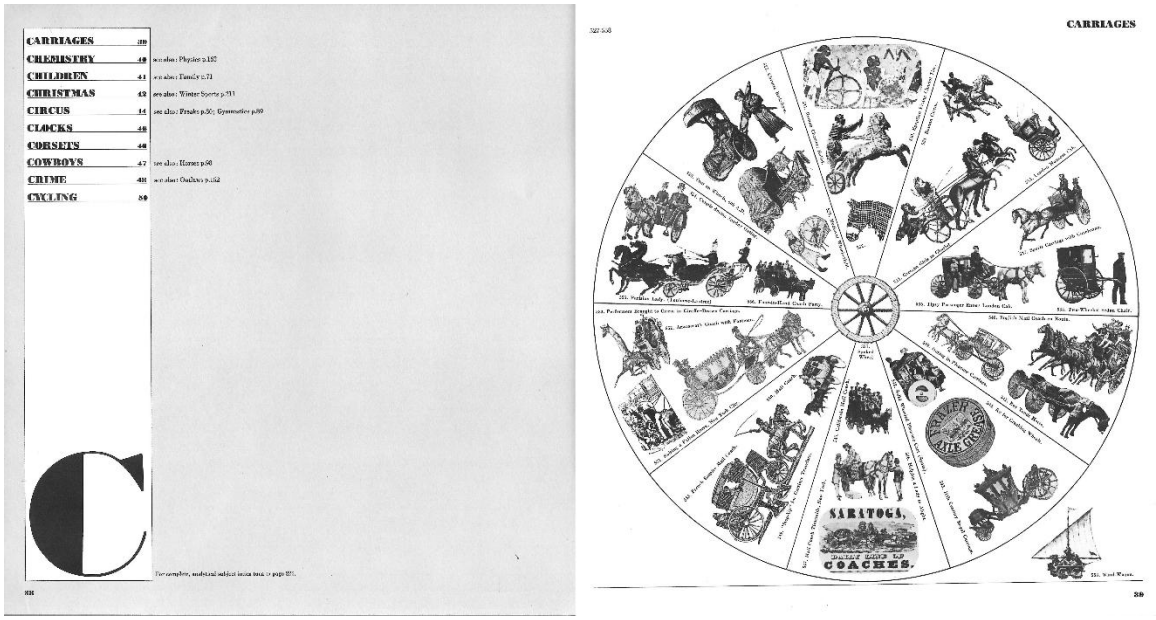

Figure 6. C as in "Carriages" (a carriage wheel of carriage types) (Bettmann, 1966, p. 37-38)

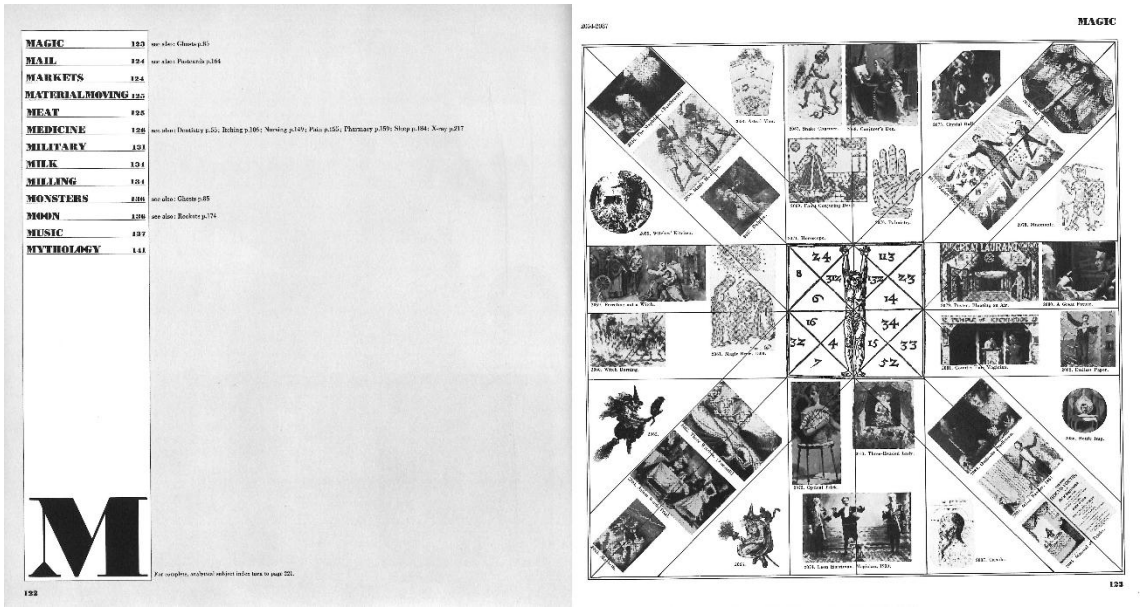

Figure 7. M as in "Magic" (a schematic chart of esoteric mnemonics) (Bettmann, 1966, p. 122-123)

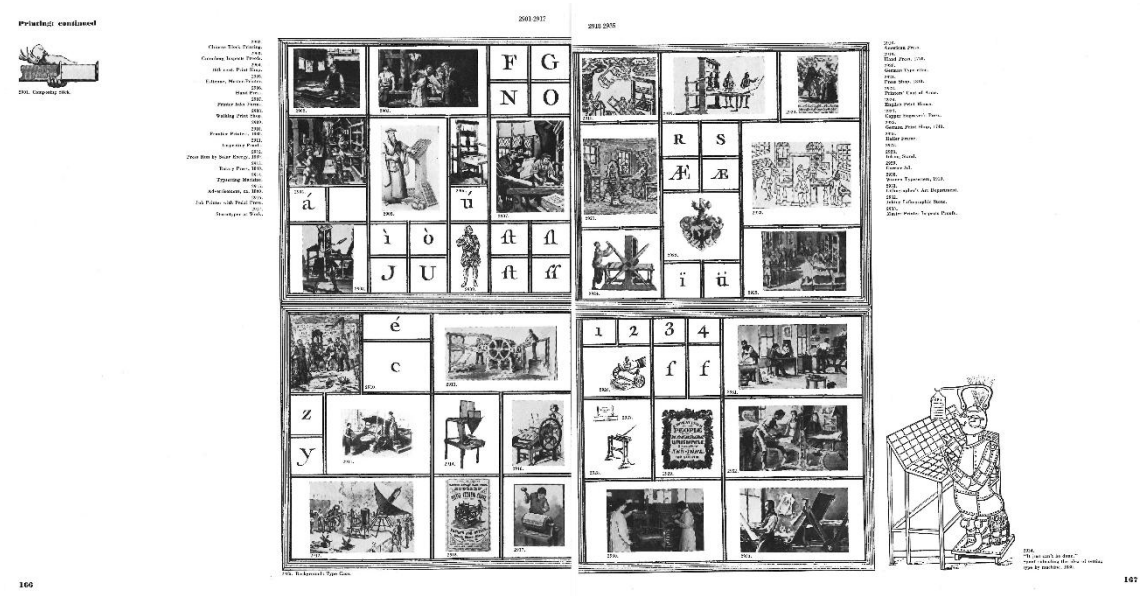

Figure 8. P as in "Printing" (a type case of printing techniques) (Bettmann, 1966, p. 166-167)

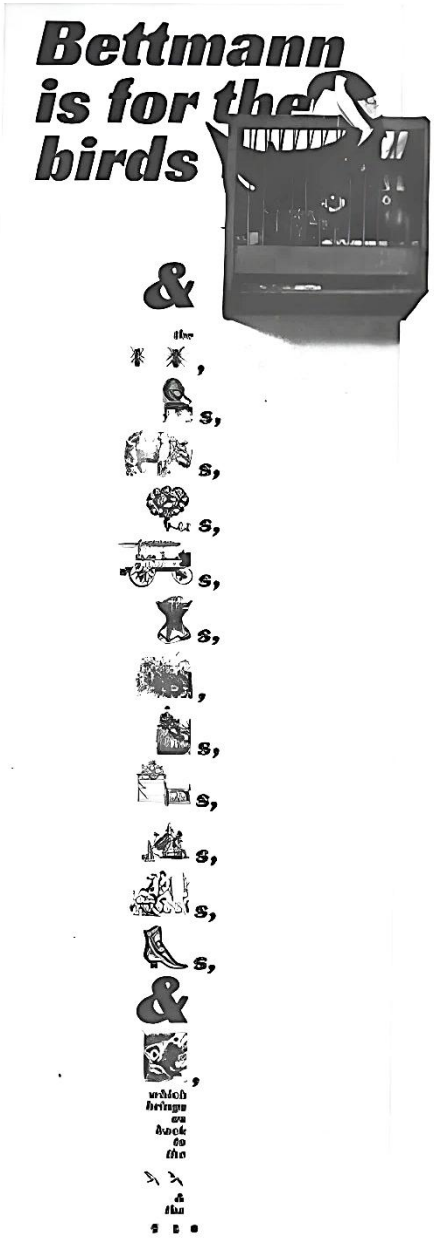

Figure 9. Poster from the *Bettmann Panopticon* catalogue (Daly & Max Studio, 1964)

ETCETERA

Bettmann's pictorial grammatology was fundamentally at odds with itself: the lexical system of classification, arranged alphabetically, defied the generative syntax of the assembled images. The archive espoused a picture philosophy in pictures that mirrors the defining split of the digital surround – a thinking machine loaded with hieroglyphics. Within the interstices of this surreal phantasmagoria lurked a disarmingly simple point, namely that it is invariably the interpretating subject of a thinking machine that does the thinking. Borges extracted a kindred lesson from Llull's combinatory machine whose "impeccable orthodoxy" produced "torrential ambiguity." Take, for example, the "capricious tiger" that Borges portayed as being "blue, yellow, black, white, green, purple, orange, and grey, or yellowishly blue, blackly blue, whitely blue, greenly blue, purplishly blue, bluely blue, etc." He wanted his "readers to grasp the full magnitude of this etcetera." Look no further than the Bettmann Archive. An obliging artist has made the case (Figure 9).

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