

AUTOMATED
SLAVES,
AMBIVALENT
IMAGES, AND
NONEFFECTIVE
MACHINES IN
AL-JAZARI'S
COMPENDIUM OF
THE MECHANICAL
ARTS, 1206

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ABSTRACT

Automated slaves abound in Ibn al-Razzaz al-Jazari's famous Arabic compendium of the mechanical arts (ca. 1200), suggesting a conflation of slave and machine, while reflecting the range and significance of courtly slavery in the Artuqid realm. A 1206 illustrated copy, however, complicates both the idea of forced labor's mechanical reproducibility *and* the fantasy of the machine as perfect servitude, especially in a context that witnessed slaves' relative access to social mobility. At once figurative and diagrammatic, the pictures steered away from the mechanical by adding historical, social specificity; indeed, they echoed a range of courtly images that situated, rather than stereotyped, slave labor. Similarly, owing to technological limitations, the machines would have likely highlighted, rather than minimized, courtly slaves' technical and social participation.

KEYWORDS

Automata; *Hiyal*; Mechanical arts; Medieval slavery; Ibn al-Razzaz al-Jazari; Visual ambivalence; Inefficiency; Anatolia; Artuqids.

A thirteenth-century folio from a famous Arabic technical treatise describes an automaton, or self-acting machine, shaped as a servant [Fig. 1]. The device was designed for the washing of the patron's hands. From the reservoir inside the statue – via a system of pipes, valve, and pulleys – water flows into and out of a pitcher. When the water subsides, the left arm stretches out, extending towel and mirror. The accompanying text explicitly refers to the serving-man as a slave, *ghulām* in Arabic. Though *ghulām* did not necessarily denote slave status, in this case it referred to a category of courtly, specialized slaves who did undergo legal objectification.¹ Thus the device may suggest a part-whole relationship, if not a metonymic slippage, between slave and machine. This has a demeaning effect, misrepresenting the unfree servant as the fungible equivalent of mechanized motion. There would be a lot to say about intention and reception as well, how the automaton may have conveyed a fantasy of replacement (this is suggested in the treatise, as shall be seen) and how it may have served to secure and reproduce domination, as an animated allegory of perpetual servitude.

Yet what follows pursues a different interpretive possibility. Moving away from the patron's desire – and in defiance of the more general, dual ideology that sees slaves as moving instruments and machines as servile tools – I propose that this and other automata complicated, rather than enforced, any pursuit of substitution or control. For one thing, courtly slavery was not essentializing, as it did allow for some access to social mobility. This requires that we forgo simply assuming a reifying vision of slavery (I still use “slave” and “slavery” here in order to acknowledge the violence of enslavement and the fact that courtly workers were legally owned as slaves).² Moreover, instead of obscuring or replacing human labor, both machine and image may have actually re-centered slaves' social and technical participation. The device, in fact, was dependent on slave work, for a *ghulām* had to attend to the machine's operation, as instructed in the text. Similarly, by depicting the servant as an actual person rather than a metal statue, the painting steers away from an abstracted, de-situated understanding of automation. Through the machine's failed autonomy and the image's emphasis on lifelikeness,

1

I will return to the polysemy of *ghulām* and the complexities of medieval slavery later but for a recent overview and more references on slavery's legal, cultural, and religious bases in the medieval Mediterranean, see Hannah Barker, *That Most Precious Merchandise. The Mediterranean Trade in Black Sea Slaves, 1260–1500*, Philadelphia 2019, especially chapter 1.

2

On nuanced approaches to medieval slavery that challenge the binaries of ruler and oppressed, subjection and resistance, see Craig Perry, *Slavery and Agency in the Middle Ages*, in: id., David Eltis, Stanley Engerman, and David Richardson (eds.), *The Cambridge World History of Slavery, AD 500–AD 1420*, Cambridge 2021, 244–245.



[Fig. 1]

Mechanical Slave, folio from a copy of *al-Jāmi' bayn al-'ilm wa al-'amal al-nāfi' fi šinā'at al-ḥiyal* of Ibn al-Razzaz al-Jazari, probably Amid, modern-day Diyarbakır, Turkey, 1206, ink and opaque watercolor on paper, 33 cm × 24 cm, Istanbul, Topkapı Palace Library (Ms. Ahmet III 3472, fol. 121v) © Topkapı Palace Library, Istanbul.

service work appears as an embodied, socially mediated form of skill, as much as, or more than, a mechanizable, motor activity.³

The folio belongs to the earliest known copy of a celebrated engineering book, *al-Jāmi' bayn al-'ilm wa al-'amal al-nāfi' fi šinā'at al-ḥiyal* ("A Compendium on the Theory and Useful Practice for the Fabrication of Machines") by Abu al-'Izz Ibn Isma'il Ibn al-Razzaz al-Jazari (1136–1206), henceforth *al-Jāmi' fi šinā'at al-ḥiyal*.⁴ The compendium was commissioned around 1200 by Artuqid prince Nasr al-Din Mahmud (r. 1201–1222) in the city of Amid, modern-day Diyarbakır in Anatolia, so it firmly sits within a royal context, while drawing on the long tradition of the mechanical arts. The majority of specimens are contrivances, *ḥiyal* in Arabic (sing. *ḥīla*), including automata or *ḥiyal mutaḥarrika* (literally, moving or self-moving machines), intended for courtly entertainment. Half of the automata, moreover, represent human figures. Mechanical slaves are particularly numerous, a little-noted fact, despite – or perhaps because of – the treatise's popularity. Among scholars and the general public alike, a halo has indeed been grafted onto *ḥiyal*, through the frequent invocation of art, wonder, and innovation, often at the expense of political and social considerations.⁵

Another defining yet understudied feature, devised by al-Jazari himself, is the treatise's imagery, fusing diagrams of the mechanisms with painterly aspects. This essay's opening image, for example, was meant to show both "the likeness (*šūra*) of the slave and everything inside him and inside the pitcher", in the author's words, placed on the same folio.⁶ This blended look is especially visible in the earliest surviving copy, dated 1206 and which was likely made under the engineer's supervision.⁷ The 1206 manuscript constitutes

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That the figure was later defaced, an iconoclastic act meant to counter representational power, confirms that the picture could be received less as a technical diagram and more as a figurative painting.

4

Ibn al-Razzaz al-Jazari, *al-Jāmi' bayn al-'ilm wa al-'amal al-nāfi' fi šinā'at al-ḥiyal*, ed. by Ahmad Yusuf al-Hasan, Aleppo 1979. For an English translation, see Ibn al-Razzaz al-Jazari, *The Book of Knowledge of Ingenious Mechanical Devices*, trans. by Donald Hill, Dordrecht 1974.

5

For a general introduction to *ḥiyal*, see Anna Caiozzo, *Entre prouesse technique, cosmologie et magie. L'automate dans l'imaginaire de l'Orient médiéval*, in: Véronique Adam and Anna Caiozzo (eds.), *La fabrique du corps humain. La machine modèle du vivant*, Grenoble 2010, 43–79; Donald Hill, *Ḥiyal*, in: *Encyclopaedia of Islam. New Edition*, Leiden 1954–2007; and Siegfried Zielinski and Peter Weibel (eds.), *Allah's Automata. Artifacts of the Arab-Islamic Renaissance (800–1200)*, Ostfildern 2015. On *ḥiyal*'s wonder-inducing effects, see T. M. P. Duggan, *Diplomatic Shock and Awe. Moving, Sometimes Speaking, Islamic Sculptures*, in: *Al-Masāq* 21, 2009, 229–267.

6

The Arabic text, visible on the folio, reads: *šurat al-ghulām wa jamī' mā fi bāṭinihi wa bāṭin al-ibrīq* (for an English translation, see al-Jazari, *The Book of Knowledge*, 134).

7

Istanbul, Topkapı Palace Library, Ms. Ahmet III 3472: *al-Jāmi' bayn al-'ilm wa al-'amal al-nāfi' fi šinā'at al-ḥiyal* of Abu al-'Izz ibn Isma'il Ibn al-Razzaz al-Jazari, 179 folios, 33 cm × 24 cm, dated Sha'bān 602 AH/April 1206 CE, copied in *nashk* script by Muhammad ibn Yusuf ibn 'Uthman al-Haskafi. For a discussion of colophon, patron's identity, pictorial style, and early publications, see Rachel Ward, *Evidence for a School of Painting at the*

my centerpiece for exploring the following questions: why were objects of such sophistication shaped in the form of courtly slaves? And what were the effects of visual and technological mediation on the representation of slavery? I am particularly interested in the images' composite structure, how their figurative component introduces historical and social specificity, tempering both the axiomatic, atemporal principles of the machine *and* the quest for substitution and efficiency that underlies any project of automation.

Al-Jazari's decision to fashion a sizable number of machines in the guise of courtly slaves overlaps with a transhistorical, courtly trope: that of the automated servant. The motif was quite widespread in ancient and medieval sources, wherein many automata functioned as "fantasies of perfect surveillance and perfectly obedient servants", as E. R. Truitt has noted.⁸ What follows at once confirms and unsettles such a reading, by pairing an additive, diachronic model with contextual, visual, and critical analysis. The princely search for the perfect servant is not the only way of understanding al-Jazari's devices; the top-down approach, in fact, begins to crumble when one considers the figure of the mechanical slave from the vantage point of the history of slavery rather than the master's intentions or the eternal recurrence of the same pattern. Pre-modern slavery was stratified and mutable: though many led precarious lives, some slaves could climb the social ladder, especially in such royal milieus as al-Jazari's. The hypothesis that mechanical slaves worked to repeat subjection, as images of infinite acquiescence, thus might not hold from a micro-historical perspective, for it assumes a stable binarism between master and slave that was not relevant to al-Jazari's context.

The notion of the obedient instrument is further challenged by the compendium's images, as well as the machines' likely failure. The illustrations, I argue, work against the idea of the efficient, human-less machine through their mediatic indeterminacy, how they oscillate between technical drawing and figurative image. Their blended composition helps visualize hydraulic mechanisms but it also highlights a specific social context, by showcasing singular, humanized figures rather than metal robots. With al-Jazari's treatise, the figure of the mechanical slave was pushed into the realm of painting, echoing and amplifying contemporary images of slaves that appeared to situate rather than stereotype bonded labor. Finally, the machines themselves, owing to their technological limitations, could only fail to achieve the patron's political vision: instead of replacing unfree labor, they may have, in fact, made it more visible. As such they might have ultimately challenged – rather than passively conveyed – both the idea of slave labor as

Artuqid Court, in: Julian Raby (ed.), *The Art of Syria and the Jazira, 1100–1250*, Oxford 1985, 69–83.

8

E. R. Truitt, Surveillance, Companionship, and Entertainment. The Ancient History of Intelligent Machines, in: Aifric Campbell (ed.), *The Love Makers*, London 2021, (23.08.2022). Also see E. R. Truitt, *Medieval Robots. Mechanism, Magic, Nature, and Art*, Philadelphia 2015.

mechanically reproducible *and* the notion of the machine as perfect servitude.

I. Mechanical Slaves

One foundational observation prompted the present research, deflating automata's aura and raising questions about the relation between slavery, automation, and spectacle: most of al-Jazari's anthropomorphic devices represented courtly slaves and subordinates, as opposed to figures of higher status, with a strong emphasis on automated slaves.⁹ Since this phenomenon has not yet been examined, I must begin by assessing it, before placing al-Jazari's automata within a wider nexus of comparanda culled from literary, philosophical, and technical sources.

Al-Jāmi' fī šinā'at al-ḥiyal provides instructions for the fabrication of fifty *ḥiyal*, forty-six of which are automata or *ḥiyal mutaḥarrika* (the remaining four specimens include a bronze door, combination locks, bolts, and a measuring instrument). Several categories of *ḥiyal* are described, most of them linked to courtly use and display: clocks (both water-clocks and candle-clocks); vessels for drinking sessions; pitchers and basins; and fountains and perpetual flutes. Half of the devices – twenty-five, then – contain human figures; they constitute the first three categories, with the exception of a flautist in the fourth section. Some are group sculptures, involving at least two characters; others are android-like, their mechanical parts entirely contained within the body of the human figure.

Most mechanisms used by al-Jazari – air vessels, siphons, floats, tipping-spoons, gears, and cone valves – appear in previous treatises, as Donald Hill observed.¹⁰ Al-Jazari himself acknowledged his intellectual debts, referring to the ninth-century brothers Banu Musa Ibn Shakir and their *Kitāb al-ḥiyal* (“Book of Ingenious Devices”), whose designs informed al-Jazari's chapters on trick vessels and basins as well as his fountains; Archimedes, identified as the pseudo-Archimedes by historians of technology, likely a medieval combination of short works in Greek, Persian, and Arabic, and which was used by al-Jazari for his water-clocks; and underlying the perpetual flutes, Apollonius al-Najjar al-Handasi and his *Šan'at al-zāmir*, perhaps a Byzantine work.¹¹ None of the machines described in these treatises, however, depict slaves, and only a handful include human figures, the most noteworthy being Apollonius's flute player. Other figurative motifs are small-scale, decorative elements, rather than life-sized, anthropomorphic devices.

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I use the word “subordinates” for personages of lower rank who may have been free.

¹⁰

Al-Jazari, *The Book of Knowledge*, 271.

¹¹

Ibid., 17, 170.

It is thus remarkable that al-Jazari's manual should include such a large number of moving statues. Most of them, moreover, represent lower-ranking members of the court, including slaves. One exception is the ruler, shown only once as a static, unmechanized effigy (I return to the dichotomy of moving subordinate and unmoving sovereign later).¹² In addition, five figures are identified with such nondescript appellations as *shakhṣ* ("person") or *rajul* ("man").¹³ Yet outside of these examples, the emphasis is on workers of lower status. Some social types appear only once or twice: they include a monkey keeper, an elephant-rider, a dancer, and two sailors.¹⁴ Others are more frequent, like unfree servants, turning up in seven specimens.¹⁵ Musicians and scribes can be found in four and seven automata, respectively.¹⁶ Scribes too qualify as subordinates, possibly enslaved or freed, while musicians are unequivocally labeled as slaves; as a matter of fact, writing, playing music, and singing were activities often outsourced to slaves, freedmen, and freedwomen, as historians have shown.¹⁷ This may have been because of these activities' contested licitness, as well as the level of precision and exactitude that they required – turning bodies, quite literally, into instruments.¹⁸

In nine of the figurative *ḥiyal*, the personages are identified with words that denote unfreedom – generally, *ghulām* for a male slave and *jāriya* for a female slave; they encompass servants, musicians, and a swordsman.¹⁹ Mechanical slaves stand out as a circumscri-

12

Device II, 4 (since the division of al-Jazari's treatise into categories and chapters is the same across manuscripts and printed editions, I will refer to the devices using that classification, with a Roman numeral for the category and an Arabic number for the chapter).

13

Devices I, 1; I, 2; I, 10; II, 3; III, 8.

14

Devices I, 9; I, 4; II, 3; II, 4 (both sailors appear in the boat automaton, though only one is illustrated in the 1206 copy).

15

Devices II, 3; II, 7; II, 8; II, 10; III, 3; III, 9; and III, 10.

16

For musicians, see devices I, 1; I, 2; II, 3; and II, 4. For scribes, see devices I, 3; I, 4; I, 5; I, 8; III, 6; III, 7; and III, 8.

17

Elizabeth Urban, *Conquered Populations in Early Islam*, Edinburgh 2020, esp. chapter 6; Matthew Gordon and Kathryn Hain, *Concubines and Courtesans. Women and Slavery in Islamic History*, Oxford 2017; Yusuf Ragib, *Esclaves et affranchis trahis par leur nom dans les arts de l'Islam médiéval*, in: Christian Müller and Muriel Roiland-Rouabah (eds.), *Les non-dits du nom. Onomastique et documents en terres d'Islam*, Beirut 2013, 247–301.

18

On the artist as bodily instrument, see Lamia Balafrej, *The Making of the Artist in Late Timurid Painting*, Edinburgh 2019, 150–151, 154, 156.

19

Devices I, 7; II, 3; II, 4; II, 7; II, 8; II, 9; III, 3; III, 9; and III, 10. Although it could also designate a free servant or a young girl, *jāriya* was one of the most common (and juvenilizing) terms for a female slave; see Shaun Marmon, *Intersections of Gender, Sex, and Slavery. Female Sexual Slavery*, in: Perry, Eltis, Engerman, and Richardson, *The Cambridge World History of Slavery*, especially 202–205. In al-Jazari's compendium, slave status is confirmed by *jawārī*'s functions, whether service or music performance, as those were

bed group also because, unlike most of the remaining humanlike statues, they tend to function as self-contained, articulated entities, the mechanisms inside them moving bodily parts. Thus, in addition to being more numerous, they constitute a coherent category, distinguished by a greater capacity for the replication of corporeal movement. Another reason for this essay's focus on unfreedom is that it allows for a critique of the pervasive, ideological slippage between slave and machine, while foregrounding the complex intertwinement of courtly slavery and power in the medieval Islamic Middle East.

The first device with an explicit slave is a candle-clock.²⁰ The image, again, shows both the outside and the inside of the device [Fig. 2]. One sees a large candle, drawn in a diagrammatical way, with three threads at the top representing its wick, and, inside its sheath, such mechanisms as a pulley with a string. A human figure with a sword appears to the right, seated on a bracket projecting from the sheath; he is characterized in the text as a "Black slave" (*ghulām aswad*).²¹ The slave looks quite realistic, clothed in a red garment resembling *tirāz* textile, with golden bands on the sleeves. Every hour, he is supposed to strike the candle's wick with his sword. His gesture's regularity and precision highlight the constant, steady passage of the hours.

The next device with automated slaves is a tower-like, palatial structure with a multitude of personages [Fig. 3].²² From bottom to top, one sees a female servant, pouring wine into a cup; four female musicians on a balcony; above them, a dancer in a niche; and at the very top, a horse rider carrying a lance. All five female figures stand for slaves (*jawārī*, singular *jāriya*).²³ I should add that the dancer, while not explicitly designated as a slave in the text, is probably a subordinate; this is signified by his function as a dancer and possibly also by a dark complexion and partial nudity. The machine functions as a drinking arbiter: when the rotating horseman at the top comes to a halt, the person in the audience to whom his lance

historically reserved for female slaves (for female slavery in medieval Islamic courts, see Gordon and Hain, *Concubines and Courtesans*). The images further support the identification of *jawārī* as unfree workers, since they closely echo depictions of female slaves, as shall be seen. In support of the argument that "*ghulām*" meant "male slave" in a domestic context and for more references, see Lamia Balafrej, *Domestic Slavery, Skin Colour, and Image Dialectic in Thirteenth-Century Arabic Manuscripts*, in: *Art History* 44, 2021, 1020–1021. Both *ghulām* and *jāriya* were translated as indicative of slave status by Donald Hill in his landmark translation (al-Jazari, *The Book of Knowledge*).

20

Device I, 7.

21

Istanbul Ms. Ahmet III 3472, fol. 73, a few folios before [Fig. 2]. Donald Hill too translated *ghulām aswad* as "Black slave" (al-Jazari, *The Book of Knowledge*, 83). The word *ghulām* appears twice on the folio of [Fig. 2].

22

Device II, 3.

23

The female servant is designated as "*jāriya*" and the four musicians as "*jawār arba*" (Istanbul Ms. Ahmet III 3472, fol. 87v).



[Fig. 2]

Candle-clock of the Swordsman, folio from a copy of *al-Jāmi' bayn al-'ilm wa al-'amal al-nāfi' fi šinā'at al-ḥiyal* of Ibn al-Razzaz al-Jazari, probably Amid, modern-day Diyarbakır, Turkey, 1206, ink and opaque watercolor on paper, 33 cm × 24 cm, Istanbul, Topkapı Palace Library (Ms. Ahmet III 3472, fol. 76) © Topkapı Palace Library, Istanbul.



[Fig. 3]

Arbiter for Drinking Parties, folio from a copy of *al-Jāmi' bayn al-'ilm wa al-'amal al-nāfi' fi šinā'at al-ḥiyal* of Ibn al-Razzaz al-Jazari, probably Amid, modern-day Diyarbakır, Turkey, 1206, ink and opaque watercolor on paper, 33 cm × 24 cm, Istanbul, Topkapı Palace Library (Ms. Ahmet III 3472, fol. 88v) © Topkapı Palace Library, Istanbul.

is pointing must drink the cup of wine that the female servant will have poured.

More female slave musicians appear in the boat automaton [Fig. 4].²⁴ The king sits under a domed structure, accompanied by four boon-companions. To the left, a group of musicians occupy a raised platform, while a sailor stands on the prow, directing the boat. The performers – a flute player, a tambourine player, a harpist, and another tambourine player – are referred to as female slaves (*jawāri*).²⁵ While the boat seems a direct reflection of the milieu for which it was made, not every figure is imparted with motion. As both text and image indicate, only the sailor and the musicians are automated, their motion activated by the waterwheel hidden inside the boat. The king and his boon-companions, meanwhile, are still, and hieratic. Motion seems to characterize subordinate, rather than privileged, figures.

All other mechanical slaves in the treatise exemplify domestic service. Most of them move arms and hands, while often serving as vessels, channeling water or wine. In addition to the water-dispensing automaton described in the introduction [Fig. 1], one encounters the figure of a standing slave (*ghulām*), ten years old in appearance according to the text, pouring wine from a fish into a goblet [Fig. 5]; a self-drinking slave (*ghulām*) with cup and bottle; a female slave (*jāriya*) like a girl twenty years old in al-Jazari's words, who rolls out of a cupboard with a wine-filled glass in her hand [Fig. 6]; a machine with two small statues of slaves, emerging in alternance from a door, one with soap, the other with a towel; and a kneeling slave, channeling water into a pitcher.²⁶

Though absent from the treatises he mentioned, al-Jazari's emphasis on mechanical slaves recalls a transhistorical, cross-cultural imaginary of automation as perpetual labor and submission. An obvious resonance is with Aristotle's definition of the slave as "animate equipment", as well as his observation that slaves would no longer be needed if automata existed.²⁷ Thus, Aristotle posed an equation between slavery and automated labor, while foregrounding a logic of replacement.²⁸ Medieval philosophers did transmit these ideas. Theologian and philosopher Thomas Aquinas (1225–1274),

²⁴

Device II, 4.

²⁵

Ms. Ahmet III 3472, fols. 95v, 96v.

²⁶

Devices II, 7; II, 8; II, 9; III, 3; III, 9; and III, 10.

²⁷

The link between Aristotle and al-Jazari is by no means a stretch, since the compendium was very much part of the Aristotelian tradition of the mechanical arts; see George Saliba, The Function of Mechanical Devices in Medieval Islamic Society, in: *Annals of the New York Academy of Sciences* 441, 1985, 141–151.

²⁸

Aristotle, Politics, in: *The Complete Works of Aristotle*, ed. by Jonathan Barnes, vol. 2, Princeton 1984, 1989.



[Fig. 4]

Boat Automaton, folio from a copy of *al-Jāmi' bayn al-'ilm wa al-'amal al-nāfi' fi šinā'at al-ḥiyal* of Ibn al-Razzaz al-Jazari, probably Amid, modern-day Diyarbakır, Turkey, 1206, ink and opaque watercolor on paper, 33 cm × 24 cm, Istanbul, Topkapı Palace Library (Ms. Ahmet III 3472, fol. 98) © Topkapı Palace Library, Istanbul.

حتى يكاد الفرح يتملى وحرف رأس السمكة وتزفغ وهو ايدار ما كان عليه فحينئذ يلقن
 الصبيحة التي عليها رجل الغلام مزخ اظلا ليزير ويقام الغلام وينفسر با اصابعه وتنفقن الذر حيه
 فوق الفباويح على علي اسمه شربوش وازاحته به بعد ذلك يهيم ريشه اي لوزة ان يليلين



وقل صور صوت
 الكفه في حياضها
 وصله اسود بهذا الصل
 السمكة وتطبخ بالذو
 شطبه ودها حو
 تخرج عنها السمكة

الريش لا يمتد به من حجره وانما صور
 الغلام وما في باطنه ليفهم حيا وعلى به اليمنى للفرح
 لا وعلى محور من قنطرة على التقاله
 في عضده وعلى خرايدا الشرب وهو في صدره
 وكذا رقبته ولسانه وعلى حوض الكفه
 وعلى الكفه على انبوب دقيق ومصنوع من
 الكفه ويمتد الى حوض السمكة وعلى طرفه
 شقطة طرفها ثقب فيه محور وعليه
 فيمن الماصح اكل انه متى رفع الشربوش من رأس الغلام
 وصنفي رأسه مشرب مرقع على مشربة الملك
 والخزانة كما تقدم وجميع ما نفع فيه الشربوش
 واعيد الشربوش الى رأسه فان الشربوش ينقطع من
 اسفل الخزانة الى الكفه حتى يتملى ويميل وتزفغ
 ما فيها من الشربوش الى حوض الكفه وحسبي
 في الانبوب الذي هو الاصل والسمكة فينقل ويميل

[Fig. 5]

Automated Slave with Fish and Goblet, folio from a copy of *al-Jāmi' bayn al-'ilm wa al-'amal al-nāfi' fi šinā'at al-hiyāl* of Ibn al-Razzaz al-Jazari, probably Amid, modern-day Diyarbakır, Turkey, 1206, ink and opaque watercolor on paper, 33 cm × 24 cm, Istanbul, Topkapı Palace Library (Ms. Ahmet III 3472, fol. 108) © Topkapı Palace Library, Istanbul.



[Fig. 6]

Automated Female Servant, folio from a copy of *al-Jāmi' bayn al-'ilm wa al-'amal al-nāfi' fi sinā'at al-ḥiyal* of Ibn al-Razzaz al-Jazari, probably Amid, modern-day Diyarbakır, Turkey, 1206, ink and opaque watercolor on paper, 33 cm × 24 cm, Istanbul, Topkapı Palace Library (Ms. Ahmet III 3472, fol. 113v) © Topkapı Palace Library, Istanbul.

for example, described “assistants of a craftsman and slaves in a household” as “living instruments”.²⁹ In Arabic philosophy, one can think of Ibn Sina (980–1037), known to Europeans as Avicenna. At the end of the metaphysical volume of his celebrated encyclopedia *al-Shifā’* (“The Book of Healing”), Ibn Sina defined slavery as a necessary, natural phenomenon; some slaves, he argued, “must be forced to serve the just city” because they are “slaves by nature” (*‘abīd bi-al-ṭab’*).³⁰ Al-Jazari’s mechanical servants may seem to have worked in a way similar to Ibn Sina’s statement, naturalizing slavery by fixing the body of the enslaved in a spectacle of timeless, unperturbed subjection.

Evocations of mechanical slaves and servants, moreover, could be found across a wide range of literary sources, from the Mediterranean to China. A scene from Homer’s *Iliad* features mechanical female servants made of gold, assisting Hephaestus at the forge.³¹ Among the wonders that Apollonius of Tyana saw in India were automated cupbearers used at royal banquets, according to Philostratus (170–245 CE).³² Later, Bhoja’s rule in eleventh-century India witnessed the production of a book of automata, describing androids that could play music, perform greetings, pass around vessels, or refill oil lamps.³³ In China, under the Sui dynasty’s rule (581–618 CE), water-operated automata involved such moving figures as female entertainers, playing instruments and dancing.³⁴ Sources from the Tang period (618–907 CE) mention wooden cupbearers, female musicians playing the flute, and a fleet of moving boats with self-acting servants, designed to serve wine.³⁵

Medieval Arabic and Persian literary texts also featured mechanical subordinates, often guards and soldiers, many clearly identified as slaves. One may recall the pair of armed, automated slaves standing beside the bed of a princess in *One Thousand and*

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For quotes and an analysis, see Giorgio Agamben, *The Use of Bodies*, trans. by Adam Kotsko, Stanford 2015, 73–76.

³⁰

Avicenna, *The Metaphysics of The Healing. A Parallel English-Arabic Text*, trans. by Michael E. Marmura, Provo 2004, 376. Also see Paul A. Hardy, Medieval Muslim Philosophers on Race, in: Julie K. Ward and Tommy L. Lott (eds.), *Philosophers on Race. Critical Essays*, Malden, MA 2002, 38–62.

³¹

Iliad 18.410–425; for this and other examples, see Adrienne Mayor, *Gods and Robots. Myths, Machines, and Ancient Dreams of Technology*, Princeton 2018, especially chapter 7.

³²

Mayor, *Gods and Robots*, 145.

³³

Daud Ali, Bhoja’s Mechanical Garden. Translating Wonder across the Indian Ocean, circa 800–1100 CE, in: *History of Religions* 55, 2016, 460–493.

³⁴

Joseph Needham and Wang Ling, *Science and Civilisation in China*, Cambridge 1965, vol. 4, part 2, 160.

³⁵

Ibid., 162–163; Mayor, *Gods and Robots*, 201–203.

One Nights,³⁶ as well as Alexander's metal army in such Persian literary texts as the *Shāhnāma* of Firdawsi (d. 1020), a story that turned up in Hellenistic, Syriac, Hebrew, and Ethiopian sources as well.³⁷ Another consistent – and yet understudied – example was the motif of the automated *jāriya* or female slave. A noted occurrence appears in the chronicle *Akhbār Miṣr* by Ibn al-Muyassar (d. 1278), who claimed that in the twelfth century, female slave automata adorned the audience hall of the Fatimid vizier al-Afdal Shahanshah.³⁸ Carved from camphor and amber, they would bow down upon the vizier's entrance, encapsulating, through motion and smell, an entanglement of pleasure and order.

Resonating more directly with al-Jazari's manual, and hitherto unnoticed, is the sporadic presence of female slaves or *jawārī* in Arabic mechanical treatises. In *Kitāb al-asrār fī natā'ij al-afkār* ("The Book of Secrets in the Results of Ideas") by Ahmad ibn Khalaf al-Muradi (d. 1050), a third of the machines with human figures includes one or two female personages characterized as *jāriya* in the text.³⁹ In water-clocks, the *jāriya* tends to play a similar role: discharging pellets from her mouth, as a way of marking the passage of the solar hours. The same motif appears in other sources, like Arabic texts modeled after the pseudo-Archimedes; in one such manuscript, the scribe clearly labeled the female character dropping the balls as a *jāriya*.⁴⁰ The same motif was used in yet another water-clock, this time from Malta; it was described by cosmographer Zakariya al-Qazwini (ca. 1203–1283) in his *Athār al-bilād wa akhbār al-'ibād* ("Monuments of the Lands and Historical Traditions about Their Peoples") as a "female slave (*jāriya*) that throws pellets".⁴¹

By the time al-Jazari completed his treatise around 1200, the figure of the mechanical slave, then, had been a widely diffused – and culturally authorized – trope, though perhaps more in literary

36

For a survey of automata in *One Thousand and One Nights*, see René R. Khawam, Les statues animées dans les Mille et Une Nuits, in: *Annales. Economies, sociétés, civilisations* 30, 1975, 1084–1104. On automated guards in Arabic and Persian sources, see Caiozzo, *Entre prouesse technique*, 65–69.

37

Nahid Norozi, The "Metal Army" of Alexander in the War against Indian King Porus in Three Persian Alexander Books (Tenth-Fourteenth Centuries), in: *Iranian Studies* 52, 2019, 903–922.

38

D. S. Rice, A Drawing of the Fatimid Period, in: *Bulletin of the School of Oriental and African Studies* 21, 1958, 37.

39

For a facsimile of the only surviving manuscript, accompanied by an Arabic edition and an English translation, see Ahmad ibn Khalaf al-Muradi, *Kitāb al-asrār fī natā'ij al-afkār*, Milan 2018. Female slaves appear in the first, second, tenth, eleventh, twelfth, thirteenth, and twentieth devices.

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Oxford, Bodleian Library, Marsh 669, fols. 12v–13. On the connection between al-Muradi's devices and the pseudo-Archimedes, see Donald Hill, An Andalusian Treatise of the 5th/11th Century, in: id., *Arabic Water-Clocks*, Aleppo 1981, 36–46.

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Zakariya ibn Muhammad al-Qazwini, *Athār al-bilād wa akhbār al-'ibād*, Beirut 1960, 557.

than technical treatises, and with particular saliency in princely milieus. The topos covered a range of functions, from servants, to guards, to musicians, and many of these figures were explicitly designated as slaves, especially in Arabic sources. Al-Jazari, in a way, brought together the philosophical, the technical, and the courtly, by giving to the imaginary of automated service a very concrete realization, using well-established hydraulic mechanisms, and dressing them in the likeness of courtly slaves and subordinates.

II. Before the Master-Slave Binary

The goal of al-Jazari's patron may have been to surround himself with mechanical equivalents of slaves; this would have allowed him to display and strengthen his power while minimizing workers' presence. Indeed, one device was explicitly built so the patron could avoid interacting with a female servant, al-Jazari tells us.⁴² Thus, the fantasy that physical, subaltern movement could be achieved outside of human corporeality – the idea that labor could be released from the servant's body in order to achieve a master's control of his subordinates' visibility – could well have informed al-Jazari's project. Yet, while it is important to consider that al-Jazari's mechanical devices may have functioned as symbolic forms of coercion, this section argues that it is equally important to contextualize *hiyal* within the history of slavery.

For one thing, the idea of *hiyal* as tools of domination may betray an unnuanced reading of medieval unfreedom, namely by relying on and reinforcing a stable, binary opposition between master and slave. (This also plays into the discourse of the efficient, abstract machine, by repeating a functionalist, ahistorical vision of technology, a point I return to in the conclusion). Moreover, such a reading fails to capture the historical complexities of the medieval Mediterranean, for at least two reasons: one is that power functioned in a much less predictable, centralized manner; and the other is that slavery was a layered, variable phenomenon. By contrast with the European, orientalist idea of “oriental despotism”, power in the medieval Islamic Mediterranean was always in flux, shaped and reshaped by personal, dynastic, and mercantile competition.⁴³ Slavery, on the other hand, was a brutal, dehumanizing process, but it was also heterogeneous and fluid, a threat that loomed large over almost anyone, including powerful agents; especially in courtly

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Al-Jazari, *The Book of Knowledge*, 130.

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For an archeology and a critique of the discourse of oriental despotism, see Marina Rustow, *Archives, Documents, and the Persistence of “Despotism”*, in: ead., *The Lost Archive. Traces of a Caliphate in a Cairo Synagogue*, Princeton 2020, 424–450. Instability was further exacerbated by *walāʾ*, a system of benefaction that linked patron to client through strong, individual bonds of mutual reciprocity, instead of a centralized system of government (ead., *On the Salutary Effects of Empire. Muslims, Jews, and the Calculus of Benefaction*, in: Andreas Kablitz, Joachim Küpper, and Stephen G. Nichols (eds.), *Spectral Sea. Mediterranean Palimpsests in European Culture*, New York 2017, 1–50).

settings, slave status was mutable, often leading to manumission if not to higher social ranks.⁴⁴

Political fragmentation defined medieval Anatolia. Al-Jazari's patrons, the Artuqids, formed only one of many principalities. Their stability was constantly threatened by the Seljuqs, the Byzantines, and the Crusaders, and as vassals first of the Zengid dynasty of Mosul and later of Ayyubid general Salah al-Din and his successors.⁴⁵ Though sometimes described in modern ethnocentric and nationalistic terms that seek to project unity and wholeness, medieval Anatolia was an aggregation of frontiers and contact zones, as Sara Nur Yıldız has argued, and one of the most diverse lands of the medieval Middle East, with an astonishing array of religious, ethnic, and linguistic affiliations.⁴⁶ The region of Diyar Bakr in which al-Jazari lived and worked was itself a frontier, mediating between Turcoman tribes, Kurdish people, Arab territories to the south, and indigenous Christians.⁴⁷ The latter were still, by far, a majority (at the numerical level), and they were themselves a pluralistic population that included Greek Orthodox, Syriac, Georgian, and Armenian Christians.⁴⁸ Thus, Muslim sovereigns were often a demographic minority within a shifting mosaic of ethnic and religious groups, which constantly threatened their legitimacy and security.

The monolithic argument of the machine as reified slavery might not hold, also because slavery itself was not a reifying phenomenon, at least not in a terminal, exact way. Some – though not all – slaves were able to improve their positions within the hierarchical structures of the court, especially as they developed artistic, military, or administrative expertise. This is not to say that slavery was an innocuous, peaceful phenomenon. Enslavement was a violent, dehumanizing process that involved capture, physical inspec-

44

As such, medieval unfreedom differed from ancient and modern slavery, as Goitein already noted in 1962 (S. D. Goitein, *Slaves and Slave Girls in the Cairo Geniza Records*, in: *Arabica* 9, 1962, 1–20, 1). Using Moses I. Finley's distinction, one might say that while medieval societies had slaves, they were not slave societies (id., *Ancient Slavery and Modern Ideology*, New York 1980).

45

On the Artuqids, see Claude Cahen, *Artukids*, in: *Encyclopaedia of Islam*; Lorenz Korn, *The Artuqid Residence at Āmid (Diyarbakır)*, in: id. and Martina Müller-Wiener (eds.), *Central Periphery? Art, Culture and History of the Medieval Jazira (Northern Mesopotamia, 8th–15th Centuries)*, Wiesbaden 2017, 153–181; and Carole Hillenbrand, *The Establishment of Artuqid Power in Diyar Bakr in the Twelfth Century*, in: *Studia Islamica* 54, 1981, 129–153.

46

Sara Nur Yıldız, *Reconceptualizing the Seljuk-Cilician Frontier. Armenians, Latins, and Turks in Conflict and Alliance during the Early Thirteenth Century*, in: Florin Curta (ed.), *Borders, Barriers, and Ethnogenesis. Frontiers in Late Antiquity and the Middle Ages*, Turnhout 2005, 91–120.

47

Cemal Kafadar, *A Rome of Own's Own. Reflections on Cultural Geography and Identity in the Lands of Rum*, in: *Muqarnas* 24, 2007, 15.

48

A. C. S. Peacock, Bruno di Nicola, and Sara Nur Yıldız (eds.), *Islam and Christianity in Medieval Anatolia*, London/New York 2015.

tion, and commoditization.⁴⁹ Life at the court was not devoid of suffering, as a range of documentary and literary sources show. Take for example the petition addressed to the Ayyubid sultan Salah al-Din in 1174 by his slave eunuch Iqbal, a rare ego-document. In the autograph letter, Iqbal shared his desperation as a poor, vulnerable foreigner (he was from Ush, Fergana) and asked that while exiled, he be given a robe and some help.⁵⁰ Direct accounts of physical brutality, including sexual exploitation, could also be invoked.⁵¹ My aim, however, is to put the argumentative weight elsewhere: not on the graphic violence of slavery, but on slaves' knowledge and skills, the way they were able to leverage them, and the importance of technical, service work.

Technical proficiency was crucial to courtly slaves, not simply as an adornment, but as a tool of survival and advancement. The slaves in al-Jazari's treatise, in fact, would have been considered skilled, and they would have ranked quite high in the hierarchies of courtly slavery. This is substantiated by such primary sources as the eleventh-century *Siyār al-mulūk* ("Rules for Kings"), a Persian book on royal conduct and government attributed to Seljuq vizier Nizam al-Mulk. In *Siyār al-mulūk*, slaves were classified into two sorts: unspecialized (designated as *bandagān*) and skilled (characterized as *ghulamān*).⁵² The former group receives almost no attention in the book – this speaks to the existence of more silent forms of exploitation that were less susceptible to social change. Most slaves in al-Jazari's compendium exemplify the second type, even though their tasks might seem – to modern viewers – simple and repetitive. In *Siyār al-mulūk*, skilled slaves at the court included water-bearers (*āb-dār*), arms-bearers (*silāh-dār*), and wine-bearers (*sharāb-dār*). These functions constituted particular ranks within a system of education, grading, and promotion in which they appear to have been quite advanced. In fact, it was not before their sixth year of service that slaves could be made a cup-bearer or a water-bearer. Promotion sometimes led to even higher office, including to

49

Jan Hagedorn, *Domestic Slavery in Syria and Egypt, 1200–1500*, Bonn 2020, 76–78; Hannah Barker, Purchasing a Slave in Fourteenth-Century Cairo. Ibn al-Akfānī's Book of Observation and Inspection in the Examination of Slaves, in: *Mamluk Studies Review* 19, 2016, 1–24.

50

Jean-Michel Mouton, Dominique Sourdel, and Janine Sourdel-Thomine, *Gouvernance et libéralités de Saladin. D'après les données inédites de six documents arabes*, Paris 2015, see 37–38 for both Arabic original and French translation.

51

Examples can be found in Barker, Purchasing a Slave; and Pernilla Myrne, Slaves for Pleasure in Arabic Sex and Slave Purchase Manuals from the Tenth to the Twelfth Centuries, in: *Journal of Global Slavery* 4/2, 2019, 196–225.

52

Nizam al-Mulk, *The Book of Government or Rules for Kings*, trans. by Hubert Drake, London/New York 1960, 102 and 250, n. 1.

the role of chamberlain (*ḥājib*) and, for the most skilled and loyal, to that of *amīr*, a governor appointed to a province.⁵³

Al-Jazari's illustrations also hint at slaves' varied origins, through aspects of skin coloration and clothing. Slaves could be native Anatolians like Armenians or Greeks, Alans from the Caucasus, or Qipchaqs and Circassians from territories north of the Black Sea.⁵⁴ Most slaves represented in the compendium may belong to any of the latter categories; this is signified by their light skin, such Turkic stereotypes as slit eyes, as well as the inclusion of fur in their headgear [Fig. 1 and Fig. 5]. Black African slaves were also present in the medieval Middle East, especially in Egypt, Iraq, and Syria; they were mainly brought from Ethiopia and East Africa.⁵⁵ Hence, perhaps, al-Jazari's inclusion of a Black soldier automaton [Fig. 2].⁵⁶

Generally, al-Jazari's treatise was reflective of medieval Anatolia's "mobile grammar of estrangement", to use Michael Pifer's expression.⁵⁷ This is also visible through the occasional presence of minorities (I use the term "minorities" for religious and ethnic groups that rarely had access to political power, though they may have been numerically significant). One automaton represents a Christian monk, testifying to the presence of indigenous Eastern Christians in Diyar Bakr.⁵⁸ Another, the so-called elephant clock, features an Indian elephant keeper.⁵⁹ This is not surprising either, given the connected histories of Hindustan and the Middle East at the time,⁶⁰ as well as the use of the Indian elephant trainer as a motif

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Ibid., 103–104, 120.

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For primary sources contemporary to al-Jazari's treatise that list slave origins, with the first focusing on women in particular, see al-Samaw'al ibn Yahya al-Maghribi, *Nuzhat al-aṣḥāb fī mu'āsharat al-aḥbāb*, ed. by Kasrawi Hasan, Beirut 1971, 120–148; and Ibn Butlan, *Risāla jāmi'a li-funūn nāfi'a fī shirā al-raḡiq wa taḡlīb al-'abīd*, in: Abd al-Salam Muhammad Harun (ed.), *Nawādir al-Makḥūḡāt*, vol. 1, Cairo 1951, 352. For secondary literature, see Hagedorn, *Domestic Slavery*, 64; and Barker, *That Most Precious Merchandise*, 49.

55

Balafrej, *Domestic Slavery*, 10.

56

On Black slave soldiers, see Jere L. Bacharach, *African Military Slaves in the Medieval Middle East. The Cases of Iraq (869–955) and Egypt (868–1171)*, in: *International Journal of Middle East Studies* 13, 1981, 471–495.

57

Michael Pifer, *The Age of the Gharīb. Strangers in the Medieval Mediterranean*, in: Kathryn Babayan and Michael Pifer (eds.), *An Armenian Mediterranean*, Cham 2018, 13–38.

58

Device III, 5.

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Device I, 4. On the transcultural quality of the elephant clock, see Nadia Ambrosetti, *Wavering between the True and the False. A Short Excursion through Greek and Arab Automata*, in: Zielinski and Weibel, *Allah's Automata*, 46.

60

Hindustani jurists, scholars, and craftsmen were not rare in thirteenth-century Anatolia and some might have been brought as slaves; see Cailah Jackson, *Islamic Manuscripts of Late Medieval Rūm, 1270s–1370s*, Edinburgh 2020, 57 and 77, n. 95.

in medieval texts and artifacts.⁶¹ Moreover, al-Jazari distinguished a few characters as dark-skinned, though they were not always illustrated as such.⁶² One example is the dancer in the drinking arbeiter, who might stand for *ghurabā'* or Roma people, since dancing was often associated with that group and given also the presence of Roma at Artuqid courts [Fig. 3].⁶³

Could the presence of slaves, subordinates, and minorities in the treatise, then, be interpreted not as a way of reproducing and strengthening servitude for the benefit of a putative, stable master, but as a testament to “an age of estrangement”, a period marked in particular by the mobility of captive and minority populations? Such an argument has already been entertained by Scott Redford for slave soldiers. As a sign of their social assent and increased visibility, military slaves might have shaped the construction of bastions and citadels in the twelfth and thirteenth centuries, as Redford suggested.⁶⁴ Examples include the two towers – known as Ulu Bene and Yedi Kardeş – that were added to the walls of Artuqid Amid under the rule of al-Malik al-Salih Mahmud, al-Jazari's patron. According to Redford, these towers reflected the growing reliance of such small states as the Artuqids' on military slaves, placed at various ranks, from soldier to governor (elites, in fact, became gradually composed of governors of slave origin, leading to the formation of dynasties of freedmen, like the Mamluks in Egypt).

Redford also noted the concomitant, widespread diffusion of images of slave soldiers, within and beyond elite environments.⁶⁵ One common iconographic pattern featured a centrally placed ruler, surrounded by rows of attendants and courtiers, many of whom were slaves and freedmen.⁶⁶ Young Turkic slave attendants were particularly numerous, found across a range of monuments and portable objects, from Samarkand to Cairo; they usually appear beardless, wearing fur hats, and bearing attributes, as Redford and

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For an example from a thirteenth-century play by Ibn Daniyal and further references, see Kristina Richardson, *Roma in the Medieval Islamic World. Literacy, Culture, and Migration*, London 2022, 49 and 177, n. 23.

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See for example the scribe in device I, 5.

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Richardson, *Roma*, 33 and 40.

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Scott Redford, *Mamālik and Mamālik. Anatolian Seljuk Citadels and Their Decorative and Inscriptional Programs*, in: id. and Nina Ergin (eds.), *Cities and Citadels in Turkey. From the Iron Age to the Seljuks*, Leuven 2013, 305–346.

⁶⁵

Scott Redford, *Portable Palaces. On the Circulation of Objects and Ideas about Architecture in Medieval Anatolia and Mesopotamia*, in: *Medieval Encounters* 18, 2012, 382–412.

⁶⁶

For examples, see Robert Hillenbrand, *The Frontispiece Problem in the Early 13th-Century Kitāb al-Aghani*, in: Korn and Müller-Wiener, *Central Periphery?*, 199–227.

others have observed.⁶⁷ Just like military towers, the visual dissemination of the figure of the Turkic slave bore witness to the expansive power of military slaves. Like slave soldiers, then, unfree servants and entertainers may have gained access to artistic and visual representation, as shown by al-Jazari's compendium. This is further confirmed by the illustrations themselves, as the next section suggests, through their insistence on the figurative, and through their link to a wider network of images that foregrounded slave presence in courtly contexts.

III. Ambivalent Images

The visual material is all the more important since none of the machines described in al-Jazari's treatise have actually survived. There is no evidence that they were ever built other than the author's claim that he did.⁶⁸ Moreover, the paintings appear not so much as illustrations of what the machines would have looked like; in that regard, they most certainly fail, as they show creatures made of flesh, not metal. Compare them to the set of automata depicted in a 1272 anthology of astrological and magic-related texts – parts of the manuscript were made for the Seljuq of Rum Ghiyath al-Din Kay Khusraw III in central Anatolia, not far from Artuqid territory [Fig. 7].⁶⁹ The page illustrates the mythical wall that Iskandar (Alexander the Great) erected against Gog and Magog, with three effigies at the top: bronze statues of horse riders with trumpets, conveying a protective, apotropaic function through visual and sonic presence. The machines are mostly identical, and they appear as metal sculptures, not actual guards.

By contrast, in the 1206 illustrations of *al-Jāmi' fi šinā'at al-ḥiyal*, the automata seem as though clad in the flesh of concrete figures. The paintings link forms of movement both physical and abstract, human and geometric, providing the devices with an affective, qualitative sense. Take for example the mechanical slave with fish and goblet [Fig. 5]. The image is a painterly rendition of the machine's external appearance, with only one mechanical detail, an axle and a weight at the right elbow. According to the text, the slave is supposed to be made from large, thin plates of copper, bent into the shape of body parts and then soldered.⁷⁰ The image does

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See more references in Redford, *Portable Palaces*, 388, n. 5 and 393, n. 10.

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Al-Jazari, *The Book of Knowledge*, 109 and 118.

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On this manuscript, see A. C. S. Peacock, *A Seljuq Occult Manuscript and Its World*. MS Paris persan 174, in: Sheila R. Canby, Deniz Beyazit, and Martina Rugiadi (eds.), *The Seljuqs and Their Successors. Art, Culture and History*, Edinburgh 2020, 163–179. On the artistic relationships between Seljuq Anatolia and the Artuqid realm, see Suzan Yalman, 'Ala al-Din Kaykubad Illuminated. A Rum Seljuq Sultan as Cosmic Ruler, in: *Muqarnas* 29, 2012, 151–186.

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Al-Jazari, *The Book of Knowledge*, 118.



[Fig. 7]

Iskandar's Army, folio from an anthology of astrological and magic-related texts, Aksaray, 1272, ink and opaque watercolor on paper, 25.5 cm × 17 cm, Paris, Bibliothèque nationale de France (Ms. Persan 174, fol. 100v) © Bibliothèque nationale de France, Paris.

not betray the automaton's metal quality; rather, it foregrounds the servant's lifelikeness. The painter used contemporary conventions of figurative representation, including golden halo, *tirāz* textile, and *sharbūsh* (pointed headgear with a metal plaque and fur), features that were typical of contemporary Seljuq imagery.⁷¹ If it were not for the axle at the elbow, or the diagram at the top left, showing the tipping bucket and trough that channel wine into the fish, the painting would read as a representation of a slave – not a representation of a sculpture representing a slave.

The images' hybrid quality is a dominant feature of al-Jazari's compendium, and a remarkable departure from earlier technical treatises which, though often illustrated, privileged a diagrammatic model. If one sticks to mechanical slaves, one of the few and most relevant examples appears in the thirtieth chapter of a medieval Arabic translation of the *Pneumatika* ("Pneumatics") of Philo of Byzantium (ca. 230 BCE).⁷² It is possible, in fact, that the chapter, found only in Arabic translations, was a medieval addition rather than a Greek original – it is indeed a bit of an anomaly, given that most artifacts in Philo's book are jars, cups, washstands, and water-lifting machines, often devoid of figurative motifs.⁷³ This was noted in the early twentieth century by Bernard Carra de Vaux, who further suggested that the new chapter might have been directly inspired by al-Jazari's treatise.⁷⁴ Sylvia Berryman recently concurred, observing that while the hydraulic technology was not new, its "presentation in a self-contained and free-standing figure [...] may be a later interpolation".⁷⁵ The device is shaped as a standing female slave, *jāriya* in the text, with a jug in her right hand. In the only illustration I have found, a line drawing provides a sketch of the figure while mapping out its inner mechanical parts – the reservoir inside the servant's chest, as well as the tubes and air pipes pushing liquids into the ewer [Fig. 8]. The jug was not represented, only indicated with a word right underneath its purported location. The drawing is mainly explanatory, with an emphasis on technical rather than aesthetic features.

71

For examples, browse *Court and Cosmos. The Great Age of the Seljuqs* (exh. cat. New York, Metropolitan Museum of Art), ed. by Sheila R. Canby, Deniz Beyazit, Martina Rugiadi, and A. C. S. Peacock, New York 2016.

72

Oxford, Bodleian Library, Ms. Marsh 669, fols. 29v–30.

73

Philo of Byzantium, *Le livre des appareils pneumatiques et machines hydrauliques par Philon de Byzance*, ed. and trans. by Bernard Carra de Vaux, Paris 1902, 52 (Arabic edition) and 135–137 (French translation).

74

Bernard Carra de Vaux, Les pneumatiques de Philon de Byzance, in: *Notices et extraits des manuscrits de la Bibliothèque Nationale* 39, 1903, 35.

75

Sylvia Berryman, *The Mechanical Hypothesis in Ancient Greek Natural Philosophy*, Cambridge 2013, 162–163.



[Fig. 8]

Automated *Jāriya*, folio from an anthology of mechanical works containing an Arabic translation of the *Pneumatics* of Philo of Byzantium, ca. 1300–1500, ink on paper, Oxford, Bodleian Library (Ms. Marsh 669, fol. 29v) © Bodleian Library, Oxford.



[Fig. 9]

Washstand with *Jāriya*, folio from an Arabic translation of the *Pneumatics* of Philo of Byzantium, ca. 1300–1400, ink on paper, 16.8 cm × 12.5 cm, Istanbul, Süleymaniye Library (Ms. Ayasofya 3713, fol. 46v) © Süleymaniye Library, Istanbul.

Another *jāriya* appears in the Arabic Philo, as part of the wash-stand described in the thirty-sixth chapter, though the figure's limbs are not articulated – it functions as a float rather than an automated servant *per se*. The image accompanying a fourteenth-century copy shows the human figure in the middle of a vessel, drawn in a cross-section view [Fig. 9].⁷⁶ As is often the case, red letters allow readers to identify the device's components, by linking image and text (the description appears in the preceding folio, characterizing the figurine as a *jāriya*). The basin has two embedded containers and a lid. When water is poured into the inner vessel, the effigy comes out, pushing the lid. Dispensing water through the faucet causes the servant to move downward. The illustration maps out the machine's main parts, but it does not contain any information as to the object's visual appearance. The *jāriya* herself seems rather generic; certainly, the drawing lacks the figurative quality of al-Jazari's images.

As earlier noted, humanlike statues could also be found in some of al-Muradi's machines in his *Kitāb al-asrār fī natā'ij al-afkār*. The book survives in only one copy, completed in 1266, perhaps at the court of Alfonso X in Toledo.⁷⁷ In this manuscript, the aforementioned water-clock that includes a *jāriya* dropping pellets is accompanied by an abstract diagram, with no figurative dimension [Fig. 10]. In fact, none of the machines' anthropomorphic elements were illustrated. Such was the aim of this manuscript's images: diagramming each device's internal parts, not its external look. What is interesting in al-Jazari's images, therefore, is their blending of human and mechanical forms. With the 1206 copy, the figure of the mechanical slave became embedded in a visual language that was at once figurative and abstract, juxtaposing – rather than collapsing – corporeal and mechanical motion.

Instead of reducing the machine to an abstract box of technical operations, the 1206 illustrations point to human, social aspects. This was achieved by drawing on contemporary visual culture, in addition to the tradition of the mechanical arts. A close example is an Artuqid copy of the *Maqāmāt* of Abu Muhammad al-Qasim al-Hariri (1054–1122).⁷⁸ The book is a collection of fifty stories or *maqāmāt* (sing. *maqāma*), each revolving around an encounter between the narrator al-Harith and an eloquent but treacherous

76

Istanbul, Süleymaniye Library, Ms. Ayasofya 3713, fols. 46–46v. See Philo of Byzantium, *Le livre des appareils pneumatiques*, 61 (Arabic edition), 147–148 (French translation).

77

Florence, Biblioteca Medicea Laurenziana, Ms. Orientale 152. On this manuscript, see Hill, *An Andalusian Treatise*.

78

Paris, Bibliothèque nationale de France, Ms. Arabe 3929. On the connection of this manuscript to Artuqid patronage, see Ward, *Evidence*.



[Fig. 10]

Diagram of a Water-clock, folio from a copy of *Kitāb al-asrār fi natā'ij al-afkār* of Ahmad ibn Khalaf al-Muradi, Toledo, 1266, ink on paper, 27.3 cm × 20 cm, Florence, Biblioteca Medicea Laurenziana (Ms. Orientale 152, fol. 18v), permission MiC © Biblioteca Medicea Laurenziana, Florence.



[Fig. 11]

Slave Market at Zabid (*maqāma* 34), from a copy of the *Maqāmāt* of al-Hariri, probably Amid, modern-day Diyarbakır, Turkey, ca. 1200–1210, pigment and ink on paper, 27 cm × 21 cm, Paris, Bibliothèque nationale de France (Ms. Arabe 3929, fol. 79) © Bibliothèque nationale de France, Paris.

protagonist, Abu Zayd al-Saruji.⁷⁹ *Maqāma* 34 is the story most explicitly linked to slavery, since it takes place at a slave market in Zabid, Yemen [Fig. 11]. Having lost his slave, who died in the desert, al-Harith seeks to get another one at the slave market, the scene depicted in the image. There is no pictorial detail about the setting, but the nature of the transaction is clear. The slave is standing to our left, his status as human merchandise indicated by the seller's tight grip on his wrist and by the presence of a scale. Al-Harith and Abu Zayd, disguised as the seller, are portrayed as Arabs; they are both bearded and turbaned, with wide eyes. By contrast, the slave is depicted as a young Turk. Just as in the 1206 compendium, Turkic features include a moonlike face with long, narrow eyes, hair falling in braids down the shoulders, crowned by *sharbūsh* (compare to [Fig. 1 and Fig. 5]).

Another comparison can be drawn between an illustration of *maqāma* 18 [Fig. 12] and the mechanical *jāriya* of the 1206 compendium [Fig. 6]. While at a wedding in Sinjar (Iraq), Abu Zayd tells the story of how he lost his enslaved concubine (*jāriya*). The plan had been to keep her in strict seclusion, but one day, under the influence of alcohol, he made the mistake of revealing her existence to a neighbor. Word got around; eventually, Abu Zayd was forced to sell the concubine to the governor. No other known manuscript of the *Maqāmāt* provides an illustration of the *jāriya*. This may be because the slave appears not in the frame tale but in the story within a story, the embedded narrative told by Abu Zayd at the party. Whatever the case, such a choice does confirm that slaves had become likely subjects of visual representation. In the *maqāma* image, the *jāriya* might be dancing, with a mirror in her hand, while the mechanical *jāriya* figures a wine-pouring servant. Still, they share remarkable similarities. They wear the same headgear, composed of a red veil with golden dots and a knot headband, and they are both dressed in *tirāz* textile, with golden bracelets around their wrists, the tips of their fingers dyed with *henna*.

One can easily expand the material to encompass portable objects. Compare for example the figure in the middle of a Seljuq dish [Fig. 13] with the dancer of the wine arbiter [Fig. 3].⁸⁰ In the middle of the plate is a figure in motion, perhaps a dancer or an acrobat; like the performer in al-Jazari's automaton, he is bare-chested, dark-skinned, and wears a short *sirwāl*. Near-nakedness was not usually depicted, but when it was, it tended to be associated

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Abu Muhammad al-Qasim al-Hariri, *Maqamat Abi Zayd al-Saruji*, ed. by Michael Cooperson, New York 2020. For English translations, see id., *Impostures*, trans. by Michael Cooperson, New York 2020; and id., *The Assemblies of Al Hariri*, trans. by Thomas Chenery and Francis Joseph Steingass, London 1867–1898.

⁸⁰

On the dish, see Court and Cosmos, 114 cat. 42.



[Fig. 12]

Jāriya (*maqāma* 18), from a copy of the *Maqāmāt* of al-Hariri, probably Amid, modern-day Diyarbakir, Turkey, ca. 1200–1210, pigment and ink on paper, 27 cm × 21 cm, Paris, Bibliothèque nationale de France (Ms. Arabe 3929, fol. 151) © Bibliothèque nationale de France, Paris.



[Fig. 13]

Dish with Dancer and Seated Figures, Iran, late twelfth to early thirteenth century, luster-painted stonepaste, 31.1 cm (diam.), Toronto, Aga Khan Museum (AKM739) © The Aga Khan Museum, Toronto.

with Blackness, as Robert Hillenbrand has observed.⁸¹ Generally, dark skin was connected to servitude, nudity, and other racist clichés, often in opposition with powerful, light-skinned characters.⁸² This may be the case with the portable dish, where the Black figure stands in stark contrast with the light-skinned courtiers on the side, whose bodies are covered in elaborate textiles, and who are seated cross-legged, displaying a static pose. As such the dish compares to the party boat automaton, with its clear binary of motion and rest, opposing moving subordinates and motionless royalty [Fig. 4]. But like al-Jazari's paintings, while enforcing ethnic and social stereotypes, the ceramic remains semantically capacious and ambivalent, as it centers – rather than marginalizes – the dancer. In any event, it confirms the presence of slaves and subalterns in the visual order.

Mediterranean courts were quite integrated, especially between the tenth and thirteenth centuries, so it is not surprising to find examples in the Western Mediterranean as well. A case in point is the famous painted ceiling of the Cappella Palatina in Palermo, Sicily that was commissioned by the Norman ruler Roger II in 1132. An aggregation of over three-thousand muqarnas wooden units, each enclosing a painting, the ceiling offers a comprehensive, catalog-like array of images.⁸³ Depicted figures include unfree entertainers. A dramatic example is provided by a female dancer, who overturns a drinking vessel placed between her feet. She is flanked by musicians – a drummer and a flute player – represented beardless, with golden crowns; they stand for enslaved eunuchs, as Lev Kapitaikin has shown.⁸⁴ Princely figures, meanwhile, appear unmoving and hieratic, often holding a cup of wine, just as the ruler in al-Jazari's boat automaton.

Many more artifacts could be invoked, showing a similar split between static sovereign and moving aides and performers. They encompass ivory caskets from Muslim Spain, carved ivories and wood panels from Fatimid Egypt, and more examples from Norman Sicily and Seljuq realms, including Anatolia, Iran, and Afghanistan.⁸⁵ Across these images, courtly slaves were provided with

81

Robert Hillenbrand, *The Image of the Black in Islamic Art. The Case of Painting*, in: David Bindman, Suzanne Preston Blier, and Henry Louis Gates (eds.), *The Image of the Black in African and Asian Art*, Cambridge, MA 2017, 215–253.

82

Balafrej, *Domestic Slavery*.

83

Ernst J. Grube and Jeremy Johns, *The Painted Ceilings of the Cappella Palatina*, Genoa/New York 2005.

84

For images of these figures and an analysis of their subaltern status, see Lev A. Kapitaikin, *David's Dancers in Palermo. Islamic Dance Imagery and Its Christian Recontextualization in the Ceilings of the Cappella Palatina*, in: *Early Music Journal* 47, 2019, especially 6–7.

85

For examples, see Anna Contadini, *Text and Image on Middle Eastern Objects. The Palmer Cup in Context*, in: Pippa Shirley and Dora Thornton (eds.), *A Rothschild Renaissance. A New Look at the Waddesdon Bequest in the British Museum*, London 2017, 124–143; Court and Cosmos; Redford, *Portable Palaces*; Anna Contadini, *Fatimid Ivories within a Mediter-*

hypervisibility. They also tended to be depicted as technologies of motion, their bodies a vector of instrumental, productive movement, by contrast with rulers and their retinues who remained still, extracting enjoyment from the spectacle of labor. The question of why slaves received so much artistic attention cannot simply be read, however, as symbolic domination, for courtly slaves did have access to a measure of power, especially in military and political contexts, as seen earlier. Could one also read these images, then, in light of al-Jazari's composite illustrations, that is, as *countering*, through figurative specificity, the blanket, stereotyping definition of the slave as machine?

Seen as hybrid compositions, fusing the figurative plenitude of courtly iconography with the diagrammatic impulse of technical images, the 1206 illustrations constitute a rare configuration, bringing together seemingly incompatible concepts: the organic and the inorganic, the spontaneous and the mechanical. They provide neither a mimetic illustration of the machine nor a purely practical drawing. Instead, they depict each automaton as a singularity, unmatched to a pre-given, mechanical object. The element of conceptual violence that pertains to the trope of the mechanical slave – and, more generally, to ahistorical, functionalist conceptions of the machine – is destabilized by the image, whose visual language seems to defy immobility and abstraction, by emphasizing social realities.

In many ways, the 1206 images create a pathway between slavery and representation, between the mechanical arts and the domestic arts, between fine technology and the skilled gestures of unfree labor. As such they could be said to highlight, rather than demean, the work of courtly servants, entertainers, and soldiers, especially when considered alongside a wide range of period images that similarly enhanced slaves' presence and contributions. Fundamentally, the images' ambivalent structure marks a shift from the transcendental program of thought that high, Aristotelian philosophy has enforced, while also detracting from any universal, formal understanding of mechanics. By taking automation beyond the realm of action and within motionless two-dimensionality, blended images of automated slaves may have rearticulated the mechanical away from function, procedure, and instrumentalism, emphasizing instead its outside, and thus possibly interrupting, rather than strengthening, the recursive equation between slavery and automation.

IV. Noneffective Machines

The 1206 images at once obscure and reveal *hiyal's* possible failure to constitute a purely prosthetic instrumentality. The devices themselves, I shall now suggest, point to the limits of effectiveness. While

anean Culture, in: *Journal of the David Collection* 2, 2005, 227–247; Lynn Jones, *Between Islam and Byzantium. Aght'amar and the Visual Construction of Medieval Armenian Rulership*, Aldershot/Burlington VT 2007; and *Al-Andalus. The Arts of Islamic Spain* (exh. cat. New York, Metropolitan Museum of Art), ed. by Jerrilynn D. Dodds, New York 1992.

some of al-Jazari's machines might have served a practical purpose, like his water-raising contrivances, most of the *hiyal* described in this essay were rather inefficient.

For one thing, the mechanical slaves increased, rather than curtailed, the visibility of courtly workers. *Hiyal* may have been intended to materialize a desire for substitution, but their claim of autonomy was an illusion. Indeed, servants were still needed to fetch the machines, and they also helped to set the devices into motion, as the text reveals in multiple instances. On at least nine occasions, an actual servant, often explicitly designated as a slave, was tasked to carry out the machine and activate some of its parts.⁸⁶ Ironically, this includes the device, mentioned earlier, that was explicitly built to circumvent slave presence: though shaped as a nonfigurative, automated pitcher, the object necessitated the presence and involvement of a *ghulam*, who would "bring it, put [it] down by the basin on a beautiful pedestal which is for raising it above the ground, and stand aside from it".⁸⁷ This was also the case with mechanical slaves, like the automaton with which I opened this essay. As in the preceding example, a human slave had to bring the human-shaped automaton out, "carrying him with his left arm under his left armpit and the right [arm] over his right shoulder". Then, to activate it, he would have had to "rais[e] [the sculpture's] right hand", or the valve would not open.⁸⁸ This situation must have created a strange but evident doubling between actual slave and automated one, in effect amplifying slave presence at the court, thus derailing and even contradicting any fantasy of replacement.

Though framed as self-operating machines, *hiyal* were neither labor-saving nor even self-sufficient; they could not do away with the bodiliness of human labor. The sculptures' movements, moreover, were rather limited, whether in nature, scope, or direction. In the case of the automated servant with pitcher, only the left forearm was animated, moving up and down [Fig. 1]. Human action, which is infinite, was collapsed into one single gesture, restricted to an opposition direction. For all its mimetic appearance, moreover, the automated servant does not actually pour water from the pitcher, which remains static, acting as a sort of fountain: in effect, the machine is more of an automated beaker wrapped in the guise of a servant than an automated worker.

These limitations are even more striking in the case of the mechanized musicians (whether in the boat automaton or the drinking arbiter), for how could one imagine that music could actually emanate from the single, linear gestures of the moving effigies? Only a repetitive, monotonal sound would have been produced,

86

Devices I, 2; II, 1; II, 2; II, 3; II, 5; III, 2; III, 4; III, 9; and III, 10.

87

Device III, 2 (al-Jazari, *The Book of Knowledge*, 130).

88

Ibid., 135.

with no rhythm, no color, and no variation. In many ways, then, al-Jazari's machines were ineffective. Self-motion failed to mimic, let alone replace, the work of attendants and musicians; in fact, it made such labor even more visible and necessary. Thus, when read against the grain of the ruler's agenda, *hiyal* may actually highlight the limits of functionalism (here defined as the transparent, teleological relationship between means and ends) as well as the failure of any techno-utopian approach to automation, including the desire for substitution and the belief in the flawless, autonomous machine. More broadly, they suggest that abstract, pregiven models of motion may not replicate human action, at least not without the aid of intuitive, embodied labor.

There may be more, then, to the hypervisibility of unfree and lower-ranking workers in al-Jazari's treatise (and beyond, across courtly imagery) than a political strategy or a ruse of control. While al-Jazari's devices, as theoretical objects, might seem to strengthen the ability of technology to replicate and extend bodily motion – thus foregrounding an idea of the machine as efficient – both images and machines, when considered in their social and visual environments, propose a different reading, away from a purely functionalist vision of automation. Through their hybrid format, the images destabilize the abstracting power of mechanical axioms, by insisting on the fleshiness of labor as much as geometry, and allowing real movement to re-enter the plane of representation, even as it was supposed to be evacuated from it. The element of violence that sits at the core of the idea of the mechanical slave was by no means an immobilizing force; visual language could indeed intervene, as well as the machine itself, to resist mechanization, by always implying the presence of a living worker.

Denouncing slavery in automation or automation as reified slavery is not entirely satisfying either, because such a critique may play into the flattening maneuver of the trope of the mechanical slave, which equates sensible and mechanical motion, as though the machine could efficiently, triumphally lead to human-less work. While acknowledging the ideational violence that underlies the motif of the automated servant, one further needs to challenge its assumption of a synecdoche or even of a transparent relationship between subaltern and automated action. The binarisms of master and slave, organism and machine are inadequate for describing al-Jazari's *hiyal*, for they are both steeped in the principles of transcendental philosophy, including the idea of the machine as an empty, servile vessel, and its corollary notion of slavery as animated instrumentality, to return to Aristotle's well-known statement. The point, however, is neither to frame premodern slavery as a benign institution nor is it to deny al-Jazari's affiliation with systems of thought and courtly imaginaries that did equate mechanical reproduction, passive efficiency, and bonded labor. Rather, it is to highlight the work of the image, and of the machine itself, in countering the master's viewpoint, especially in a context where power was conditioned by indeterminacy, estrangement, and the inevitability of failure.

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