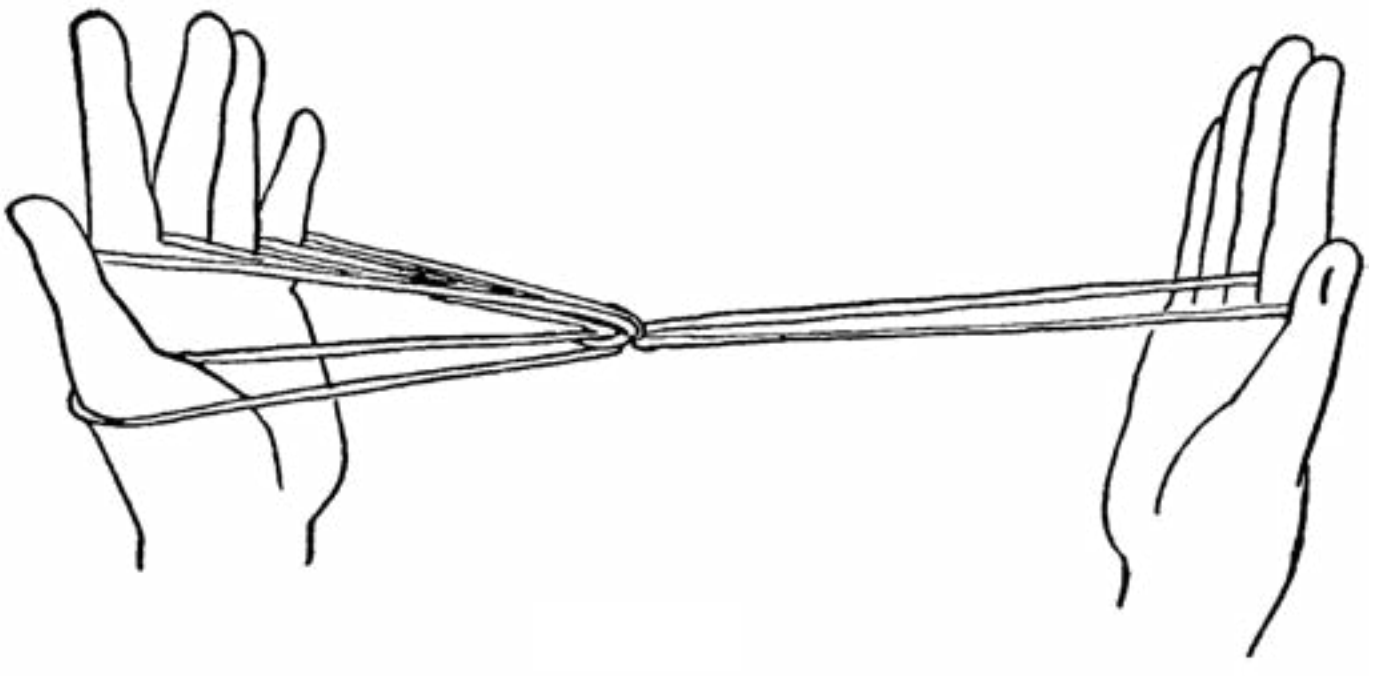
How to spell the fight– Fish and fire

Natascha Sadr Haghighian



What will the future study group for liberation from autonomic computational governance look like?

James R. Murphy, a math teacher in La Guardia, New York, has been teaching mathematics to sixth-grade students since the early 1980s. He regards mathematics as the most powerful and manipulable abstract language available to humans. Sadly, he has observed students are often "math shy," and therefore fail to acquire the ability to think in abstract terms and appreciate complex consequential phenomena. When he asks students to describe the additive or multiplicative inverse after three weeks of beginning algebra, Murphy is often met with blank stares. Simple yet seemingly inaccessible concepts seem to induce a state of amnesia.

In fifth grade, I remember thinking my brain would be incapable of ever grasping mathematics. At the time, the teacher only confirmed my fear with an indifferent shrug. During class, my head wandered elsewhere, while my hands kept busy drawing repetitive patterns or androgynous faces with European noses. The sketches that filled the

margins of my exercise book left the center of each page awkwardly empty.

James Murphy overcame his students' disenchantment with algebra by devising a way to involve the hands in order to unfold the brain's potential to think abstractly and problem solve. As the principal of a college preparatory school serving minority communities, he used string figures to acquaint students who don't "like" math with abstract and systematic thinking.

String-figure making consist of a succession of elementary operations[1] or simple procedures that involve a loop of string and one's fingers. Usually, a string figure is created by passing the loop of string from one pair of hands to another until the succession of movements produces a final figure. Sometimes intermediary positions in a sequence constitute figures too. When introducing the concept of inversion to his students, Murphy starts with a simple string figure called The Trap. The Trap begins with a sequence known as Opening A, the beginning of almost all string figures. In the next step, a volunteer's wrist is first "caught" in the string, and then set free by repeating the earlier move Opening A.

Opening A

Hold a loop of string in your right hand and then place it behind and around your left thumb and little finger. Repeat the above step with the right hand. This is the starting position. Now bring your right middle finger to scoop up the string from your left palm and pull it back. With your left middle finger, scoop the string from your right palm and pull it back. This is called Opening A, the most common base figure.

Figure 1

Figure 2

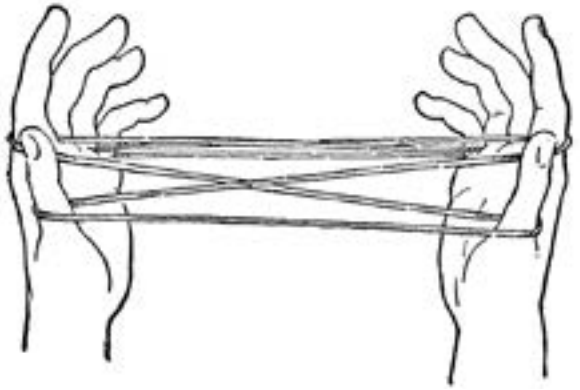


Figure 3

The concept of inversion is also found in a more complex series of figures named Ten Men. In a sequence of moves, weave *A* is followed by weave *A*' that results in a return to the original loom. The erasure of the two weaves indicates the existence of reciprocals. Mathematically, reciprocals must exist for a system to qualify as a group, a central organising principle in modern mathematics. And this is how James Murphy introduces math to his students. He considers string figures mathematical objects, in line with an expanded definition of mathematical ideas described as any idea "involving numbers, logic or spatial configurations and even more significantly, combinations or organizations of those into systems or structures." This definition was advanced in 1991 by Marcia Ascher, a founder of ethnomathematics. In order to expand a concept of math beyond the constraints of Western notation, she sought to consider practices of weaving and other pattern making as a form of mathematics prevalent in societies with a strong sense of oral tradition.

Making string figures is a ubiquitous practice that goes back to the prehistory of humankind.

Its origins are unknown but it belongs to the very early human activities. As a global practice, string figures were introduced to Europe in 1888, presumably through the anthropologist Franz Boas. Recording and description of the practice started in 1902, when anthropologists and ethnologists W.H.R. Rivers and A.C. Haddon developed a language for recording the sequences that lead to a string figure. With this invention, anthropologists rushed to collect and map figures from around the world. As they searched for contact patterns that would be evident in similarities of form, they hoped to trace and 'prove' that pre-historic contact occurred. Whether or not these practices spread through actual contact is still disputed. But the practice of making string figures exists in indigenous cultures around the globe. Similarities are apparent in core figures existing in places as far apart as the Pacific Islands, North America, Australia, Africa, and Asia, even though the names given to the forms often vary. A figure, for example, known as the "Fish Spear," which was found on Murray Island, or Mer, located north of Australia, is identical to that of "Pitching a Tent," which belongs to the Coast Salish indigenous people in

British Columbia, and is also called the "Sea-Egg (Echinus) Spear" by the Nuu-chah-nulth, living on the Northwest Coast of Vancouver Island.

A Fish Spear

A Fish Spear

1. Loop the string on both hands in the First Position.

2. Insert the right index, from above, behind the string crossing the left palm, and draw out the loop to the right, twisting the string several times by rotating the right index.

3. With the left index, pick up from below the string crossing the right palm, being careful to pick up the section between the strings of the right index loop and the right index, where the loop is not twisted (Fig. 4). Separate the hands and draw the strings tight (Fig. 5).

4. Release the loops from the right thumb and little finger and separate the hands. The points of the spear will be on the thumb, index, and little finger of the left hand, and the handle will be held by the index of the right hand (Fig. 6).

Figure 4

Figure 5

Figure 6

Often words were muttered or songs were sung while making the figures, which, according to Haddon, made little sense.[2] Whereas early anthropologists and ethnologists considered the string figure an expression of "primitive mentality" and therefore "prelogical,"[3] the interdisciplinary approach of ethnomathematics, founded in the 1970s by Brazilian mathematician Ubiratàn D'Ambrosio, views them as manifestations of profound visuospatial[4] mathematical procedures. A focus of ethnomathematics is the study of cultural variations within mathematics, especially with regard to geometrical forms and abilities, and this movement has more recently promoted the teaching of mathematics in connection to an appreciation of indigenous knowledge. Based on the string figures collected by anthropologists around the world, mathematician Eric Vandendriessche recognizes string figures (in essence, sets of elementary operations organised in procedures) as the result of genuine algorithms.[5] Moreover, he suggests that string-figure algorithms are of a "geometrical" and "topological" order insofar as the algorithmic practice at base investigates complex spatial configurations with the aim of expressing a two-dimensional or a three-

dimensional figure. This topological characteristic of string figures is confirmed by the way one figure (or drawing) transforms into another.

While I observe my fingers twisting and stretching string into figures, I cannot help but notice a resemblance to an experience of navigating virtual spaces, whether two-dimensionally in handheld devices like phones or three-dimensionally with the use of data gloves and VR controllers. Surely, virtual surfaces hold a visuospatial memory of what hands used to fiddle with and handle. Such visual space often employs mimetic translations of familiar spatial interfaces such as knobs or sliders that are the result of algorithms, which visually emulate their physical counterparts. In the device, the interface between my hands and the abstract space of command language is guarded and only allows limited access to its algorithmic layers. Instead, those layers return to me as friends' selfie streams, Google results, shopping items, or news, highlighting the convenience of result-oriented interaction instead of enabling ever-more abstract levels of engagement. This shop window deal, I suspect, de-skills not only my hands but also my cognitive capacity to understand involvement.

I lose my sense of "whereness" in relation to what I do, I lose the relation or entanglement of objects and procedures, conditions associated with topological disorientation.

Returning to the physical string in my hand, I wonder what this resemblance all means. If there is a topological operation at the core of bending, twisting, deforming, and weaving a loop of string into algorithmic figures—abstract forms that function as images, stories, and the somatic storage of ideas—what can this tell me about the spatial relation between my fingers and my phone, or at this moment, the keyboard of my computer?

In the stack that characterises today's planetary-scale computation,[6] the interface is the intersection between the micro and macro layers of this megastructure. Whereas the spatial totality of the stack is difficult to grasp, the concept finds concrete expression in the space between my finger and a digital device. This space is a site of direct interaction between algorithm and body in the service of big data patterning. Both infrastructure and design are expressions of the forces that govern this space on micro and macro levels.

The movement of the index finger and thumb when interacting with algorithms on my phone emulates many of the gestures used to bend string into figures. In both cases, my gestures produce algorithmic suggestions in the form of images, stories, and ideas. Moreover, the space between my hands when I make a string figure uncannily resembles a display when holding a digital device—a window into abstraction. As if someone pulled the string from my hands and replaced it with a phone. Or rather, did the string turn into a phone over time? If there is rationale behind this semblance, then how did the practice of visuospatial cognition fold into the ever-transforming touch between my fingers and the algorithms of my phone? Is the somatic memory forged by the age-old practice of creating string figures still stored in muscle tissue, movement patterns, and fingers trying to form a thought? Even an addictive potential seems to linger; today, as before, algorithms still know how to keep my hands occupied.[7]

Observing this resemblance releases a hollow pain, although I find it difficult to pinpoint its origin. Is it in the ligaments, or the muscles, or

the dense nerve endings in my fingers? Or is it in between my hands and my brain, somewhere in the branching nervous tissue that starts bending under the sudden recognition of loss or collapse of space? What I lost, what collapsed, I'm not sure.

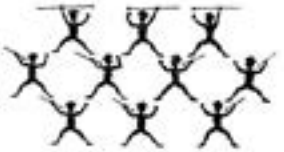
Topology examines how space is preserved under conditions of duress, incursion, and folding.[8] One of the conditions of duress my hands sense can be traced to the destructiveness and ignorance that characterizes the modern project itself. In its course, modernization excluded practices that were considered "primitive," while at the same time, absorbing them into its machinic order. A practice like string-figure making was considered worthless by colonisers and scientists, as it served no purpose, belonged to the informal domestic sphere of children and elders, and did not fit definitions of Western mathematics. Yet, the modern project still collected and analysed these practices, while at the same time, encroaching on the very land that supported the survival of indigenous societies, causing them to crumble and fold. More specifically, colonial scientists used string figures as a universal baseline of expression that enabled them to access these communities.

As A.C. Haddon once told anthropologist Louis Leakey: "You can travel anywhere with a smile and a piece of string." The violent incursion into indigenous societies, the space under duress, is enacted through a piece of looped string that becomes abstracted in the form of a line, a conceptual apparatus of modern progress and the industrial age that is now expressed as code, which operates the application that my fingers fiddle with today.

Fingering the line from string to geometric drawing to the vertices of the internet, I try to understand the power of geometry, the language of the line, "a language full of ambition (…) with the power to conjure the future," as Molly Nesbit writes.[9] Every generation grows up in the presence of a different line. When one line loses its abilities, the next one thrives. Every line comes with a new motto, beaconing the educational doctrine of the time, schooling the hands and the brains of a generation toward a pointed purpose (or product). At school, the line always extends into the future.

La Guardia student portraits, 1980s © Robin Moore

Ten Men



Ten Men

1. Begin with Opening A.

2. With the teeth, draw the far little finger string toward you over all the strings (Fig. 7), and bend the left index over the left string of the loop held by the teeth, and return the left index to its position. Bend the right index over to the left, and pick up from below the left string of the loop held by the teeth, and return the right index to its positions (Fig. 8). Now release the loop held by the teeth, separate the hands, and draw the strings tight (Fig. 9). You now have two loops on each index, a loop on each thumb, and a loop on each little finger.

3. Release the loops from the thumbs and draw the hands apart.

4. Put each thumb away from you, under the index loops, and pick up on the back of the thumb the near little finger string, and then return the thumb to its position (Fig. 10).

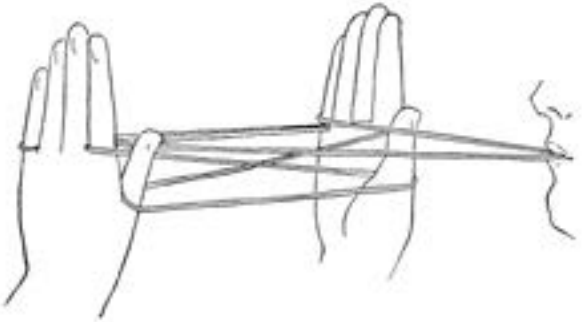


Figure 7

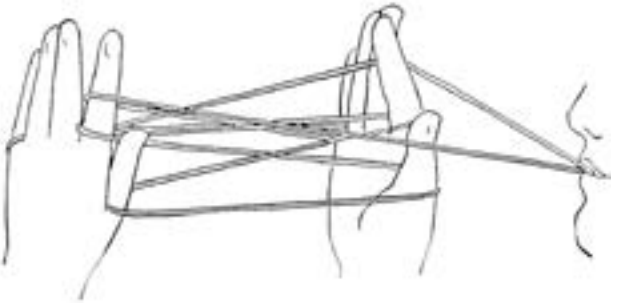


Figure 8

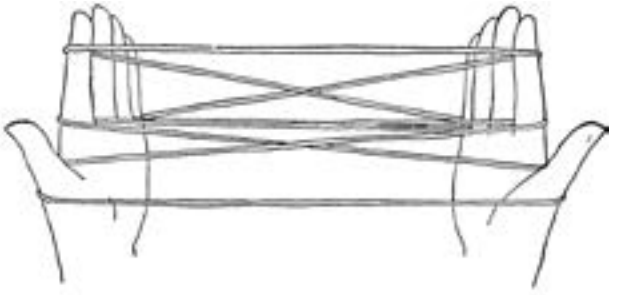


Figure 9

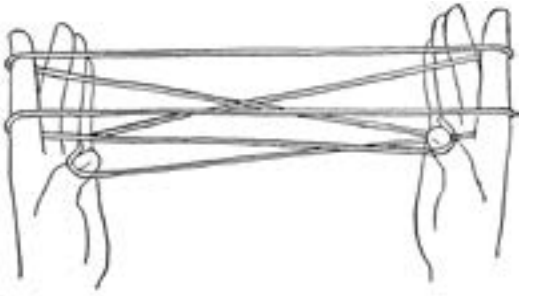


Figure 10

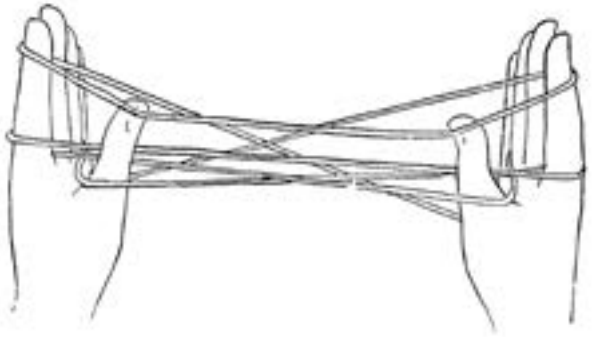


Figure 11

5. Pass each thumb over the lower near index string, and put it from below into the upper index loop, finally drawing the thumb away from the index in order to enlarge the loop now passing around both index and thumb (Fig. 11).

6. With the left thumb and index (or the teeth), pick up the right lower near thumb string closest to the right thumb, and draw it over the tip of the thumb (Fig. 12), and let it drop on the palmar side, careful not to disturb the upper thumb loop. In the same manner, with the right thumb and index (or the teeth) pick up the left lower near thumb string closest to the left thumb, and draw it over the tip of the thumb (Fig. 13), and let it drop on the palmar side. Separate the hands (Fig. 14).

7. Withdraw each index from the loop, which passes around both thumb and index, and draw the strings tight (Fig. 15, left hand).

8. Transfer the thumb loops to the index fingers by putting each index from below into the thumb loop (Fig. 15, right hand) and withdrawing the thumb (Fig. 16).

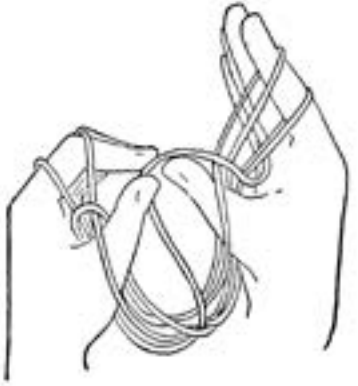


Figure 12

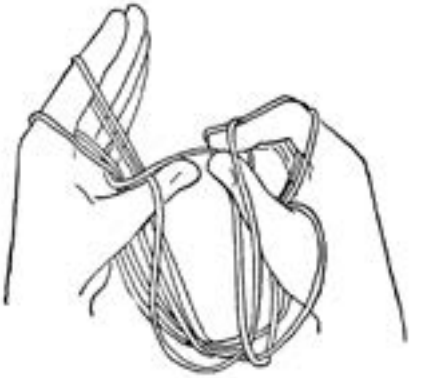


Figure 13

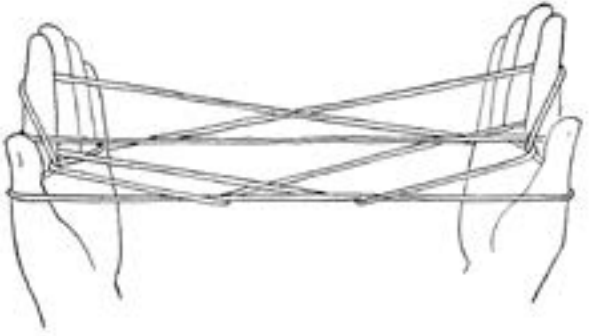


Figure 14

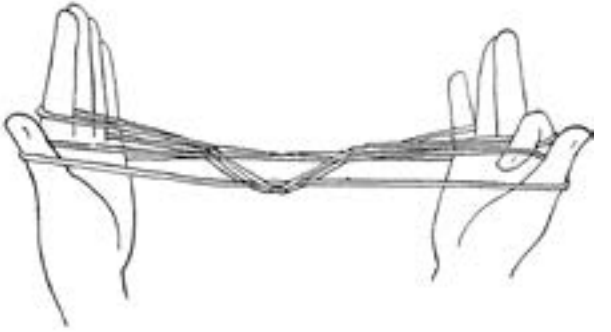


Figure 15

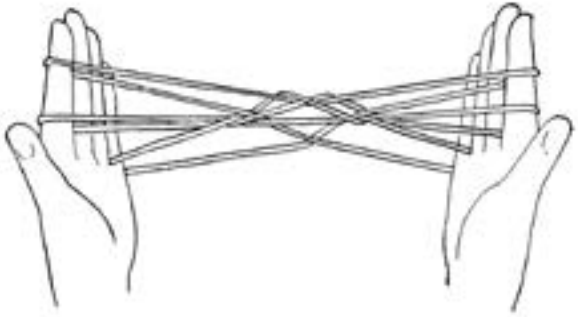


Figure 16

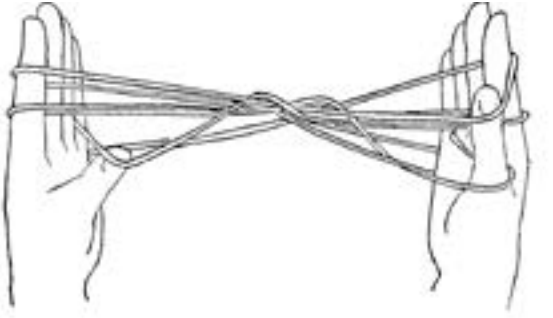


Figure 17

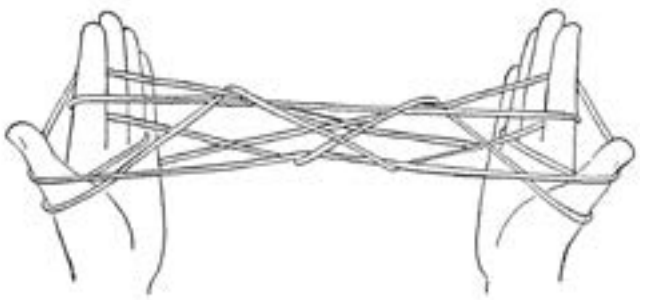


Figure 18

9. Put each thumb away from you under the index loops, and pick up the loops on the back of the thumb closest to the little finger string, and return the thumb to its position (Fig. 17, left hand).

10. Pass each thumb up over the lower near index string, and put it from below into the upper index loop, and draw the thumb away from the index (Fig. 17, right hand) in order to enlarge the loop now passing around both index and thumb (Fig. 18).

11. With the left thumb and index (or the teeth), pick up the right lower near thumb string closest to the right thumb, and draw it over the tip of the right thumb (Fig. 19), and let it drop on the palmar side, being careful not to disturb the upper thumb loop. In the same way, with the right thumb, draw it over the tip of the left thumb (Fig. 20), and let it drop on the palmar side. Separate the hands (Fig. 21).

12. Bend each middle finger over the upper far index string, and take up from below on the back of the finger the lower near index string (the one passing from index to index) (Fig. 22), and return the middle finger to its position.

Figure 19

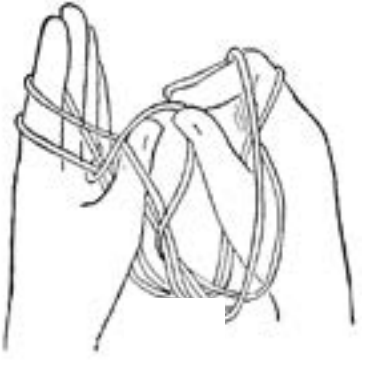


Figure 20

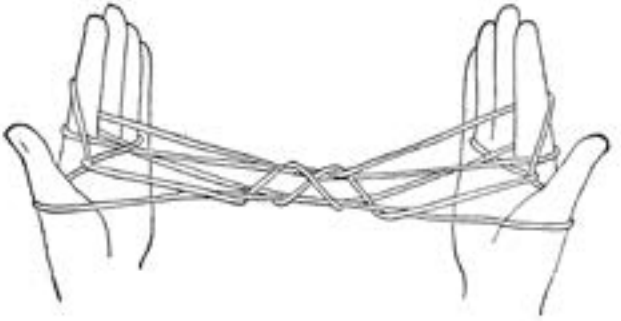


Figure 21

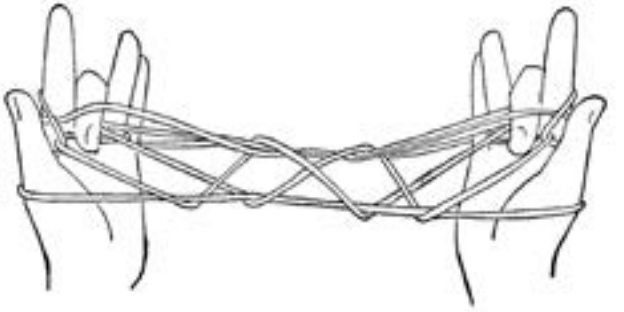


Figure 22

Figure 23

13. Release the loops from the little fingers, and turn the palms away from you. The figure is extended between the thumbs and the middle and index fingers held close together (Fig. 23).

Ten Men is the first in a series of five closely related Caroline Islands figures, which after Opening A, are based in the addition of index loops formed from the far little finger strings. Since the ninth, tenth, and eleventh movements are repetitions of the fourth, fifth, and sixth, the figure is simpler than it appears at first sight.

While the anthropologists were harvesting string figures, a new curriculum was introduced in French classrooms as part of the so-called Ferry reforms. During this period, students acquired the language of the line because drawing was made a compulsory skill answering calls from industry to forge a future generation of engineers. The curriculum introduced in 1880, as Molly Nesbit describes in her text "Ready-Made Originals,"[10] established drawing as a regular language. Although the drawing instructions were designed by a sculptor named Eugène Guillaume, drawing was not taught as a poetic or artistic form of expression, but rather foremost as a business language. Industry and art were merged in geometric drawing, and their shared language was the geometric line that was taught through repetitive, laborious drilling in the classroom. Students had to draw straight and curved lines, perfecting the circle and square, the hexagon and trapezoid. Drawing after nature was not part of the curriculum, since a non-retinal view of the world was to be built: the cylinder, cone, and sphere all had to be rendered by students, who also learned about plan and elevation views, the better to create utilitarian household objects

like chairs, rakes, pots, umbrellas, windows, and coffee grinders. After 1909, some modifications were made to the curriculum, introducing color theory and drawing after nature. Yet the utilitarian approach to drawing prevailed and cast thinking as a non-ambiguous, logical activity.

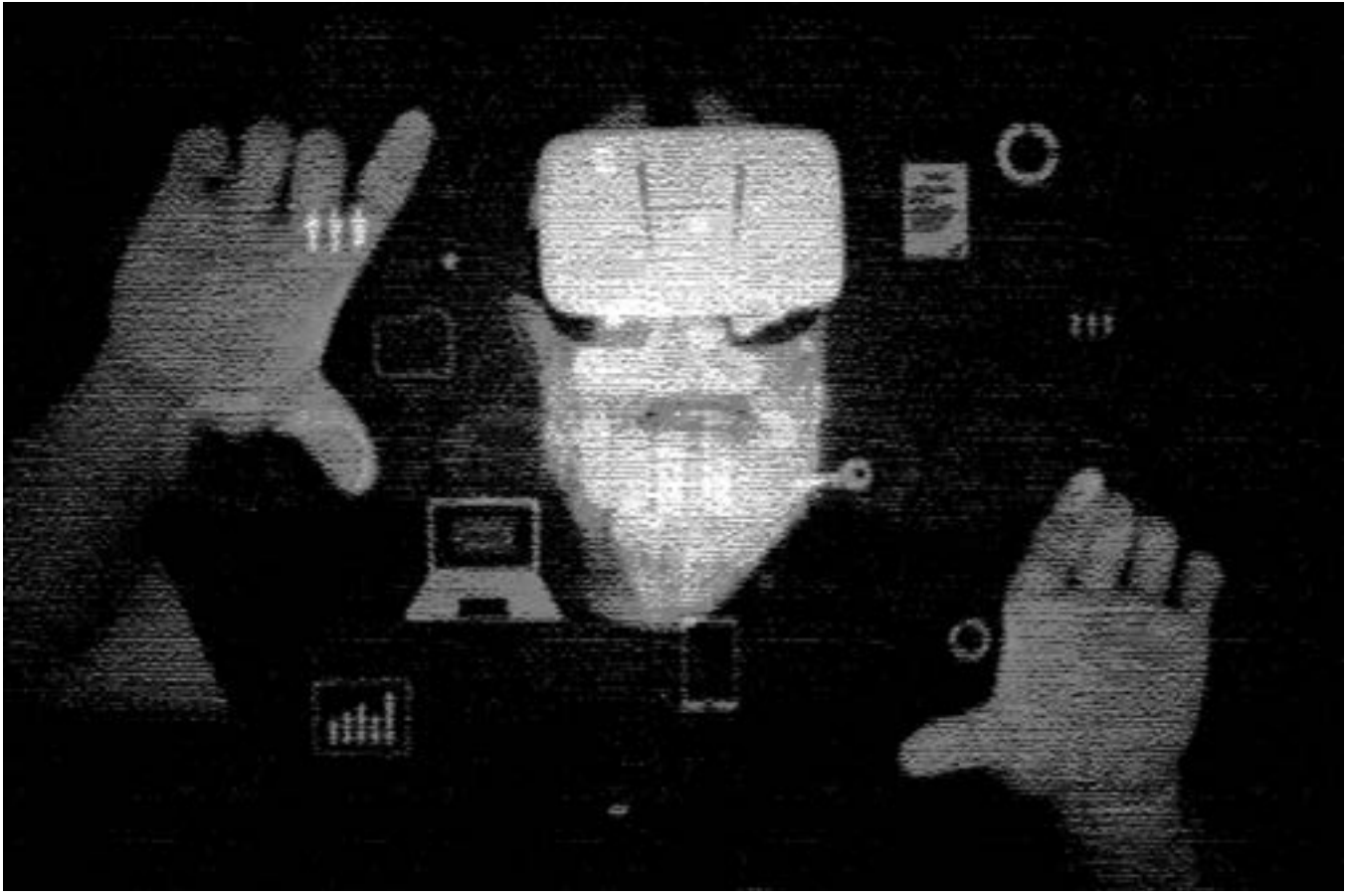
Marcel Duchamp, who grew up with the vocabulary of the Guillaume method, subverted its alphabet by adding an illogical contradiction: "I did a coffee grinder which I made to explode; the coffee is tumbling down beside it; the gear wheels are above, and the knob is seen simultaneously at several points in its circuit with an arrow to indicate movement." Duchamp's approach to drawing the object was in defence of the fundamental ability to make a choice not offered by the predictive, commodified program of exchange posited by the shop window. He insists on the poetic liberation of the line:

> *When one is interrogated by shop windows, one is also pronouncing one's own sentence. In fact, the choice is a round trip. From the demands of the shop window, from the inevitable response to the shop window, comes the end of choice.*

> *No obstinacy, out of absurdity, hiding the coitus through the glass with one or more objects from the shop window. The sentence consists in cutting through the glass and regretting it once possession is gained. Q:E:D.*

He ends with the Latin phrase "quod erat demonstrandum" (what was to be demonstrated), suggesting that geometry could be used in the implementation of a wicked plan. Q.E.D points to the predictive framing inherent to the geometric construction of the shop window. As a space of commodification, this glass display fucks with your eyes, goading a desire for visual penetration that emulates interaction with that of devices to come.

Amyl Nitrate is protagonist of queer experimental filmmaker Derek Jarman's 1977 film *Jubilee.* She is named after a drug that relaxes the muscles and blood vessels, causing a rush of oxygenated blood to the brain (a.k.a. poppers). Amyl leads a future underground female punk study group in a discussion about their school motto, "make your desires reality." She contends that artists can easily make desire into reality, and once that task is accomplished, art will become redundant. She,



Man in virtual reality glasses zooming the virtual screen.

herself, prefers the message "don't dream it, be it," taken from a song from *The Rocky Horror Picture Show*. Amyl is a radical style icon of anarchic individualism and the No Future generation; she embodies all that is new and unique. And so it is no surprise that she and her radical expression of subjectivity is quickly absorbed by the very system she aims to rail against, as she signs with media mogul Borgia Ginz ("what can I do for you or rather what can you do for me") to perform "Rule Britannia" as a contestant on the Eurovision TV show. Ginz is a Malcolm McLaren figure. Today, he would be the CEO of a startup incubator comparable to Google, or rather, Alphabet Inc. Ginz introduces himself:

> *You wanna know my story babe. It's easy. This is the generation that grew up and forgot to lead their lives. They were so busy watching my endless movie. Its power babe, power. I don't create it, I own it. I sucked and sucked and I sucked. The media became their only reality, and I owned their world of flickering shadows. BBC. TUC. ITV. ABC. ATV. MGM. KGB. C of E. You name it, I bought them all and rearranged the alphabet. Without me, they don't exist.*

In this snapshot of neoliberal capitalism, sucking and absorbing are equivalently led and fed by desires and weave the alphabet of the commodity.

Jump forward to 2033. Azuma, an artificial intelligence from artist and filmmaker Zach Blas's short film *Contra-Internet: Jubilee 2033* (2014–18), describes a flat geometric world consisting of only vertices and edges. A contemporary take on Jarman's film, Blas's work pictures the next generation of the study group as a squad of queer guerillas led by an art professor. They have just taken over the Silicon Zone and have turned it into an Anti-Campus, killing the co-founder of PayPal, Peter Thiel, and taking hostage all of the startup techies. Their lecturer is Nootropix, a contra-sexual AI prophet, who sits at a glass desk in front of a liquid backdrop and reads from their latest publication "The End of the Internet (as we know it)." Nootropix reads:

> *Do you remember when Internet evangelists re-wrote our alphabet and invented the world anew as a total reticular geography? Our lives dripped with internet, in a process that was more like saturation—doused and drowned.*

Still from Zach Blas's film *Contra-Internet: Jubilee 2033*, 2014–18

But the earth dematerialized, and our bodies became geometric prisons. Suddenly, conquests were much easier in front of a screen. The future could be modelled, predicted.

The school's slogan during Nootropix formative years was "Don't Be Evil," which was also Google's ubiquitous motto and (unofficial) code of conduct until it was changed to "Do the Right Thing" after its 2015 restructuring under new parent company Alphabet Inc. This motto remained in place until the idea of having one was completely abandoned in April 2018. Coincidently, the latter motto was also the Wi-Fi password for internet access in the Google shuttle busses.

Nootropix closes their lecture by activating a 3D rendering with the press of a button. They start to dance on a geometric weave of vertices and edges similar to the flat world Azuma described earlier. The mesh, devoid of textures, not only carries the memory of the shop window, the display, the screen but also, as an inner writing, the weave of a string-figure. Nootropix's dance on the mesh bends the vocabularies of yoga, gym

posing, and dildotectonics (from the contra-sexual manifesto by Preciado). In an endless cycle, their blue, erect, 3D rendered strap-on dildo pisses a stream of digital liquid video onto (or into?) the hollow surface of waves from which the stream of data-piss emanates. The movement of the dancing body curves, bends, twists, and stretches the parabolic line of digital piss stream. That line holds the potential for all possible images, stories, geometries, school mottos, educational doctrines, social differentiations, and world views. This is the world as image[11] in an endless stream of *Bild und Bildung*, mere busyness, the Californian everything is everything, a blend of digital and carnal fluidity.

As Nootropix tries to take back the space that lies beyond the limits of this geometric prison, pain comes back. All movements are flickering shadows of desire that are absorbed as quickly as they emerge. I'm not even sure what I'm breathing. The body is so saturated with its surrounding geometry, or in Nootropix's words, "dripped with Internet" and "drowned and doused beyond saturation," that the line is excreted from every pore and orifice. Bodies weep, drool, drivel, and

Still from Zach Blas's film C*ontra-Internet: Jubilee 2033*, 2014–18

exude predicted lines, vertices, and edges of and into the totalizing geometric order. Although this order pretends to be constructive, endlessly additive and limitlessly receptive, in short, a free space, guided by the motto "do the right thing," this system has actually absorbed and seized all stories, voices, and spaces. All thinking that matters has been violently disrupted, crunched, fragmented, neutralized, and collapsed. A geometry without world.

In search of spaces of companionship, intimacy, and experience, there is an urgent need to form new study groups and devise ways of reverse engineering this geometry without world. By now, it is clear that the school will not facilitate this study, at least not through institutionally sanctioned activity. Over the past 150 years, the alphabets that structure life have been successively written by ever more corporate forces, and now in the era of algorithmic governance, alphabets can write and rewrite themselves with incomprehensible speed. Voilà, end of story.

Or we could ask James Murphy to help us learn to use our hands again in order to

explore principles of additive and multiplicative inversion that might undo the planetary scale of computational prisons, algorithmic institutions and enslaving logistics. Stefano Harney has suggested that thinking and making algorithms might teach us how to build the alternative infrastructures we urgently need today.[12] For this very reason, I suspect that the future study group has a great deal to learn from the practice of making string figures. Donna Haraway has already given our assignment—"think we must!" she has urged[13]—and Haraway has also pointed to string figure making as a cognitive exercise in complex thinking, patterning, and entanglement. In thinking with "fingery eyes," a topology can be developed that ties infrastructure to joy.

As the sky closes in on us everywhere, I suspect the joyfully militant future infrastructuralists will soon have begun the urgent work of reverse engineering as they gather in study groups in many places. These groups will have studied string figures and the topologies of making world again. They will have fought the agnosia produced by never ending cycles of suggestion and prediction. They will have taken back the life that

Still from Zach Blas's film *Contra-Internet: Jubilee 2033*, 2014–18

has been sucked into the vacuum of the colonial order.

Donna Haraway has taught us that the worlds of "SF"—string figure, science fiction, speculative fabulation, speculative feminism, science fact—are not containers but rather patternings, risky co-makings, and propositions. Patternings that make and preserve space for relaying, thinking with, and becoming within material-semiotic makings. The future study group will therefore involve a process of thinking together as an ongoing relay of patterns, in which one hand or pair of hands, mouth and feet, other body part or other being will receive something, and in turn, add something new, proposing another knot, another web. Take the word algorithm. Its story is buried in the workings of agnosia[14] but reappears as a string figure in the form of the fish spear.

The Persian mathematician Mohammad Ibn Musa Khwarazmi (محمد بن موسى خوارزمي) or Khorazmi was born around 780 in the oasis region of Khorazm, and he worked most of his life in Baghdad. His book *On the Calculation with Hindu Numerals*, written around 825, was in the

twelfth century translated into Latin as *Algoritmi de numero Indorum* (Al-Khwarizmi on the Hindu Art of Reckoning). From the name of the author, written in Latin as Algoritmi, originated the term algorithm. Khorazmi's books were responsible for the introduction of Hindu-Arab numerals and Algebra to Europe.[15] Whereas the algorithm in today's mathematics and computer science most commonly refers to a set of rules that specifies a sequence of operations, in the Portuguese and Spanish languages, the word simply means "number."

Discussion surrounding the root of the name given to Khorazmi's birthplace has given rise to various versions of a story. According to a legend told by the physician and astronomer Zakarya Qazvini, best known for his cosmography "the Wonders of Creation," four hundred elders were said to have challenged the king, who in turn had them exiled to a distant land. When visiting the exiled community, the king asked how they were holding up, to which they responded, "We have fish, we burn firewood, we grill the fish, and eat it."
«ما ماهی داریم و هیزم، ماهی بریان می‌کنیم و می‌خوریم.»

The word خوار meant eat or meat and هیزم meant firewood. Both words together, خوار and هیزم , meant fight, رزم , in the language at that time. Hence, the place became known as Khorazm, fish and fire, or simply fight, thereafter. Although this story is not based in science, many historians and geographers have referred to the narrative over the centuries.

Khorazm, Khwarezm, or Khawarizm, today, is located between Uzbekistan, Kazakhstan, and Turkmenistan, south of the (former) Aral Sea on the Amu Darya River Delta. This area was historically rich in fish due to its close proximity to the Aral Sea, which was once one of the four largest lakes in the world. In more recent times, this sea served as a source of water for cotton irrigation, and later hydroprojects and oil exploitation, which depleted the lake almost completely. The disappearance of the sea has caused toxic dust storms and catastrophic changes in the region's micro climate and ecosystem and has even given rise to poverty due to the collapse of the fishing industry. These crises have also led to a condition of agnosia and an inability to relate to the language produced by the landscape that

yielded this place its name. Khorazm emerges as a string figure of complex entanglements that unfold in the algorithm, or the fish and fire, or the fight. Learning to think and therefore act within topological, processual patternings not only entails tracing what turned fish and fire into algorithm but also involves developing a language to spell them as one inner writing.

Thanks to

Haytham El Wardany, Zach Blas, Ashkan Sepahvand, Ana Teixeira Pinto, Sven Lüttiken, Eric de Bruyn, Sami Khatib

Endnotes

[1] Eric Vandendriessche, *String Figures as Mathematics? An Anthropological Approach to String Figure-making in Oral Tradition Societies* (Cham: Springer, 2015).

[2] Caroline Furness Jayne, *String figures: A study of cat's-cradle in many lands* (1906), xvii.

[3] "In defining it (primitive mentality) as prelogical I just want to say that it does not compel itself first and foremost to refrain from contradiction, as our way of thinking does." Lévy-Bruhl, Lucien. *How Natives Think*, trans by Lilian A. Clare (London: George Allen & Unwin, 1910), 76.

[4] Visuospatial skill is the cognitive ability to represent, analyze, and mentally manipulate two- and three-dimensional objects. It helps when fathoming distance or when reaching for objects on the visual field. According to autism researcher Michelle Dawson, atypical cognitive mechanisms cause visuospatial peaks in autistic cognition. Amanda Baggs, an American blogger, who has been diagnosed with autism, demonstrates this distinctive visuospatial ability and language in the video "In My Language" (https://www.youtube.com/watch?v=JnylM1hI2jc). In contrast, visuospatial dysgnosia is a loss of the sense of "whereness" between oneself and one's environment and in the relation between objects and each other, which is often linked to topological disorientation.

[5] Vandendriessche, *String Figures as Mathematics?*

[6] The stack, according to Benjamin Bratton, includes six layers: earth, cloud, city, address, interface, user. *The Stack* (Cambridge, MA: MIT Press, 2015).

[7] String-figure making was generally embedded into a system of prohibitions and prescriptions. For example, Inuit societies prohibited playing string figures in the presence of sunlight, and when too eagerly pursued, there was the danger of getting carried away. The Netsilik Eskimos recount the story of Tuutannguarjuk, the dangerous spirit of the string figures, who challenged a child playing string figures at night, tricking the youngster into a competition that would have taken the

child had not one of the adults suddenly woken up, causing Tuutannguarjuk to flee.

[8] Fred Moten has explained that "Black topological existence [...] is all about the making and preservation of space under duress." Within this context, topology can be understood as a form of world making that includes mobilising joy as a specific modality of social existence in the interest of its own self protection. (Robin D.G. Kelley & Fred Moten in Conversation at the University of Toronto, April 2017.)

[9] Molly Nesbit in conversation with Ashkan Sepahvand, unpublished transcript, Seeing Studies 2010.

[10] Molly Nesbit, "Ready-Made Originals: The Duchamp Model," *October*, no. 37 (Summer 1987).

[11] "Der Grundvorgang der Neuzeit ist die Eroberung der Welt als Bild. Das Wort Bild bedeutet jetzt: das Gebild des vorstellenden Herstellens. In diesem kämpft der Mensch um die Stellung, in der er dasjenige Seiende sein kann, das allem Seienden das Maß gibt und die Richtschnur zieht." Martin Heidegger, "Die Zeit des Weltbildes," in *Holzwege*, vol. 5, Gesamtausgabe (Frankfurt am Main: Vittorio Klosternmann, 1977), 94. English: "The fundamental event of modernity is the conquest of the world as picture. From now on, the word 'picture' means: the collective image of representing production [*das Gebild des vorstellenden Herstellens*]. Within this, man fights for the position in which he can be that being who gives to every being the measure and draws up the guidelines."

[12] Stefano Harney, "Logistical Infrastructures and Algorithmic Institutions," lecture at Former West, 2013, http://www.formerwest.org/DocumentsConstellationsProspects/Contributions/LogisticalInfrastructuresandAlgorithmicInstitutions.

[13] Donna J. Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham, NC: Duke University Press, 2016).

[14] Thanks to Kodwo Eshun for introducing the term agnosia as a "work of forgetting" in his lecture "WE HAVE DELIVERED OURSELVES FROM THE TONAL – Of, with, towards, on Julius Eastman" at Savvy Contemporary in Berlin in March 2018.

[15] The introduction of algebra was tremendously significant as it moved away from Greek concepts of mathematics and replaced it with mere calculation by introducing variables to be able to work with unknown figures. The word algebra is interesting, as it means both duress, coercion and joining broken parts in the Arabic original al jabr الجبر.

How to spell the fight—Fish and fire
by Natascha Sadr Haghighian

This publication is the fifth in the Kayfa ta series.

Commissioning editors
Maha Maamoun and Ala Younis

Copyeditor
Ryan Inouye

Design template
Julie Peeters

Copublishers
Kayfa ta
www.kayfa-ta.com

Sternberg Press
Caroline Schneider
Karl-Marx-Allee 78
D-10243 Berlin

Tanmia Bookstore
19 Huda Shaarawi Street
Cairo

ISBN 978-3-95679-453-7

Printed in Egypt
Deposit number 20396/2018
(ISBN 9789776633117)

This edition is produced in the context of and with support from Durub Al Tawaya (2018), a program curated by Tarek Abou El Fetouh within Abu Dhabi Art.

Image credits
Pages 2–3, 8–10, 14, 16–18, 32, 34–38, 40–46, 48–52: Drawings from *String figures: A study of cat's-cradle in many lands*, by Caroline Furness, 1906.

Kayfa ta is an independent publishing initiative founded in 2012 by Maha Maamoun and Ala Younis.