

约翰·杰勒德  
权力·演绎  
John Gerrard  
Power.Play



UCCA

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Contemporary Art  
尤伦斯当代艺术中心



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约翰·杰勒德（生于1974年，都柏林）的作品初看仿佛视频影像，实则与之截然不同：并非实时拍摄的真实人物与场景，而是算法生成的模拟影像。这些影像处于后电影式的非线性时间之中，由计算机同步执行的复杂程序生成、销毁。

本展览呈现约翰·杰勒德过去5年中所创作的3件重要作品。它们关注权力、监视与控制的机制，反映数码技术所中介的、极具地缘政治色彩的当下现实。《太阳能储备，内华达州的托诺帕，2014》呈现内华达州沙漠中的大型发电厂——作品中，错综的镜面矩阵在该设施的中央地带反射太阳光，在整1年的时间内追随太阳的运动轨迹。《场，俄克拉荷马州的普赖尔小溪，2015》聚焦于俄克拉荷马州平原的谷歌数据中心。不顾该公司的反对，艺术家雇佣了一架直升飞机拍摄了一系列相关照片，并在此基础上制造虚拟影像，罕见地捕捉到这一数码空间的建筑实体；该设施的外观令人联想艺术家此前作品中的现代化养猪场。《演习，敦煌，2014》则将中国西部戈壁滩上由一系列神秘人工痕迹组成的道路系统转化为一个复杂的淘汰制游戏面板，一些源于广州某计算机厂工人的动态扫描图像化身参与了这款游戏。

在过去的15年中，约翰·杰勒德致力于探索方兴未艾的程序语言和游戏引擎技术，并将其转化为不断复杂化、自治化的景观。约翰·杰勒德以全新的媒介进行创作，而如漫长艺术史中的经典作品一般，他的作品超越了其所描绘的对象，并使之历久弥新。

展览“约翰·杰勒德：权力·演绎”由UCCA馆长田霏宇与助理策展人郭希联合策划。展览的影像设备赞助为科视数字投影系统（上海）有限公司。感谢爱尔兰驻中国大使馆对本次展览的支持。

At first glance, the works of John Gerrard (b. 1974, Dublin) may look like video, but they are something entirely different: not filmed records of real people and places in real time, but rather algorithmic generators of simulated images. They exist in post-cinematic, non-linear time, sequences produced and discarded in the time it takes the computer to execute the complex codes in which they are written.

This exhibition brings together three of John Gerrard’s most ambitious recent works. Created over the past five years, they together offer a commentary on dynamics of power, surveillance, and control that play out across our digitally mediated, geopolitically fraught present. *Solar Reserve (Tonopah, Nevada) 2014* is a monumental portrait of an electrical plant in the Nevada desert in which an intricate configuration of mirrors reflects at a central cell as sunlight fluctuates over the course of an entire year. *Farm (Pryor Creek, Oklahoma) 2015* captures one rare physical manifestation of digital space—a Google data center on the Oklahoma prairie—constructed virtually using images taken from a helicopter against the company’s wishes, and implicitly conscious of the architectural parallels between this apparatus and another that has appeared in Gerrard’s previous works, the modern pig farm. *Exercise (Dunhuang) 2014* turns a set of mysterious manmade markings on the floor of the Gobi Desert in western China into the board for an elaborate elimination game, enacted by a company of avatars crafted from motion scans of Guangzhou computer-factory workers.

Over the past fifteen years, John Gerrard has produced a body of work that has harnessed the emergent technologies of programming languages and gaming engines, and transmuted them into landscapes and portraits of ever increasing intricacy and autonomy. Innovative as they are, these works, like their antecedents throughout the long history of art, both transcend and immortalize their subjects.

“John Gerrard: Power.Play” is curated by UCCA director Philip Tinari with assistant curator Guo Xi. The video equipment sponsor for the exhibition is Christie Digital System (Shanghai) Co., Ltd. The exhibition is supported by the Embassy of Ireland in China.

《演习，敦煌，2014》**2014****模拟****尺寸可变**

由**Richard J. Massey 基金会收藏****由艺术家、Simon Preston 画廊（纽约）、Thomas Dane 画廊（伦敦）提供**

《演习，敦煌，2014》源于2011年在网上引发热议的卫星图片，它们呈现了中国戈壁滩地区的神秘痕迹，如同一个具有小镇 规模的道路系统，其外观似乎专门为卫星轨道而设计。约翰·杰勒德委托一家卫星图像公司对这些痕迹进行深度扫描，从而以数据的形式重建其整体结构及周围的地貌。

在这一由模拟技术呈现的广袤道路网络上，艺术家设置了38位虚拟选手。实际上，这些选手基于中国广州某计算机制造厂工人的真人动态捕捉，他们仍穿着真实工作环境中的蓝色工服。这些工人在这个所谓的游戏板、风景或者巨型舞台上移动，其运动路径由A星算法生成，计算两点之间的最短距离，该算法亦用于GPS卫星定位系统的路线规划功能。当两位工人相遇时，距离其自身目的地更近的一位继续行走，另一位则停止移动，原地坐下或躺下。约24小时至36小时之后，场景里只剩下一名处于站立状态的工人。此时，整个演习的过程结束，所有的工人聚集于场地中心；随后，演习再次开始

《场，俄克拉荷马州的普赖尔小溪，2015》**2015****模拟****尺寸可变**

由**Bernard Chwatal（维也纳）收藏****由艺术家、Simon Preston 画廊（纽约）、Thomas Dane 画廊（伦敦）提供**

2014年初，约翰·杰勒德被禁止进入谷歌服务中心的大楼，随即雇佣了一架直升机，从上空拍摄了大量照片，形成一份详细的调研报告。这一位于俄克拉荷马州的“数据场”或许可视为互联网的重镇，是网络虚拟现实的物质形式。本作品始于这次 航拍调研工作，模拟了“一对” 两侧设有柴油发电机和强力冷却塔的低矮大楼。尽管每一秒钟都有难以想象的信息流穿过这一设施，这座大楼的建筑本身显得索然无味，传达着技术与权力如何交织、运作及消耗。该作品明显与艺术家此前的创作一脉相承——《成长基地》（2008）和《养猪场》（2009），聚焦于外观相似、由计算机控制的建筑：美国中西部地区的工业化农业生产基地和养猪场。

《太阳能储备，内华达州的托诺帕，2014》**2014****模拟****尺寸可变**

由**Carl & Marilyn Thoma 艺术基金会收藏****由艺术家、Simon Preston 画廊（纽约）、Thomas Dane 画廊（伦敦）提供**

《太阳能储备，内华达州的托诺帕，2014》源于沙漠中一座发电厂的计算机模拟，即所谓的“太阳能塔”。在这一设施中，一方面镜子将太阳光反射于中央塔上以加热熔盐，从而制造用以发电的热电池。在一年365天的周期里，该作品模拟太阳、月亮及星星在内华达州的实际运动轨迹，镜子则根据太阳的实时轨迹调整自身的位置。这一虚拟世界由艺术家及其建模师、程序员团队以精心设置的模拟引擎建构起来。每60分钟，地平线视角会转为卫星视角，虚拟摄像头的视角转换、镜子的旋转、日出与日落的节奏共同实现某种复杂的场面调度。

***Exercise (Dunhuang) 2014*****2014****Simulation****Dimensions variable**

**Lent by The Richard J. Massey Foundation****Image courtesy the artist, Simon Preston Gallery, New York, and Thomas Dane Gallery, London**

*Exercise (Dunhuang) 2014* began from satellite images that were the object of intense online discussion and speculation in 2011. These images show a mysterious set of markings on the floor of the Gobi Desert, a precise system of roadways the size of a small town and apparently designed to be seen from orbit. Gerrard began by commissioning a satellite imaging firm to depth-scan these markings in order to digitally reconstruct the entire structure and its surrounding landscape.

Into this simulation, set wandering through the vast road network, Gerrard places thirty-eight virtual players. These players are actually based on full-body motion scans of workers from a computer manufacturing plant in Guangzhou, still wearing their blue uniforms. Players on what may equally be read as a gameboard, a landscape, or a gigantic stage, the workers’ paths across the grid are calculated and determined by the A\* algorithm which calculates the shortest distance between two points, as used in GPS routefinding systems. When two participants meet, the actor closest to their goal continues walking, while the other must sit or lie on the landscape and rest. After a period lasting between 24 and 36 hours, only one remains standing. The process then draws to a close as the figures reassemble at the center of the scene, and the exercise begins anew.

***Farm (Pryor Creek, Oklahoma) 2015*****2015****Simulation****Dimensions variable**

**Lent by Bernard Chwatal, Vienna****Image courtesy the artist, Simon Preston Gallery, New York, and Thomas Dane Gallery, London**

In early 2014, after being denied access to a Google server building, John Gerrard hired a helicopter and produced a detailed photographic survey of it from above. This ‘data farm’ in Oklahoma might be seen as one of the key places where the virtual reality of the Internet takes physical form. The aerial survey was the starting point for this work, which features a simulated ‘twin’ of the squat building flanked by diesel generators and powerful cooling towers. Despite the unthinkable amounts of information that pass through this facility every second, it is entirely mundane in its architectural expression, offering a possible vision of how technology and power now intersect, function and consume. The work bears marked resemblance to Gerrard’s earlier works *Grow Finish Unit* (2008) and *Sow Farm* (2009), which focus on physically similar, computer-controlled buildings: an agri-industrial complex and a pork production facility, also in the American Midwest.

***Solar Reserve (Tonopah, Nevada) 2014*****2014****Simulation****Dimensions variable**

**Lent by The Carl & Marilyn Thoma Art Foundation****Image courtesy the artist, Simon Preston Gallery, New York, and Thomas Dane Gallery, London**

*Solar Reserve (Tonopah, Nevada) 2014* is a computer simulation of a desert power plant known as a ‘solar thermal power tower’. In this facility, 10,000 mirrors reflect sunlight upon the central tower to heat molten salts, forming a thermal battery which is used to generate electricity. Over the course of a 365-day year, the work simulates the actual movements of the sun, moon, and stars across the sky, as they would appear at the Nevada site, the mirrors adjusting their positions in real time according to the position of the sun. This virtual world is meticulously constructed by the artist working with a team of modelers and programmers, using a sophisticated simulation engine. The point of view cycles from ground level to satellite view every 60 minutes, creating an elaborate choreography among the shifting perspective of the virtual camera, the turning of the mirrors, and the rhythms of sunrise and sunset.







关于它与“维基解密”等事物的关系，我没怎么想到这一点。在信息方面，这并不能算是政治的揭露。我会说，它更多是一种推测，而更加重要的是其实质内涵，其经验性的存在。

**岳鸿飞**：我们讨论了石油方面的话题，以及你与罗宾•麦凯（Robin Mackay）、雷萨•内加雷斯塔尼（Reza Negarestani）对石油政治的兴趣。所以我们就这一点继续探讨一下，我想知道更多关于“激活的场景”（Animated Scene）系列的事情，我对这一系列的作品不是很熟悉。

**杰勒德**：从 2007 年起，“激活的场景”系列聚焦于制作沙尘暴的肖像，它涉及一整个系列的场景；这些场景既制作动态图像意义上的动画，亦具有激活（animating）的作用，因为它们产生了当下的现实。油井架的升降既是动画形式，亦是激活的形式，它制造一种我所描述的虚拟状态，即石油的现实，我们均在其中移动。从某种奇怪的角度来说，这一事实在日常生活中如此普遍，以至于我们对它们视而不见。我们生活在一个“石油的现实”无所不在的世界中。我们浸入其中。对我来说，油泵似乎带有一种动物般的忧郁，这又为它添加了另外一层含义。它既抽取地球的原油，也在毁灭它。这个毁灭与被毁灭的机制，亦为“激活的场景”系列的基础，甚至包括沙尘暴、养猪场，以及最后的“场”。谷歌公司的“场”像是“激活的场景”系列出口处的一个点。

**岳鸿飞**：从实际操作的层面来说，“激活的场景”系列是怎么运作的？它们采用了相似的媒介吗？

**杰勒德**：它们都是计算机模型。从根本讲，它们是软件，但也是特地点的肖像。如果你是博物馆或藏家，要购买我的作品，你得到的将是一个软件。这个软件可以被展现出来，需要性能比较强大的机器，比如游戏类的机器。它可以通过投影展现出来，也可以作为一个物体存在，或作为一面 LED 墙而存在。它唯一无法存在的地方是“线上”（online），这有些讽刺意味，因为这些场景太密集、太复杂，目前无法在互联网上展示。

**岳鸿飞**：我想问你关于“开放式”作品的概念，当然这在艺术中是一个很陈旧的概念，与表演性等概念联结在一起。更具体地说，现在有一批艺术家在计算机模拟的领域中创作，像郑曦然（Ian Cheng）的装置，和你的作品类似，人们可以看上几百个小时。

**杰勒德**：如果你是一个受虐狂的话。

**岳鸿飞**：在创作的过程中，你是否参考了历史？还是说科技的影响占了更大的比重？

**杰勒德**：我会从两个方面来回答这个问题。1994 至 1995 年间，我开始用一种近乎观念化的方式创作，我称之为雕塑摄影（sculptural photography）、三维照片。那是从 3D 扫描的技术中延伸而来的。利用 3D 扫描技术，你可以用三维工具——3D 扫描仪来记录三维世界，而非投射在二维平面上的世界。突然间，你获得了可以转动的图像。这让我想起了轨道的概念。马克•莱基（Mark Leckey）的作品《天堂制造》（Made in ‘Eaven）也与虚拟世界中不可见的摄像机概念类似；不过，在此它们围绕着杰夫•昆斯（Jeff Koons）的兔子——那是一个录像，一件渲染作品，我很多年没有看见它了。但是，我继续就雕塑图像的概念展开实践，不过我并没有将它们打印出来，而是把它输入至一个引擎之中。

当我开始使用引擎创作时，首先想到的是“时间视域”（temporal horizons）概念。所以我早期创作了一件作品叫《缓慢的死亡》（Slow Fall），并偷偷借用了《虚幻竞技场》（Unreal Tournament）中的 3D 模型。其中有一段呈现死亡过程的动画，游戏角色在两秒钟的时间内倒下。我改编了这段程序，让倒下的过程持续了 22 天。当时正值北约进攻巴格达与推倒萨达姆•侯赛因雕像之间的时期。那座雕像彼时先是被推翻，又被扶起，随后再次被推翻。这其实是一个延展时间的概念，类似 24 小时的循环。

接下来的一件作品对我个人而言非常重要——《一千年的朝霞》（One Thousand Year Dawn）。其中，一个男子的模拟形象站在虚拟的海滩上。他正在观看日出，日出的实时过程持续一千年。从 2005 年开始，太阳持续上升，直至 3005 年穿越地平线。那时，他会离开海滩。所以这是持续一千年的日出。从我的角度来看，这件作品引发人们对环保的兴趣。除此之外，另外一个重要的线索可能是戏剧。不可避免的是，如果你处理一个三维舞台，即一个动作发生的三维空间，某种程度上来说，塞缪尔•贝克特（Samuel Beckett）的影响不得不被考虑在内。存在一个舞台，一个被给予特定指令的角色，这个角色通过执行指令来完成作品——这是贝克特的形式。当然，不同的是，我的作品中没有真人参与者，只有一个虚拟的参与者。所以，它可以完成非人性的持续长度和非人性的指令要求。我想，这件

is an annual work—the sun rises and falls in real time, which completes the piece along with the orbital camera.

**RP**：There are obviously some components of this that are shared with the other works in terms of the production process and the body of the work, so I want to talk about that a little bit later. But what this piece brings that the others don’t necessarily is this dialogue between secrecy and transparency. Your work very much belongs to the tradition of the leak in a way, the discourse of Wikileaks and all of that, and I wonder how much it belongs in the public domain after you’ve produced it in this way, and what your political position is there.

**JG**：I’m going to put the political question aside for one moment and talk just about energy in a sense. My greatest interest in the site related to what it suggested in terms of what powers it. The internet is completely surrounded by these terms—the ethernet, the cloud—that are almost intangible. It’s sometimes almost ecclesiastical, semi-divine in a way. Then you find this squad of industrial buildings tethered to the landscape, both by coal-powered energy on the one hand, diesel-powered on the other—very historic, carbon-based energy sources. So first of all, in a political sense, I was interested to root the internet in this one particular site, that it’s not an ethereal, otherworldly entity. It has a presence on the landscape. Secondly, in a way I haven’t made it explicit, but just by documenting these great diesel generators it is clear that this is a diesel-powered website. Data is energy in transit. It’s energy. Where does that energy come from? It has to emerge from somewhere. It doesn’t just exist ethereally.

In terms of its relationship to things like Wikileaks, I suppose that was not really on my mind. It was less of a political reveal in information terms. I would say it’s more within that kind of speculative zone, more about its material implications in a sense, its empirical presence.

**RP**：So we had just talked about petroleum and oil, and your interest in that in relationship with Robin Mackay and Reza Negarestani and petropolitics, so why don’t we pick up on that. I want to hear a little bit about the “Animated Scene” series, because I’m not so familiar with that body of work.

**JG**：The “Animated Scene” series began with the portrait of a dust storm in 2007. It relates to a whole series of scenes, which are both animated, in the sense that I animate them, and also animating, in that they create contemporary reality. The rise and fall of the oil derrick is both an animated form and an animating form. It also produces what I describe as a virtual state, which is the oil reality in which we all move. It is, in a weird way, so profoundly entrenched in the everyday that it has almost become invisible, that we live in these petroleum realities that are incredibly omnipresent. We are immersed in them. For me, the pump has this weird, zoomorphic melancholy to it, which was another layer. As it’s draining the earth of oil, it’s also kind of ruining it. It’s this ruined and ruinous dynamic, which is at the base of the whole “Animated Scene” series. I would say it includes the dust storms, the pig production units, and ends with the farms. The Google farms are kind of an exit point from the “Animated Scene” series.

**RP**：Physically how do the “Animated Scenes” work? Are they similar in medium?

**JG**：Well, they are simulations. They are pieces of software, fundamentally, and they are also portraits of places. Now if you were to acquire a work, if you were a museum or a collector, you acquire a piece of software. And that piece of software can be manifested. It needs a powerful machine, like a gaming-type machine. It can be manifested as a projection, it can exist as an object, it can exist as an LED wall. The only place that it really cannot exist is online, ironically, because the scenes are too dense. They are too complicated to function in that space at the moment.

**RP**：I wanted to ask you a little bit about the idea of the open-ended work, which is of course kind of an old concept in art in a way, tied to performativity and all of these things. In a more specific sense, there are a few artists working in the simulation territory now, like Ian Cheng’s installations that, like yours, you could watch for hundreds of hours.

**JG**：Well, if you were a masochist.





目前正在北京展出的作品《演习，敦煌，2014》也是极其非人性的，因为这 38 位“工厂员工”从白天到夜晚一直在表演，这一过程持续一年的周期，没有休息时间、没有食物，也没有任何在正常工作状况下需要的东西。所以这其中存在着某种残忍。但从某种程度上来说，这更像是没有受害者的犯罪。

**岳鸿飞**：谈到《演习，敦煌，2014》，它也是作品系列中的一部分，这系列中的每一件作品都与军事行动、编舞有关，对吗？

**杰勒德**：在很大程度上，即使是非常有经验的人也会将我的作品看成艺术（或文化）的影像。黑特•史德耶尔（Hito Steyerl）和埃德•阿特金斯（Ed Atkins）这样的艺术家也在创作 3D 作品。不过，这些作品的 3D 属性很明显，它们具有一种特别的美学特征，有点类似古怪的早期 3D 作品，甚至带有 1980 年代的风格，就像发电站乐队（Kraftwerk）一样。它们具有一种特别的外观，仿佛在明确地对你说“这是 3D”。我并非自卖自夸，但是花了 20 年的时间，让自己的作品看起来不像他们的作品一样，让自己的作品避免以一种明显的“3D 方式”呈现，而是对摄影史或电影史进行发问。所以我依赖于 3D 扫描技术、动态捕捉（motion-capture）和景观扫描（landscape scanning）等。

从根本上来说，这件作品建立在军事模拟传统的基础上，我指的是作战模拟、飞行模拟——这是它的历史。如果你回溯到最初的时刻，会发现四国军棋（kriegspiel）或战斗游戏，这是早期的策略、沙盘游戏；军事战略家会以此演示作战结果和军事行动。在二战期间，美国实施的“曼哈顿计划”（Manhattan Project）中，这些游戏被录入计算机。所以“曼哈顿计划”的军事策略模型实际上是最早的计算机模拟之一。

我在创作“激活的场景”系列的时候——从 2007 年起持续至今——一直在考虑其作为一种军事科技的特征。我越来越清晰地意识到，发达世界的边缘存在着一些地区，世界各国的军队都持续不断地在此演习。全面战争、大型军事行动是非常罕见的，但是军队必须时刻为此做好准备。在此基础上，巨大的能源支出产生了。这些军事演习在西方发达世界的外缘一直持续进行着。

这种无止境演习的最著名地点之一，就是非洲的吉布提，位于埃塞俄比亚与厄立特里亚国的边境下方。为了寻找一张源于第三军 / 美国军队中央防卫影像分配系统（Third Army/ US Army Central Defense Video & Imagery Distribution System）的美国军队照片的拍摄地，我去了那里，见证了一场实弹演习。他们在演习中使用的不是仿制品，而是真枪实弹。我最终找到该照片的拍摄地点，然后为皇家芭蕾舞团创作了一件作品。这件作品并非在战争之前以真枪实弹刺激军队，却以意外的爆炸而惊吓到伦敦皇家歌剧院的精英观众。随后是由编舞师韦恩•麦克格雷格（Wayne McGregor）编排的舞蹈表演。

这一切启发了“演习”系列作品，其中包括 5 件基于美国军方纪录、重现真实军事演习的作品。不过，它们仍然带有一层剧场或虚构的性质，而这在“激活的场景”系列中则体现得不那么明显。除去一两个例外，那个系列与事实更为接近。例如，其中一件作品中，人物形象呈“8”字形奔跑，这明显是个持续的循环。但从一个有趣的角度来说，它像是一种互联网式的记忆。《演习，敦煌，2014》是“演习”系列的最后一件作品。

**岳鸿飞**：你曾提到过，在创作“演习”系列作品中的一件时，你曾对奥林匹克运动会的开幕仪式感到好奇？

**杰勒德**：是的，这其实是与中国相关的。我的第一个本科学位在拉斯金美术学院（Ruskin School of Fine Art）获得，它是牛津大学的一个学院。众所周知，牛津大学是那个“一英里四分种纪录”的产地地，《火战车》（*Chariots of Fire*）中的那个镜头。牛津大学想要为 2012 年伦敦奥运会做出一些贡献，来突出运动在大学历史中所扮演的重要角色。由于我的毕业生身份牛津大学邀请我创作一件作品，这件作品会在伦敦奥运会期间的文化节中展出。我对他们说，我很乐意创作一件关于国家景观、权力与竞争的日常演绎等方面的作品。但是，我当时拍摄了关于吉布提的照片，很希望能够在其基础上进行一次大规模伤亡的演习——在一个虚构的平坦湖床上，一大批人在一次大规模伤亡事件中受伤，需要被营救。这是一种大规模行动，直升机来到此处，丢下烟雾弹，随后军人营救了所有人，治愈了伤者。

然后，牛津大学的人回应，以重建大规模伤亡的演习来回应奥运会有些奇怪，但是他们同意我这样做了。我与 3 位在为奥运会做准备训练的运动员合作。我的灵感之一就是中国北京奥运会的开幕仪式，它是如此精确，以至于看起来像是虚拟的，像一个盛大的集会；其中，人们的行动实现了高度同步。有一个传言——这是由中国军队进行的表演，因为那是唯

**RP**：Do you come to this place from a particular historical reference? Or is it more of a technological effect for you?

**JG**：I would answer that in two ways. I began to work almost conceptually with what I would call sculptural photography, three-dimensional photographs, in 1994-95. That was derived from the technology of 3D scanning, where, instead of taking the world projected onto a two-dimensional plane and recording it, you record a three-dimensional world using a three-dimensional instrument, a 3D scanner. Suddenly you have an image that you can turn. That connected me with this idea of the orbit. Someone like Mark Leckey, his piece *Made in ‘Eaven* deals with that a little bit, this idea of the invisible camera of the virtual, which centers around, in that instance, Jeff Koons’s bunny. It’s a video piece, a render, basically. I didn’t see that piece for many years, but I took that idea of the sculptural image, and instead of going and printing it back to tape, I put it into the engine.

One of the first things that I thought about when I was in the engine was about what I would call temporal horizons. So I made a very early work called *Slow Fall*, where I sort of stole a 3D model from *Unreal Tournament*. There’s a death animation within it, which takes about two seconds where the character simply drops, and I reprogrammed it so he would fall over 22 days, which was the time between the original invasion of Baghdad and when they toppled the sculpture of Saddam Hussein. So the sculpture falls over that period, gets back up, and then falls again. It’s this idea of stretching time, a little bit like a 24-hour cycle.

The work that then followed that was a really important work for me, personally. It was called *One Thousand Year Dawn*, where you have a simulation of a young man standing on a virtual beach. He’s watching the sunrise, and it rises in real-time over a thousand years. So it started in 2005, and the sun will break free of the horizon in 3005. He will walk out of the sea at that point, so it’s like a thousand-year dawn. That also triggered a lot of interest, from my point of view, in conservation.

Putting that aside, the other thread is probably theater. Inevitably, if you’re dealing with a three-dimensional stage, a three-dimensional space on which action occurs, you’re going to start looking at Beckett at a certain point. I think there’s a legacy of Beckett there where you’ve got a stage, you’ve got a character, and the character is given explicit instructions, which are then played out to form the work. What’s different, of course, in the work that I am doing is that you don’t have a human participant; you have a virtual participant. So you can deal with much more inhuman durations, inhuman requests. And I think the piece that’s in Beijing, *Exercise (Dunhuang)*, is very inhuman in that these 38 factory workers perform through night and day, over an annual orbit, with no rest, with no food, with nothing that would be considered normal working conditions. So there’s a kind of cruelty within it, but it’s sort of a victimless crime in a way.

**RP**：Sticking with *Exercise* for a minute, that’s also part of a longer series, all of the entries in which touch on military operations and also choreography in some way, is that right?

**JG**：For the most part, even very sophisticated people in the art world, or let’s just call it the cultural world, read the work that I make as cinema. People like Hito Steyerl or Ed Atkins are making 3D, but it’s recognizable as 3D because it’s a particular aesthetic, which is kind of early 3D in a weird way. It’s almost kind of 1980s, a bit like Kraftwerk. It has that particular look that says very explicitly, “This is 3D.” Not to heap praise on myself, but I have spent 20 years endeavoring not to look like that, not to build resources that are obviously 3D, but that speak to histories of photography, perhaps to histories of cinema. So for that reason I rely on 3D scanning, motion capture, and landscape scanning, all that stuff.

I think, fundamentally, this work rests on traditions of military simulation, and by that I mean battlefield simulations, flight simulations—that is its history. If you track that all the way back, you find what’s called *kriegspiel*, or battle play, which were early strategy games, sandbox games, where military strategists would play out outcomes and military campaigns. During what was called the Manhattan Project in America during the Second World War, those types of games were computerized. Some of the very earliest simulations were actually the Manhattan Project’s military strategy models.





——一个能在训练后呈现如此精确的表演效果的群体，简直像是行军的另一种形式。我不知道这个传言是不是真的，但是我为这个表演的虚拟性而着迷——作为景观及权力的展示。所以，最终有两个运动员呈“8”字形奔跑，总共跑了两个小时。他们的奔跑经历5个阶段，直至筋疲力尽。这几个阶段由棱镜中的彩虹色模拟烟雾的释放而启动。这是一件制作过程极其复杂的作品，我们花费了一整年的时间制作它；它于2012年在伦敦展出，完全没人理解它的含义。我觉得人们对这件作品完全没有头绪。它是我非常喜欢的一件作品，作为一件艺术品它还很有前景。

**岳鸿飞：**这些奔跑的人是真正的人还是纯粹的模拟？

**杰勒德：**他们是真正的人，以3D方式呈现的真人肖像。我们制作了一些非常美观的3D扫描图像，然后将这些运动员带到伦敦附近谢珀顿地区的、史上最大的动态捕捉设施中，它一向用作电影的拍摄。我们让他们在一个足球场大小的动态捕捉现场以“8”字形奔跑，直至筋疲力尽。我们有3小时的动态捕捉时间。当你进行动态捕捉的时候，会得到作为大数据的动画。这是一段作为万亿数据点的动画，给我们很大的空间去创作和改造；你既可以让它运作起来，也可以通过二维模式下非常难实现的方式去操控它，因为以二维记录的剪辑方式，你很容易陷入不停的拼接中。你可以使用动态捕捉，使其在空间中发生转向，在各种维度上压缩或拉伸它们，时间维度、空间维度；你也可以将它们分配给任何一个虚拟形象，自由度很大，可能性很丰富。

有趣的是，黑特•史德耶尔非常明确地参考了动态捕捉，却没有创造性地运用它，我觉得这有些奇怪。很明显，他的创作与我所谓的“算法转换”（algorithmic turn）概念或算法转换的可能性相关联——将素材重新印在磁带上。她将素材从算法空间中取出——我甚至不确定它是否来自算法空间。她生成了3D的形式，随后将其放置回模拟材质（analogue medium）中。她并没有推进至引擎的空间，但那对她而言，将会是个非常有趣的创作领域。不过有意思的是，这也是很难进入的一个领域。

**岳鸿飞：**所以，这里的运动员在《演习，敦煌，2014》的场景中成了工人？

**杰勒德：**基本上是这样。在敦煌，我先找到的是地点。由于某种未知的原因，这个地方在戈壁沙漠的一个封闭军事区中。它很巨大，面积约有1.5千米x1千米，是一个非常壮观的不规则网格型景观，有人在谷歌地球（Google Earth）上发现。罗宾•麦凯将它发给了我。最初是雷萨•内加雷斯塔尼Reza Negarestani告知他这个景观的存在。随后，他对我说，约翰，这太疯狂了。我随即想要创作一件作品。我得到了委托人的赞助，其中一位来自伊斯坦布尔，另一位来自纽约。随后，我来到敦煌，找到了这个地标。我们没有踏上这一承载着这些地标的土地，但我们发现它是一片砾漠，之下有一些浅色的黏土基质。与大地艺术或古代大地艺术的传统一脉相承，人们只是将土地表面的沙砾刮除，来使下面的黏土露出，也就是你从空间中看到的那些线条。我的第一步是委托一家美国卫星成像公司——他们从太空中扫描了这个地点，因此我们首先得到了地形的景观。

随后我开始思索一个我很感兴趣的概念，所谓的“机器视觉”（machine vision），很有可能这是因为此处景观与之相关。在机器视觉中，有一架安装着摄像机的无人机，可以拍摄这一地貌的景观，并通过一个虚拟的模型来解读它。你还可以编排那些基于地面的无人机，使之与卫星无人机、空中无人机形成对话。它们可以整合为精密的地面/空中/高空演习。所以这也可能正是此地标的意义所在，很可能是某次演习留下的痕迹。现在，这些痕迹已经被腐蚀殆尽，几乎荡然无存；所以，在某种意义上，我对它及时的记录将会是唯一的记录。

机器视觉依赖于计算机编程的主体——处理器、显卡等。所以，我来到珠江三角洲的世界工厂，试图探寻这些东西是由什么生产而来的。我最终在广州找到了一家制造主机的工厂，并与他们商谈，后来38名工人同意参与这件作品。我开始在广州工作，在城市里找到一家摄影工作室，为全部38名参与者做了扫描图。我们得到了这些肖像，然后开始与一组欧洲的演员与舞者合作，将其转化为动态图像。我们用动态捕捉技术捕捉其走路、坐下等一切我们所需要的动作。在一系列繁琐的工作之后，《演习，敦煌，2014》诞生了。这像是一种淘汰赛，这些制作电脑主机的工厂工人在这个地形中在玩着一个极具戏剧性的游戏。

**岳鸿飞：**你刚刚提到古代的大地艺术，我对你的创作作为互联网时代的大地艺术这一点感到好奇。如果我们沿着这个类比的思路，或许可以谈谈大地作为创作中的观念性地理概念，或者说数字材料作为创作的土壤，这或许更为有趣？

**杰勒德：**这些都是非常有趣的观察。在某种程度上来说，在此之前还从未有过这样的说法，所以能注意到它们是很有趣的。我直觉上的反应是这样的：我在洛杉矶度过了一个月，对它的兴趣主要在于4个原因。首先，很明显，这里存在很深厚的电影历史，也存在洛杉矶、

So I’m doing the “Animated Scenes,” which begins in 2007 and runs to now, basically. But in the back of my mind, I am thinking that this is a kind of military technology. I became increasingly aware that, on the peripheries of the developed world in particular, you have these zones where the world’s armies are perpetually in exercise. What are called theater wars are extremely rare—major actions are very rare, but armies must be perpetually ready. On that basis, there’s this enormous energy outlay, which is perpetual exercising on the peripheries of the developed Western world.

One of the most famous sites for these never-ending exercises is Djibouti, in Africa, which is below Ethiopia bordering Eritrea. I went there pursuing a single image from the American army, from the Third Army/US Army Central Defense Video & Imagery Distribution System. It was of what’s called a live-fire exercise, which is an exercise that, instead of using dummies, uses live explosions. I finally found the site of the photograph, and I made a piece for the Royal Ballet called *Live Fire Exercise*. Instead of pre-shocking the troops with live explosives, it sort of shocked this elite audience in the Royal Opera House in London with an unexpected explosion, followed by a series of choreographies developed with Wayne McGregor, who’s a choreographer.

That endeavor triggered what I call the “Exercise” series, which is about five works that recreate actual military exercises on the basis of documentation released by the American army. But there is a layer of theater or fiction inserted within them, which is not typical for the “Animated Scene” series. Those are very factual as such, bar one or two exceptions. But the exercises are military exercises, which are then fictionalized. For instance, one of them runs a figure of eight, which is obviously a perpetual loop, but also kind of like an internet sort of memory, in a funny way. *Exercise (Dunhuang)* is the last step in the “Exercise” series.

**RP:** You’ve mentioned that in one of the “Exercise” pieces you were also curious about Olympic opening ceremonies?

**JG:** Yes, which actually relates to China, quite explicitly. My first undergraduate degree was at the Ruskin School of Fine Art, which is part of Oxford University. Oxford, rather famously, was where the four-minute mile was run. That *Chariots of Fire* moment. Oxford wanted to do something for the 2012 London Olympics that would acknowledge the role of sport in university history. As a graduate, I was approached to propose a work for the University, which would be installed as part of the cultural festival alongside the Olympics. So I said, well, I would love to make a piece about national spectacle, about the everyday performance of power, of competition, all these things, but I have these pictures from the American army of this exercise in Djibouti, and I really want to base it on this mass casualty exercise, where you take this great flat lakebed, and all these people are fictitiously injured in a mass casualty, and then they have to be rescued. It’s a huge operation, with all these helicopters coming in, and they drop smoke bombs, and they all run around, rescue everybody, and repair injured people, that sort of stuff.

So Oxford University said, uh, that’s a bit strange that you want to respond to the Olympics by recreating a mass casualty exercise, but they let me do it. I worked with three athletes training for the Olympics, and one of my references was the opening ceremony from the Chinese Olympics, which was extraordinarily precise. It looked almost virtual in its precision, this great gathering of people doing very synchronized things. There was a rumor that it was performed by the Chinese army, because that is the only entity that is sufficiently trained to produce a performance of that precision. It’s almost like marching redux. I don’t know if that’s true or not, but I was fascinated by the virtuality of it, as spectacle and as representation of power. So in the end it had two of the athletes running in a figure of eight, and they run for about two hours in total. They run to the point of exhaustion in five stages, and those stages are triggered by the release of camouflage smoke in the color of the rainbow, of the prism. It was a very complicated piece to make. We spent a year making it, and it was installed in 2012 in London. And literally nobody really got it. I think they couldn’t make heads or tails of it. So it’s a piece that I really like, but I think it has its life ahead of it as an artwork, if you know what I mean.

**RP:** Were those runners real people, or were they pure simulations?

**JG:** They are real people, real portraits of real people represented as 3D scans. We made these very beautiful 3D scans, and then we brought those athletes to the biggest motion capture setup in history, which had been put together for film in Shepperton near London. We





旧金山和帕罗奥多之间深远的科技发展历史。我的作品与科技、电影都有关系。洛杉矶又具有另外一层意义，这里有光与空间（Light and Space）的运动，有约翰•麦克拉克肯（John McCracken）、我的偶像罗伯特•欧文（Robert Irwin），以及拉里•贝尔（Larry Bell）。在这里，你可以感受到光与空间运动的无与伦比的历史。另一方面，这里又有大地艺术、《螺旋形防波堤》（*Spiral Jetty*），詹姆斯•特瑞尔（James Turrell）等。

所以我对这一空间思考了很多，包括这件作品如何与那个地区产生关联与对话。对我来说，大地艺术的迷人之处之一在于罗伯特•史密斯森（Robert Smithson）的《沥青倾泻》（*Asphalt Rundown*）。其中一辆卡车一面靠着悬崖，倾斜着，并从悬崖处将沥青倾泻而下，从而完成这件作品。有趣的是，它明显是一件大地艺术作品，也反应出不可思议的石油机制，因为你必须将这一以柏油为基础的材料——沥青，通过卡车运输到沙漠中央，然后使用石油能源将它浇下悬崖。所以这是非常不可思议的观察，因为自从这件作品被创作出来后，我们在整个地球上都洒满沥青。我也想到中国及其巨大的碳能源区域、废料。

谈到大地艺术的历史，计算机仿真的有趣之处在于，它消耗能源，但消耗量极少。大地艺术描绘了一种非常特别的潜能，石油的潜能，一种由石油驱动的介入行为的美国式语言。你用挖土机挖一个巨大的洞，然后在其中泼洒液体。不过，我不会说，这种行为带有一种环境上的无知，大地艺术在物质方面的含义没有被充分地讨论，像《太阳能储备，内华达州的托诺帕，2014》。奇怪的是，它有些像《螺旋形防波堤》（*Spiral Jetty*）与镜面创作的混合，像拉里•贝尔的创作。它同时看似一种神话的形式。它是地面上的一件太阳能设备，不过不一定非常实用——关于它是否实用还并不明晓它是艺术介入的行为不一定会造成太高的环境成本。我觉得将大地艺术当作一种虚拟形式，并呈现给观众——这是很有趣的。这种主要的介入是轻松的。

在读大学本科的时候，我最早喜爱的艺术家可能是马塞尔•杜尚（Marcel Duchamp）。很奇怪，后来这个地位被布鲁斯•瑙曼（Bruce Nauman）取代了，随后则是费利克斯•冈萨雷斯-托雷斯（Felix Gonzalez-Torres）和 罗妮•霍恩（Roni Horn）。不过如果细数我喜爱的艺术家，应该包括杜尚、马塞尔•布达埃尔（Marcel Broodthaers）、瑙曼，以及将那类空间与情色、身体混合起来的作品。当我刚成为艺术家时，大地艺术对我来说不是一个主要的着眼点。但是，这些作品在后来对我而言逐渐重要起来，尤其因为我与唐纳德•贾德（Donald Judd）的关系。“养猪生产场”系列作品来自一次参观马尔法（Marfa）的经历。我来到马尔法，并观看了贾德的杰作。在我开车穿越那片土地的时候，凑巧看到一些与贾德作品类似的建筑物，那些夺目的连续形状、结构中充满了猪。这就是我创作这件作品的原因。那些养猪生产场可能是一种对贾德的另类回应，像冈萨雷斯-托雷斯用悲剧和身体来激发贾德的潜能，将生命强行置于贾德的纯粹实体中，我则用猪来塞满贾德的作品。从某种角度上讲，数据，比如服务器的“场”，是非常具有连续性的。从外观上看，场实际上是极简的实体，但它充满了力量，不是空的，在其中放着40000台计算机。

**岳鸿飞**：猪和数据；有点像美国香肠的填料。我注意到这些形式都与美国有关，是美国军事工业复合体的一部分。你选择在这个方向上进行创作实践，却没有选择相关的欧洲主题，有什么特别的理由吗？

**杰勒德**：我对美国的兴趣来自这几个层面：首先是因为那里发生了地球上最大的石油开采行为，第一次石油大开采在德克萨斯州的纺锤顶（Spindletop），在1901年。它从根本上使整个20世纪运转起来。很多石油巨头都是在这次开采中起家的。被称为卢卡斯井喷（Lucas Gusher），那是一个非比寻常的历史瞬间，事实上我现在正根据这一事件创作一件主要作品。在1901至1950年间，是所谓美国霸权完全建立的时期，而这与石油的推动极其相关。这里的霸权，是军事、文化与经济霸权。在1950年至2000年之间，出现了一些来自不同层面的挑战，但是美国依然保持着军事霸权。文化上，美国的影响仍然很强大；经济方面，情况一般。所以无论谈到哪里的现状，我们都要承认美国的霸权及美国科技带来的影响。

如果你从数据角度来考量一些大公司，谷歌显然是其中最大的怪兽，但同时也存在脸书（Facebook）和其他发展中的美国商业巨头。同时，这里存在基础结构的极大动力，与19世纪铁路的铺设有些相似，当时的铁路工程为未来至少四五十年的贸易提供了基础。目前存在一种围绕基础电缆而建设的好斗情绪，导致一群强盗资本家（robber baron）角色的崛起，一群正在崛起的马克•扎克伯格（Mark Zuckerberg）式企业家。对于处在晚期资本主义社会的美国，文化结构似乎迅速地进入了一个关键时刻。因此，景观中出现的各种形式得到了充分的发展，它们在审美方面让我产生了兴趣。

奇怪的是，在另外一个层面上，美国的土地大部分都具有一个特质，即荒漠或荒野般的其他特征。欧洲的土地是非常密集的，那里简直不具有进行大规模基础设施实验的空间。但是中国却有，所以我一直密切关注着中国，但是如果你的创作集中在虚拟层面，美国具有非常奇异的景观，它们本身就带有一种虚拟属性。“养猪生产场”是如此，太阳能储备也是这样。

ran them in a figure of eight on a football pitch-sized motion-capture field until they could no longer run. We got about three hours of capture. When you motion capture, you get animation as big data. It’s animation as a trillion data points, and it becomes a very rich terrain to work in, because you can both let it run and also manipulate it in a way that is very hard to manipulate in two-dimensional records, because for those you just get trapped in collage in the edit. You can take those motion captures, turn them in space, compress them, stretch them in all dimensions—temporal dimensions, scale dimensions—and you can then assign them to virtual bodies of any sort. It is really a rich terrain.

It’s funny because Hito Steyerl is explicitly referring to motion capture without actually using it, which is slightly strange. She’s also explicitly relating to what I would call the algorithmic turn, or the potential of the algorithmic turn, and then printing that material back to tape. She takes it out of the algorithmic space—I’m not sure if it was ever even in the algorithmic space. So she generates 3D forms and then puts them back into an analogue medium. She’s not progressing into that space of the engine, which could be a really interesting space for her to work in. But it’s not easy to penetrate, in a funny way.

**RP**: So the athletes in that scenario in *Dunhuang* then end up as factory workers?

**JG**: Basically, in *Dunhuang* I found the landmarking first. The landmarking is, for reasons unknown, in a closed military zone in the Gobi Desert. It’s vast, about 1.5 kilometers by 1 kilometer. It’s this great, fractal grid on the landscape, which was discovered by people on Google Earth. Robin Mackay sent it to me. It was sent to him by Reza Negarestani originally, and he said John, this is wild. So I wanted to make a work. I raised some support from a commissioner in Istanbul and also one in New York, traveled to Dunhuang, and found the markings. We didn’t get onto the markings, but we worked out that this is a gravel desert, and there’s a pale clay substrate underneath. In the tradition of land art, ancient land art, they’ve simply scraped the gravel off the surface of the land to reveal this pale clay, which is what those lines are that you see from space. So the first step was to commission an American satellite imaging company, and they scanned that site from space. So we got the landscape, first of all.

Then I was developing a concept where I was interested in what is called machine vision, because it’s likely that this landscape marking relates to this. In machine vision you have a drone equipped with cameras that sees that landscape and can understand it in a model, a virtual model, and then you can position other land-based drones in dialogue with satellite-based drones and air-based drones. They can coordinate some kind of sophisticated land/air/sky exercise. So that’s probably what that marking is; it’s quite likely a remnant of an exercise. But it’s now being washed away. It’s nearly gone, so my record of it, in time, will be the only existing record of it, in a way.

Machine vision relies on the corpus, the body of computing—the processor, the graphics card, these things. So I went to the workshop of the world in the Pearl River Delta trying to find where these kinds of things are made. I finally found a factory in Guangzhou that makes motherboards, and negotiated with the workers that 38 of them would join this piece. I worked in Guangzhou proper, in the actual city, with a photo studio, and we photo-scanned all 38 participants. So we had those portraits, and then we worked with a group of actors and dancers in Europe to animate them. We motion-captured them walking, sitting, all the things we needed, and, after an insane amount of work, it became this piece, *Exercise* (*Dunhuang*). It’s a sort of elimination game, where these factory workers who produce motherboards are playing a theatrical game on this landscape.

**RP**: You mentioned this reference to ancient land art, and I was curious about your work in general as a kind of land art for the internet age. I was wondering if we kind of follow that analogy, is it more interesting to talk about land as the conceptual geography of what you do, or is it more interesting to think of the digital material as kind of the soil, the stuff of what you do?

**JG**: I think both of those are interesting observations, and in a sense, they are new ones, so it’s interesting to pick up on it. I would say my first kind of gut response is this. I just spent a month in Los Angeles, and there are four reasons I was interested in Los Angeles. First of all, obviously you’ve got deep histories of cinema there, and you’ve got incredibly deep histories of technology between L.A. and San Francisco, Palo Alto, those kinds of places. My work has one foot in technology and the other foot in cinema, in a sense. Then the other





最后我要说的是，我出生在爱尔兰，在英国和美国读书，奇怪地处在英、美轴线之中——在某种程度上，爱尔兰在右边的英国和左边的美国之间迷失了。所以，我也在承认我个人的历史，在我称之为英美轴心的位置上创作，一个以英语为主要语言、科技发达、军事化、“自由”流动的全球化主导空间。就像大地艺术反映了石油的现实一样，我的作品表达了一种现实，即晚期资本主义社会蕴含着超级能量的自由，你可以做任何你想做的事情。即使是这样，我开始进入一些边缘空间，而我实际上似乎是非法的闯入者。创作在 UCCA 展出的所有作品时，我都处于某种擅自闯入的状态。这不是公共空间，所以作为一个受过西方教育的、英美背景的富有操作者，我在走向我自由的边界，挑战这些极限。

**岳鸿飞：**我们刚才谈到了关于生态成本的内容，我很好奇这些作品所需的运转能源，你是否有兴趣让它也成为呈现内容的一部分？

**杰勒德：**这是个好问题。你的观察也十分细致。事实上，关于这个问题，我想了很多，因为我制作的这些作品基本上是软件。如果没有能源的话，它们就不存在。这些作品其实是传输中的能源。这是它们的状态。没有胶卷，没有人工制品，只有被打包成一个可执行文档的一系列指令。如果没有计算机来运作它，就什么都不存在。所以我的逻辑是，这些作品作为回应现状的方式是非常耐人寻味的，因为我们的现实被我称之为算法转换的东西深刻地影响着。金融投资、政治决策、军事决策、经济贸易、超市：它们都在模拟现实，在此基础上，它们决定着现实形成的方式。我想，艺术家需要考虑到算法的现状，并用一种精确的方式使用它们。

但是能源动力是必需的。这些作品必须被实时呈现出来。对于这个方式，我想说的是，文化表达的价值在哪里？它有价值吗？这个价值可否被量化？回到鲍里斯·格罗伊斯（Boris Groys），他谈论了艺术的力量。艺术的核心力量是什么？它是合理的吗？是有趣的吗？让我们再看军事演习，我想我在一生中创作的所有作品，都不会用到一次军事演习中所花费那么多的能源。所以，我的解释是，在创作和展示这些作品时所消耗的能量，通过其以艺术回应现状的特质而被证实。它们可以改变公众的想法，不管是正面的，还是负面的——它们都具有一种文化力量。我会在这个基础上继续创作；我不会因其对能量的消耗而停工。

另外一个层面是作品的展示。公共艺术基金（Public Art Fund）曾经问我，你想如何在纽约展示自己的作品。我说，我希望能通过一个无框 LED 墙来展示它们。讽刺的是，LED 实际上不会消耗那么多能量。在城市空间中，它可作为巨大的空间介入方式。不过它又因时代广场的规模大幅度矮化。如果商业贸易可以消耗能量，并在 LED 屏上展示它们的力量，为什么艺术家不能借鉴这个方式？不仅借助它探讨消费问题，也探讨当代境遇、可持续性及其他主题？我们正在被与消费相关的信息轰炸，因此以批判的态度去回应这个现象是必要的。正如杰夫·沃尔（Jeff Wall）将广告技术的历史浓缩进他的电影中，如刚刚出来的幻灯片。或许，LED 墙目前与广告历史的挪用相去不远，它作为一种广告技术在艺术方面存在很大潜能。

**岳鸿飞：**我好奇的是，在展厅中我们看不见运行作品的计算机。你是否有意不将电线和灯光等事物展示出来？

**杰勒德：**你想到的是布鲁斯·瑙曼这一派，他非常刻意地不去制造一种无缝对接的错觉。他将材料本身完全展现出来，你看到的就是那样。我想，我的习惯与詹姆斯·特瑞尔和罗伯特·欧文等人更相关，因为我创作的不是影像装置，而是用一种比较正式的方式设置光。我最大的兴趣是，制造模棱两可的介入装置，公众不太能理解的装置。无框播放的好处之一，是消除了现实与介入行为之间的明显差别。从历史上说，画框带有“这是一件艺术品”的暗示。如果你能设法将作品的边框去除，消除现实与作品所呈现世界之间的界限，那么这就会产生一种离奇的感觉。

人们问的第一个问题通常是“这是什么？”“这件作品有问题，它看起来有些像电影，但我不觉得它是电影”。在纽约，当我坐在观众旁边时，他们对《太阳能储备，内华达州的托诺帕，2014》到底是什么”进行了令人捧腹的解释。《太阳能储备，内华达州的托诺帕，2014》是一个软件，但有人说这是一个地方的实况直播，并开始讨论如何设置相机才能使空间实现这种程度的无缝对接。人们对他们朋友说的话简直令人发笑，比如说，摄像机是被安装在无人机上的——不可思议。但是，从根本上讲，人们还是能看出这个场景有些不寻常。下一个层面的问题在于，观众无法确定作品中真实的部分、再现的部分从何处开始、结束，因为这些作品被安装得天衣无缝。我将所有的仪器都嵌入作品内部，于是一切线索都被排除在外——这是一件基于计算机的作品，一个投影仪，诸如此类。

我也设法隐匿了制作这件作品的技术设备。回到埃德·阿特金斯一类的艺术家，他的语言带有自觉的三维性，显示出一种游戏美学。我在过去 15 年的创作过程中，都试图避开这种

layer in L.A. is that you’ve got Light and Space, you’ve got John McCracken, you’ve got my great hero Robert Irwin, you’ve got Larry Bell. You’ve got those extraordinary histories of Light and Space, and on the other hand, you have Land Art, *Spiral Jetty*, Turrell, all those kinds of things.

So I’ve been thinking a lot about that space, how this work speaks to and relates to that area, and one thing about Land Art that for me is quite fascinating is Smithson’s *Asphalt Rundown*, where a truck was backed up to a cliff and tipped up, and the asphalt simply tumbled down that cliff and became a work. What’s interesting to me about that is that it’s obviously a piece of Land Art, but it also illustrates an incredible petroleum dynamic, because you have to take this tar-based material, asphalt, drive it on a truck out to the middle of the desert, and use petroleum energy to tip it off the side down a cliff. So it’s an incredible observation, because we have made an asphalt spill of the entire Earth in the interim, since that piece was made—thinking about China as well, and its vast areas of carbon resource and waste material.

What’s interesting to work with in simulation, talking to histories of Land Art, is that illsimulation has an energy profile, but a very light one. Land Art illustrates a very particular potential, which was a petroleum potential, an American language of major, petroleum-driven intervention. You take a JCB and you dig an enormous hole or you spill something. While I would never say there is an environmental blindness to those actions, the material implications of Land Art have not been much discussed. With a piece like *Solar Reserve*, it’s weirdly like a blend of *Spiral Jetty* and someone working with mirrors, like Bell. It’s also a kind of mythic form. It’s a solar device on the landscape, which is not necessarily very practical—it’s a bit unclear as to whether it’s practical or not. It’s an intervention artistically, which doesn’t really have much of an environmental cost, in a sense. I think it’s interesting to pick up Land Art as a virtual form and present it to the public, these major interventions that are light.

My first great artistic love was probably Duchamp, as an undergraduate, who then was replaced by Nauman, and then, in a weird way, Felix Gonzalez-Torres and Roni Horn. If I was to trace a lineage love affairs, it would be probably Duchamp, Broodthaers, Nauman, and then that integration of the erotic and the body into those spaces. Land Art was not a major subject for me as an emergent artist. But I think the work in time has become important to me, particularly through my relation to Judd. The pig production units came from a visit to Marfa. I went to Marfa, and I saw the great Judd opus. I drove back across the landscape, and there were these accidental Judds, in a weird way, these glittering serial forms filled with pigs. I think that’s really why I made them, those pig production units almost responding to Judd in a weird way, like how Gonzalez-Torres sort of filled Judd’s potential with tragedy, and with body. You kind of force life into Judd’s literal objects. I have sort of then filled Judd’s legacy with pigs, in a sense. Data, like the farms, are very serial. If you look at the farm, it’s actually a minimal object in a sense, but it’s full of power. It’s not a void. It has 40,000 computers in there.

**RP:** Pigs and data: it’s kind of like the stuffing of the American sausage. I notice that these forms are mostly American, part of the American military-industrial complex. Is there a particular reason you gravitate towards that over a European parallel?

**JG:** I am interested in America on a couple of levels. First of all, the greatest oil strike on earth, the first great oil strike on earth, was in Spindletop, Texas, in 1901. It kickstarted the twentieth century, basically. Many of the oil majors emerged from that strike. It’s called the Lucas gusher, and it’s an incredible historic moment, on which I’m actually basing a major work at the moment. Between 1901 and 1950, what I would think of as a total American hegemony emerged, powered by petroleum very particularly. And by hegemony, I mean a military hegemony, cultural hegemony, and economic hegemony. Now, between 1950 and 2000, there was a challenge on quite a few levels, but American military hegemony still stands. Culturally, it’s still fairly strong. Economically, it’s in the middle I would say. So if you talk about conditions anywhere, you have to acknowledge American hegemony and the influence of American technologies.

If you look at the big dominant companies in data terms, Google is obviously the monster, but you have Facebook and all the other emergent American superpowers too. You also have this incredible infrastructural drive, a little bit akin to the laying of the railways in the nineteenth century, which has laid the substrate for future trade for





语言——这其实是非常难的。你需要组建一个团队，要筹到 30、40 万美金，而且要花费一年才能创造出一件作品。即使是现在这些作品仍然是稚嫩的，因为制作它们的过程极其复杂。展览中的每一件作品，都是一个 5 至 15 人的团队花费了一年的时间制作出来的，为这个团队支付薪水、组织这个团队都不容易。

超级写实主义不是最终目的，但回溯绘画史中的约翰内斯·维米尔(Johannes Vermeer)，这是一个起点。当你真正实现了逼真，便可以就此大干一场。但是我们目前在虚拟领域中还没能达到绘画对现实的呈现水准。我们正在边缘上徘徊。从这个角度来说，我的作品很有意思，因为他们正陷入真实与对真实的再现之间，这里存在着模糊的中心地带。《演习，敦煌，2014》并非如此，因为其中的人物形象提供了很多线索。但是，《太阳能储备，内华达州的托诺帕，2014》完全是这样的。我有时会弄混照片与作品的静帧，基于镜头的记录与来自虚拟世界的静止画面。我希望人们带着一种不安或焦虑的情绪沉浸在这件作品中。对我而言，这是非常有趣的，因为这是充满焦虑的时代。

**岳鸿飞：**谈到作品中图像的外观，很明显，对于人的肉眼来说，一切都非常清晰。我很好奇为什么这一点如此重要，为什么不采用机器视觉这个概念，并进一步发挥这个概念，而减少其视觉上的吸引力？为什么计算机模拟要成为如此完美的视觉再现？

**杰勒德：**我想，这个问题与风格有关。我可以以一种更加抽象的方式来呈现世界，像菲利普·加斯顿(Philip Guston)那样。这可能会很有意思。但我是一个形式主义者，我无法让我自己以那样的方式创作，无法将其呈现给大家，那让我感到尴尬。我确实认为对一些年轻一代的艺术家而言，虚拟呈现是一种惯例，他们会在其之上发展出自己的风格。你必须要建立它们。我觉得乔丹·沃尔夫森(Jordan Wolfson)很有趣，虽然他不在虚拟领域内创作，但引入了机器人学(robotics)，发展出一种混杂的、漫画式的、阴郁的美学风格，同时探讨了虚拟和文化领域的问题。他的创作以一种怪异的方式将机器人学发挥得淋漓尽致。

**岳鸿飞：**最后一个问题：就技术层面而言，你非常清晰地展现出，你的作品作为软件而存在，但同时我发现你也将其称为雕塑。你能否就这一点做出一些解释。

**杰勒德：**我会说，在技术层面，在纯粹实际的意义上，这件作品是计算机模拟。它是一个可执行文档，其中含有 5000 到 10000 行代码，这些代码生成你最终看到的这个世界。所以，它是一个计算机模拟程序，不是电影，不是影像。这里没有任何人工制品，你所获得的只有一系列指令。它百分之百是一个软件，我将其称为计算机模拟程序。但同时，它也是图像，带有三维特性，因为你可以在其中走动。这是由评论家和理论家去判断的，但在我的思考中，它保持着雕塑的某方面特质，因为我可以走在这把椅子的周围，在视觉上体验这把椅子，通过视神经与大脑之间的联系。我可以环绕它的四周，可以环绕整个世界——它既作为一个图像存在，又作为一件物品存在。所以这也就是为什么我时不时称它为雕塑摄影，三维图像。

**岳鸿飞：**听起来你在某种程度上正在进入虚拟现实的领域。

**杰勒德：**是也不是，有两个理由：其一，虚拟现实的视觉体验质量很低。虚拟现实头盔——我无法采取这种方式。对我来说，进入这个领域还太早，因为我投入了巨大的资源来制造非常密集的视觉图像，制造这一世界。我见过的所有虚拟现实都很糟糕。不过，我不排除未来进入这个领域的可能性。但我也很关注它与二维图像制作的历史——比如说绘画——之间的相互作用。它像一个绘画空间，但又具备引擎的巨大潜能。我应该会坚持这样创作下去。我对 LCD 显示屏越来越高的分辨率，以及多样化的屏幕幅型都很感兴趣。与浸入式技术相比，我对此更感兴趣。

at least the next 40, 50 years. And there's an incredible amount of aggression around that infrastructural layout in cabling and all that. It has resulted in these robber baron characters that are emerging, the Zuckerbergs. Things seemed to reach a critical point very rapidly in the dynamic culture of American late capitalism. As a result, the forms that emerge on this enormous landscape are profoundly developed, and for that reason, they greatly interest me aesthetically.

The other layer, in a funny way, is that a lot of the American landscape has this very particular quality, whether it's desert or another wild quality. Europe is extraordinarily dense. They simply don't have the space to place these incredible infrastructural experiments. China does, actually, so I'm paying close attention to China. But if you're working in the virtual, America just has these scenes that are so profoundly strange, they almost appear virtual on their own. Pig production units would be one. Solar reserves would be another.

The last thing I'll say is that I was born in Ireland, and then educated in the UK and in America. So I have existed on this Anglo-American axis in a weird way—Ireland sort of lost between the UK on the right and America on the left. So I'm also acknowledging my own history, operating on what I would call an Anglo-American axis, which is a very globally dominant, English-speaking, technically sophisticated, militarized, "free"-moving kind of space. And as much as Land Art expresses petroleum realities, my work expresses a kind of late capitalist, turbo-powered freedom, in a funny way, to do what you wish. Even in that, I'm starting to move into peripheral zones where I am technically trespassing. For all of the works in UCCA, I am technically trespassing. These are not public sites. So I am going to the edge of my freedom as a wealthy, Western-educated, Anglo-American operator. I am pushing on those limits.

**RP:** We were talking a little bit about ecological costs, and I was curious about the processing power that's required for these works, and how interested you are in making that a part of the presentation.

**JG:** That's a good question and a good observation. I actually think around this subject quite extensively, because I am producing works that are fundamentally pieces of software. They do not exist if they're not energized. The works are effectively energy in transit. That's their condition. There is no film. There is no artifact. You simply have this set of instructions, which is bundled into an executable file. Without a computer to execute it, you have nothing. So my logic around that is that this is a very pregnant way to respond to contemporary conditions, because a lot of our realities are profoundly influenced by what I would call the algorithmic turn. Investment banking, political decision-making, military decision-making, trade, supermarkets: they are modeling reality, and, on that basis, they are making decisions about how reality is formed. I think artists have to take on algorithmic conditions and use them in a sophisticated sense.

But there is an energy dynamic in that it has to be produced. These works have to be produced in real-time. I suppose the way that I rationalize that is, what is the value of having a cultural voice? Is there a value to that? Can it be quantified? Getting back to someone like Boris Groys, he talks about art power. What is the essential power of art? Is it valid? Is it interesting? And looking at something like a military exercise, I think in the entire lifetime of all the works I have ever made, they would never use the energy expended in one military exercise. So I've had to rationalize that my energy consumption to produce these works and manifest them is validated by the potential to speak to contemporary conditions, artistically, and to move the public, whether positively or negatively—to have some sort of cultural force. On that basis I continue to work; I've not just shut down this process because it consumes.

The other layer for me is obviously display. The Public Art Fund asked how do you want to display your work in New York, and I said I want to put it up on a frameless LED wall. LEDs actually don't consume that much energy, ironically. But it was a massive intervention in the city. But again, it's dwarfed by a thousand times by Times Square, so if trade gets to consume energy and display its force on LEDs at that scale, why should an artist not co-opt that system and put it to work to speak not just about consumption, but about contemporary conditions, sustainability, and other subjects? Because we are bombarded by messaging related to consumption, critique is essential in response. A little bit like how Jeff Wall absorbed the histories of advertising





technologies into his large films, like the printed transparencies. The LED wall is probably not far off from being the equivalent now, in terms of an advertising technology that has great potency for art.

**RP:** I was curious, you don't see the machinery of the work there, in terms of the computer. I assume you have a reason for not showing your cables and lights and things like that?

**JG:** You're thinking of the school of Nauman, who is very self-conscious about not creating any illusion of a kind of seamlessness. He just puts his material on the ground, and that's what it is. I suppose my tradition pays closer attention to people like James Turrell and Robert Irwin, in that I am not doing cinema installations, I am installing light in quite a formal way. So my great interest is to create ambiguous interventions, which the public cannot quite place. One of the benefits of working framelessly is that you lose that stark distinction between the real, on the one hand, and the intervention, on the other. Historically, the frame says "this is an artwork." If you're able to install the work with no edge to it, with no barrier between the real, as you find it, and the world of the work, this slightly uncanny sense emerges.

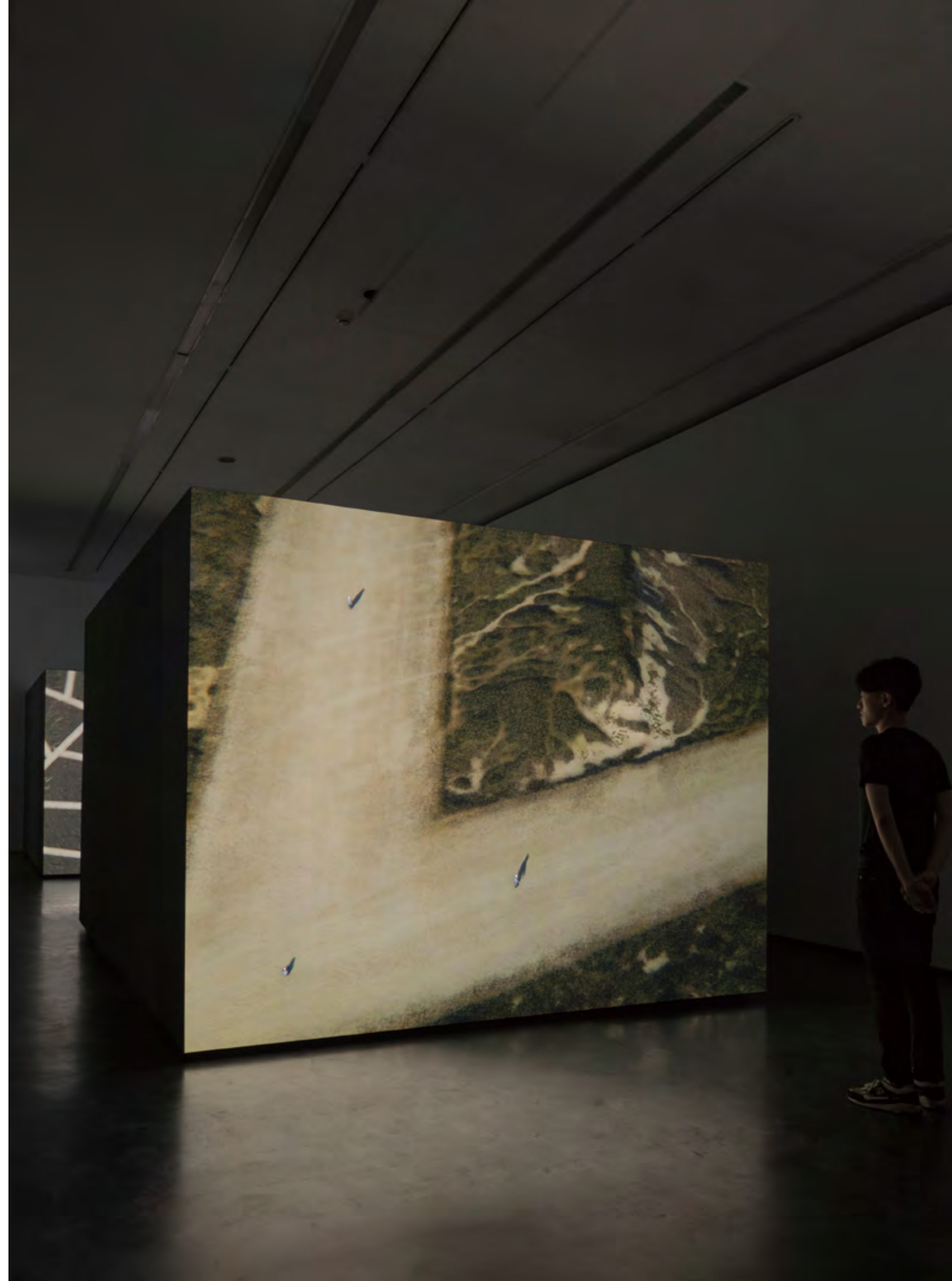
The first question they say is, what is this? There's something wrong with it. It looks a little bit like a film, but I don't think it is a film. When I sat beside people in the installation in New York, people had hilarious theories as to what what *Solar Reserve* actually was. *Solar Reserve* is a piece of software, but some were saying it was a live feed from the site, and then they would work out how the camera could be lifted so seamlessly into space. The things that people would tell their friends were literally hilarious. You know, like there was a camera attached to a drone—fascinating. But, fundamentally, people know that there's something wrong with the scene, and the next layer for me is that they are not quite sure where reality starts and representation begins, because these works are very seamlessly installed. I have all the equipment embedded in the works so that any of those clues are excluded—that this is a computer-based work, this is a projector, this is whatever it is.

I also endeavor to remove artifacts of the technology that gives rise to the work. Getting back to someone like Ed Atkins, his language is self-consciously three-dimensional. It has a game aesthetic of a sort. I have worked for 15 years to try not to speak that language, which is brutally hard. You need to build a team, you have to raise three or four hundred thousand dollars, it takes a year to make a work. Even now the work is still naïve, because it's brutally hard to make these pieces. Each piece in that show would have taken a year to make for a team of five to fifteen, and that's not easy to pay for or to organize.

It's not that photorealism is the end game, but certainly in terms of histories of painting going back to Vermeer, it's a start to a game, where you actually achieve verisimilitude, and then you fuck with it. But we haven't quite got to a painterly representation of the real within the virtual yet. We are hovering on the edge. My works are getting interesting in that regard, because they genuinely are starting to slip into a space between the real and the representation of the real. There's a kind of ambiguous trough there. Less so *Exercise (Dunhuang)* because the human figure gives away too many clues. But certainly in *Solar Reserve*. I sometimes mix up photographs and stills, the lens-based record and the still from the virtual world. I want people to emerge into the work from a place of discomfort, or a place of anxiety. That for me is really quite interesting, because these are anxious times.

**RP:** Talking about the appearance of images in the work, everything is obviously very legible for the human eye. I am curious why that is so important, why you don't take on this idea of machine vision and push into something more conceptually productive and less visually appealing in that territory? Why do the simulations need to exist in such a perfectly recreated visual sense?

**JG:** I think that gets down to questions of style. I could represent these worlds in a more abstract fashion, almost like Philip Guston. It could be really interesting to do that. But I'm such a formalist that I can't bring myself to do it. I just can't release it. It's too embarrassing, somehow. I do think that a younger generation of artists coming up, for whom this kind of virtual representation is the norm, will take it as they find it and develop their own styles. You have to literally build these things. I would say someone like Jordan Wolfson is quite interesting, because while he's not working within the virtual, he is absorbing robotics and





developing this hybrid, cartoonish, sinister aesthetic that speaks to the virtual but also culture. He is operating on a very rich terrain within robotics in a weird way.

**RP:** One more question. You're obviously very technically clear that your work exists as software, but I also see that you refer to it a lot as sculpture. I was wondering if you could explain that a bit.

**JG:** I would say that technically, in purely practical terms, this work is simulation. It is an executable file, which has five to ten thousand lines of code and produces the world that you see. So it is a simulation. It's not a film; it's not a video; it's not any of these things. There is no artifact. You really acquire a set of instructions. It's 100 percent a piece of software, which I would call a simulation. But, by the same measure, it's also an image, which has been given a three-dimensional quality in that you can travel around it. I mean, this is for you critics and theorists to decide, but, in my thinking, it retains aspects of the sculptural quality of the real in that I can walk around a chair and experience it visually, in terms of its relationship between my optic nerves and my brain—as an object. I can look around it. You can also look around this world—it exists as an image that is also an object. So that's why I occasionally call them sculptural photographs, images that are three-dimensional.

**RP:** That sounds like you are moving towards VR in a way.

**JG:** I am and I'm not. There are two reasons for that. One is because the visual experience of VR is so impoverished. The headsets—I can't go there. It's far too early for me to go there because I invest enormous resources into creating these very dense visual pictures, these worlds. Any VR that I've seen was pretty terrible. But in time, maybe. But I also like the interplay between histories of picture-making on a two-dimensional plane like painting. This is quite a painterly space, with this vast potential of the engine. I think I'll probably stick with this. I'm interested in LCD panels becoming extraordinarily high-resolution and variable in aspect ratio. I'm more interested in that than I am in immersive technologies.





































阻碍，完全忽视了个性化的内在政治性和超经济性<sup>9</sup>。同理，新自由主义经济的核心——“方法论的个人主义”源于理论建构所产生的完整、独立、平等的主体，这些主体在平坦地形上“无辜”而对称地相遇。任何社会领域内的秩序都被认为纯粹地从社会原子的相互作用中产生，而非诞生于具有历史依据的超个性化过程；混沌、复杂、突现的伪科学“主体”掩盖了让这些“单元”得以呈现的条件。

这一抽象的进程，建立在对社会人口生产（尤其是母亲的工作任务）的排除之上，将其排除于全部经济领域之外，乃至整个社会现实的模型之外。该模型通过社会化、教育及社会支持机制的游戏化展开进一步的扩张，巩固了被排除和不可见的状态。对于夏特莱和斯蒂格勒而言，“社会动力学”与一切“社会学”的差别，在于个性化在其中扮演的关键性角色；个性化的需要不能被归入“控制论式杂耍剧”（cybernetic vaudeville）的丰富资源和不计回报的慷慨行为模式中；这一“控制论杂耍剧”的交易场景被秉承游戏化心理的既定“理性主体”所充斥<sup>10</sup>。

如果像夏特莱论证的那样，新自由主义经济产生自受惠于博弈论的、有瑕疵的心理学理论<sup>11</sup>，那么建立在技术机制调节基础上的理论所建构的社会模型，会无法避免地导致模型的内在化（internalisation）及政治的幻灭。随着模型逐渐改变其所模拟的现实，政治成为了经济的“副本”：作为“自然”单位被建构的社会原子会受到政治算法的制约：他们会被解析为统计数据，以探测其行为和反应的规律，群体身份根据统计学意义上的大众调节模式而被重新定义。这种去政治化亦导致对独特个体之实在概念的全面冲击，而这一独特个体在精神上和社会上都是个性化的；新自由主义经济所提供的数字“确定性”作为其自身客观性的证明，由自证式（self-evidence）统计数据的‘明晰性’（clarity）而实现；这一统计数据抹去了个体生成的条件，而统计数据本身正是通过这些个体起作用。<sup>12</sup>

在个体的层面上，在被称为“注意力经济”的语境中，个性化过程中注意力养成作为建构性的元素被替换成对信号的警觉个人被嵌入全球范围内持续不断的警示行动号召民意测验，以及模式识别的指令之中，即以不可知的速度、由算法调节的机械符号学；在此，每一次互动都立即产生出更多对注意力的需求，每一次回应都被反馈回“场”，后者正在逐渐吸纳政治管理的功能。根据夏特莱的观点，这一伪装成政治退化（obsolescence of politics）的政治程序彰显出对社会的“轻而易举的科学管理”，该社会将自身托付于自动调节中——其介入只为优化所谓的“自然”秩序。

为了反驳“网络政治”（Cyberpolitics）所鼓吹的透明化和去中心化优势的论调，夏特莱提出，新自由主义政治持续建立行政中心，“无形的手”的政治相似物（political analogs）：黑匣子，对输入的信息进行加工处理，产出优化结果的治理术机器。政治仅沦为政治服务的供求关系（一个在“政府服务”私有化和技术自动化中可以观察到的趋势，通常被誉为透明化与民主的进步）。经济与政治因此汇合，进入表面上自发的内在性（immanence），即实际上由某种伪装的超越性机制所支配的内在性。尽管作为自然准则的理想状态，无形的手和黑匣子属于一个由中心权力设计、维护的模型。<sup>13</sup>

个性化的资源——看护、注意力与教育——因此成为另一种“稀缺资源”，被不均等地分配，并通过“双方赞同的管理”来实现优化配置，以便保证每种意见的“平衡”。这一整合由“服从的微观物理学”或者被夏特莱所谓的“神经政治”（neurocracy）所实现：终极的大脑殖民，让控制论的人民管理接近“政治的绝对零度”。从比“孤立的社会原子”更精确的角度而言，通过对行为的持续测量和构建，控制论将调制的自动化系统扩展至大脑本身。<sup>14</sup>在最极端的情况下，大脑成为被动写入的表面，由此形成的容器强化了计量经济学的总体模型，后者将其自身在身体这一有机组织中实现。斯蒂格勒警示我们，“没有被教化的存在——其注意力在任何程度上都没有形成……是没有思想的。”<sup>15</sup>夏特莱认为，这类存在就像“认知家畜”（cognitive cattle），它们的思维只能以获利为目的而被培养、训练：

神经家畜（Neurolivestock）：市场中进行自我管理的原材料，像理想气体一般同质化而可预测，且易于测量，被剥夺了一切谈判、协商的权利，它们大脑逐个沦为出租的精神空间。<sup>16</sup>

无疑，这一观点看似遥远的科幻反乌托邦；但是，当代游戏化社会中的形象——无论是查看消息、状态和点“赞”的强迫性行为，还是学生成绩追踪、游戏化教学、动态信息源——均变得像是资本主义潜意识之下的认知伺服机制系统。个体处在一个逐渐被自动传感器、视觉媒体和软性惩戒机制管理的网络世界中；在此，信息传播的速度超越了人的认知速度，与其说这是社会主体的注意力培养，不如说是将这一认知主体作为元素，在适于交换价值生产的电子编排中进行调制——亦即吉尔·德勒兹所说的“控制社会”（Control Society）。<sup>17</sup>

According to Stiegler, it is the cultivation of *attentional forms*—the gradual forming of mental capacity through interpersonal care and contact—that generates individual subjects within a social milieu:

It is only possible to have this apprenticeship *on one’s own* that we call *experience* on condition of *knowing how to pay attention*: individual experience, which is in effect the conquest of autonomy, supposes that one has received as heritage, through education, the *lessons of collective experience out of which the attentional forms are elaborated*. Collective experience itself comes from what were once individual experiences that have become collective through a process of *transindividuation*.<sup>6</sup>

The social is therefore reproduced through the necessary process of psychic individuation, but this individuation—the realization of culture in the singular—is also a condition for the continued growth and transformation of the social. Furthermore, these processes themselves cannot be abstracted from the modes of inscription and recording in which culture is materialized, the material techniques that enable the transmission of forms and the creation of a common space and time.<sup>7</sup> The cultivation of individuals thus also depends upon the mobilization of memory traces that underwrite transindividuation.

Consequently, when the archives and institutions of a common culture are progressively decanted into a memory-system that exists primarily to produce value from quantifiable data and to farm cognitive resources, and when the cultivation of attention is entrusted to this system, the process of transindividuation is transformed and the ‘game of life’ takes a new turn. This event imparts a subtle difference to the meaning of *autonomy*: rather than being a hard-won capacity which is inseparable from the individual’s social history, autonomy is now predicated of individuals as such, who simply do not exist prior to their entry into The Game.

Such is the image of the individual that accompanies a ‘new process of psychic and collective individuation that emerges at the heart of [...] a network society of planetary proportions’;<sup>8</sup> one where the ‘rules of the game’ lead to the dissolution of politics as surely as they elide the question of individuation.

Philosopher and mathematician Gilles Châtelet argues that the link between individuation and politics is precisely what is suppressed by the pseudoscientific alibis employed to naturalize ‘market democracy.’ The neoliberal concepts of spontaneous order, catallaxy, emergence, and the discourses of cybernetics and networks merely extend and impart a futuristic sheen to early liberal discourses of ‘political arithmetic’ and ‘social physics.’ The latter championed a naturalistic conception of the social in which order spontaneously emerges from discrete interactions between individuals, and on this basis sought to defend the economic individual against the hindrances of political intervention while stringently ignoring the inherently political and extra-economic process of *individuation*.<sup>9</sup> Likewise, the ‘methodological individualism’ at the heart of neoliberal economics proceeds from the theoretical fiction of fully formed, fully independent, and equivalent agents meeting innocently and symmetrically on a level terrain. Any order that exists in the social is seen to emerge not from the historically grounded process of transindividuation, but purely from the interplay of these atomic individuals, with the pseudoscientific figures of chaos, complexity, and emergence dissimulating the conditions under which such ‘units’ become available.

Such an abstraction of course has its roots in the exclusion of social reproduction (and especially the work of mothers) from the economic field and thus from a whole model of social reality. The further extension of this model through the gamification of the apparatus of socialization, education, and social support merely confirms this exclusion and invisibility. For Châtelet, as for Stiegler, if one can speak of a ‘social dynamics,’ what marks it out from any such ‘social physics’ is the crucial role of individuation, which demands resources and modes of generosity that cannot be integrated into the ‘cybernetic vaudeville’ of transactional scenarios populated by the gamified psychology of readymade ‘rational agents.’<sup>10</sup>

If, as Châtelet argues, neoliberal economics emerges from a flawed psychology endebted to game theory,<sup>11</sup> the concerted effort to shape the social around its theoretical model via the mediation of technical machines inevitably leads both to the internalization of the model and





### 三个场景

在对当代生活的三重肖像中，约翰·杰勒德为我们提供了一个没那么具体却恰恰更令人不安的政治视角，因为其在视觉上反映出这个高分辨率模型的自我呈现方式。它们不仅是移动图像，更是全球机器总体的成比例模型，在作为其自身基本机制的媒介中展现（算法、数字模型及平板显示器——作为投射社会与个人游戏的表面，逐渐成为人进入自我的视窗——均属于这种媒介）。

在这三个虚拟世界的视野中，我们可以看到自己的世界，它被三者的联结所控制：游戏及其原子化玩家的平面世界，游戏的幕后集中管理及场对玩家的培育，以及为整个回路提供能源支持的能量源。

如果今天的“超个性化已经成为工业技术的对象”，成为某种社会工程学的对象——“这种社会学将……社会关系……塑造为工业上离散化的、可再生产的、可标准化的、可计算的、可被自动装置控制的，”<sup>10</sup> 这种社会的游戏化暗示了曾为其提供认知原材料的主体的逐渐消失——至少是发生转变。在这个经过分析的、重组的碎片化信号流过程中，社会虚构的人格仅被当成进入游戏的动机：自我实现、个人成长、学习成果与社会声誉，最终均会反馈在场之中。

杰勒德的三个场景亦有助于揭示权力和可见性的关系。第一，被简化为数据点的准个体在《演习，敦煌，2014》的地形中被“具体化”为玩家的形象，使其游戏成为表演，并导致他们不安地与姿势的算法编排（游戏）产生认同感。第二，类自然的“自我组织”幻象受到了挑战，“某种程度上集中化的器官——实际上控制着整个超个性化的循环”进入了公众视线中（场）。最后，一个超自然的形象，如同能源“升华”的纪念碑，这些能源是持续巩固“第二天性”所需要的：所谓的“第二天性”是成比例的社会模型，基于行星尺度的能源开采和传导（能量源）。

在这幅三联画中，你可以从他人的“复眼”中看到自己：在此，你发现自己在游戏中的形象即为“真正的自己”。肖像制作者的使命在于，使主观化生活的运动简化，使之变得更为可见；这一运动在日常生活中不易觉察，但对它的认知却会让我们大吃一惊。

to the withering away of politics. As the model gradually shapes the real it is supposed to model, politics becomes a kind of ‘photocopy’ of the economy. Established as ‘natural’ units, atomic individuals can be subjected to a political arithmetic: they are statistically analysed in order to detect laws in their movements and reactions, and collective identity is redefined in terms of the *modulation* of these statistical masses. This depoliticization also implies a full-on assault against the notion of a concretely singular individual, the individual who is properly psychically and socially individuated: the numerical ‘certainties’ proffered by neoliberal economics as evidence of its objectivity “are obtained by way of the ‘clarity’ of the self-evidence of statistics, which *effaces the conditions of the genesis of the individuals* upon whom statistics does its work.”<sup>12</sup>

On the level of the individual, in the context of what is called the attention economy, the forming of attention that is a constitutive part of individuation is replaced by a mere vigilance to signals: the injunction to insert oneself into a transglobal flow of continuous alerts, calls for action, polling points, and pattern-recognitions, a machinic semiotics modulated algorithmically at infra-cognitive speeds where every interaction immediately generates yet more demands for attention, and where every response is fed back to The Farm, which now gradually absorbs the functions of political administration. According to Châtelet what emerges from this political program in the guise of the obsolescence of politics is a ‘painless scientific management’ of the social that places its trust in automated modulation and, where it intervenes, does so only to optimize the ‘natural’ order.

Against the claim that such a ‘cyberpolitics’ boasts the virtues of transparency and decentralization, Châtelet argues that neoliberal politics continues to establish centers of administration, political analogs of the ‘Invisible Hand’ of economics: black boxes, machines of governmentality that process inputs and produce optimized outputs, with politics becoming nothing more than the supply and demand of political services (a trend now observable in the privatization and technical automation of ‘government services,’ lauded as an advance in democracy and transparency). Economics and politics thus converge, entering into an apparently spontaneous immanence that is, in fact, governed by a masked transcendence. Despite their idealization as natural principles, the Invisible Hand and Black Box belong to a model contrived and maintained by concentrated centers of power.<sup>13</sup>

The resources of individualization—care, attention, and education—thus become nothing but another ‘rare resource,’ unequally distributed and optimized through ‘consensual engineering’ to ensure the ‘equilibrium’ of equal atoms of opinion. This integration is consummated by the installation of a ‘microphysics of obedience,’ or what Châtelet calls a *neurocracy*: the ultimate colonization of the brain that permits the cybernetic administration of populations to close in on the ‘absolute zero of politics.’ On a finer scale yet than the isolated units of atomized individuals, cybernetics extends the automated system of modulation into the brain itself through the continual measurement and fabrication of behaviors. At the limit, brains become nothing more than a passive surface of inscription; receptacles formed by and reinforcing a generalised econometric model which is realising itself in the organic fabric of bodies. Where Stiegler warns that a “being that has not been educated, whose attention has not been formed to any extent [...] does not have a mind,” Châtelet suggests that such beings are nothing short of ‘cognitive cattle’ whose cogitations are cultivated only in so far as they can be profitably harvested:

Neurolivestock: the self-regulating raw material of a market as predictable and as homogeneous as a perfect gas, a matter counted in atoms of distress, stripped of all powers of negotiation, renting out their mental space, brain by brain.

No doubt this vision seems like a distant science-fictional dystopia; yet the contemporary figures of social gamification—not only the compulsive checking of messages, statuses, and ‘likes,’ but the plugging-in of schoolchildren to performance monitoring, gamified teaching, and dynamic information resources—are indeed becoming little more than subconscious cognitive servomechanisms of capitalism, within a world in which the individual is increasingly managed by networks of automated sensors, visual media, and soft disciplinary mechanisms; in which information circulates at a speed that outstrips human cognition, tending to draw on the social body in ways that have less to do with the cultivation of attention than with a modulation of





cognitive bodies as elements in an electronic choreography attuned to the production of exchange value—precisely what Gilles Deleuze called the 'control society.'<sup>17</sup>

### Three Scenes

In his threefold portrait of contemporary life, John Gerrard gives us a less pointedly political vision, yet one that is more disturbing precisely because it is presented visually, in the alluring mode of this model's own high-resolution self-representation. These are not just moving images, but scale models of a totalizing global machine, rendered in the media that are its basic mechanisms (the medium of the algorithm, the digital model, and the flat display that is the screening surface for all of our social and personal play, and increasingly the window into our selves).

On the horizon of these three virtual worlds, there appears our own: a world governed by an articulation between the apparently horizontal world of The Game and its atomized players, the silent centralized administration of this game and the cultivation of its players by The Farm, and the remote fueling of this whole circuit by The Power Source.

If today "transindividuation has become the object of industrial technology"—and the object of a "social engineering which aims to render [...] the social relation [...] industrially discretizable, reproducible, standardizable, calculable, and controllable by automata,"<sup>18</sup> such a gamification of the social implies the progressive disappearance, or at least transformation, of the kinds of subjects that once seeded it with cognitive raw material. In the circulation of continually fragmented, analyzed, and reagggregated signals, the social fiction of personhood is preserved only in so far as it serves as a motivation for entering The Game: self-realization, personal growth, learning outcomes, and social reputation, tracked and fed back to The Farm.

Gerrard's three scenes also serve to further expose the relation between power and visibility. Firstly, the quasi-individual reduced to a set of data-points is 'incarnated' in the figures of the players on *Dunhuang's* landscape, making their play into a performance and inducing an uneasy identification with the algorithmic choreography of their gestures (The Game). Secondly, the illusion of a quasi-natural 'self-organization' is challenged by bringing into the public eye the "more or less centralised organs which have de facto control over the circuits of transindividuation"<sup>19</sup> (The Farm). And finally, an occult figure stands as a monument to the sublimation of energy required for the continued enforcement of this 'second nature'—a scale-model of the social predicated in the last instance on a planetary-scale extraction and transduction of energy (The Power Source).

In this triptych you may see yourself through the compound eyes of another: a vision in which your place in the game is 'the real you.' For the vocation of the portraitist consists in condensing and rendering visible a movement of subjective life that does not reveal itself to everyday perception, yet strikes us with a shock of recognition.









于是，派珀特的乌龟们在被转化为类鸟群后，“学会”在集群环境中飞翔，并通过应用基于 Logo 语言的向量和面向对象的程序设计构建一系列简单的规则，以操纵这一集体的位移。雷诺兹并没有经历为整个集群建模的困难、繁琐过程。雷诺兹的聪明之处在于，他像为 Logo 的乌龟编程那样，为每一个类鸟体单独编程，并设定一些有关个体和群体关联的限制（比如，所有的类鸟体必须朝向鸟群的几何中心）。于是，电脑可以迭代地计算出类鸟体们合成的运动轨迹。<sup>5</sup>

这一成果让雷诺兹（和世界）都备感震惊。集群的动态被成功地复制，在屏幕上呈现。这些类鸟群的行为看似“未经规划”，但其个体和集体行为实则皆具目的性，比如避让障碍物，分散成独立的小组、再重新聚拢在一起，以及突然的转向。<sup>6</sup>

因为类鸟群的程序设计主要基于个体、而非群体的属性，这一模拟反映了雷诺兹的论调，即“我们直观地识别出的群体动态，比如鸟群、鱼群和羊群的移动实则取决于对世界的有限性、局部性的认识”。<sup>7</sup> 因此，雷诺兹的模拟在许多领域都是一个广泛引用的例子，以解释“突现”和“自我组织”这些现象。在复杂的系统中，“突现”的关键在于精确判断或预测模型最终结果的不可能性。因为它们的状态和变量取决于模型自身的不断演化。

于是，雷诺兹的自我组织类鸟群让近乎魔术般的可逆还原“智能”自动机成为可能。解散类鸟群这一操作可以推演出有机集群中意志自由的个体（可为类鸟体或是其它），凭借一种形而上学的方式辨认“个体”和“集体”作为同一个自然体系中相对的两极。雷诺兹的模拟似乎是在暗示，如果此类逆向还原是可能的，那么人工智能或许能够创造出具有自主性的人工智能体。

然而有趣的是，其对立面从历史角度而言才更为准确。由于类鸟群编制程序的突现性（尽管这不是唯一的原因），它们并没有“自己的心智”（如雷诺兹所言）；实际上，类鸟群的建模建立在这样的理念之下，即人类作为独立和自治的个体能够像元生物有机体（meta-biological organisms）一样聚集在自我组织的环境中。

该建模理论并非建立在任意人群的基础上，而在于对新生命形式的定义与创造特别敏感的一群人：儿童。这一理论亦并非适用于一切环境；而是在适用美国的军事—工业—学术复合体的环境下。

**玩着乌龟，自己动手**

1960 年代晚期，Logo 程序最初由西蒙•派珀特在麻省理工学院的人工智能实验室研发。与日内瓦大学的让•皮亚杰（Jean Piaget）合作之后，派珀特加入了为多路存取计算机（Multiple Access Computer, MAC）或机器辅助认知学（Machine-Aided Cognition）而设立的电子项目研究实验室（Research Laboratory of Electronics’ Project）。该实验室的经费主要源于美国高级研究计划局（Advanced Research Projects Agency, ARPA；美国国防部高级研究计划局的前身），由艾森豪威尔总统于 1958 年创建，对军事和工业领域的科学研究进行投资。自此，派珀特开始策划一个项目，将认知科学、计算机和控制论领域的新闻念、技术同儿童学习的相关实验联系在一起。因此，Logo 诞生于大相径庭的文化和科学研究领域的交汇——从军事—工业复合体所资助的算法和认知学研究，到皮亚杰的发展心理学理论，直至 1960 年代麻省理工学院弥漫的反文化、反机构的氛围。

派珀特利用人工智能实验室在认知、理解力和控制论领域的研究成果进一步研发为更“整体”（holistic）、在哲学层面更“实用主义”的数学学习方法。其教育认知方面的实验包括教孩子们描绘自己的计算机图形，因而使之可以通过“自己动手”来学习几何，而非以“死记硬背和反复操练”的方式。<sup>8</sup> 这种方法深受皮亚杰理论的影响。皮亚杰的主要理论之一即为，儿童根据周遭的事物整合自己的认知框架。对派珀特而言，“皮亚杰关于遗传认知学的研究揭示出，从孩子出生的第一天起，他便从自身和环境的互动中汲取数学知识”。<sup>10</sup> 因此，问题在于如何让孩子意识到他们已经在形成自己的数学知识，尽管这一过程是下意识的。

为了实现这一点，Logo 研究小组假设道，“在教会计算机如何思考的同时，孩子们也开启了探索自身如何思考的旅程。这会是令人兴奋的经验：对思考本身的思考让孩子充当了认知论学者的角色。许多成年人甚至都不曾拥有这种经历”。<sup>11</sup> 因此，Logo 被设想为促使孩子在“智力和情感上都全身心投入”的学习工具。<sup>12</sup>Logo 的目标在于，将孩子在皮亚杰的理论框架内已下意识地获得的空间数学知识，与促进孩子表达兴趣和热情的理念结合起来；由此帮助他们养成更积极、负责、富有创造力、系统性的行为。在外在的纯几何和内在的纯精神的两种向度之间，派珀特构想了一个起联结作用的科技和社会性的界面；该界面即由可控的机械乌龟这一“中介”调节。<sup>13</sup>

in other words, to demystify, deflect, or redirect this power—may be to consider how images of swarms are culturally and technically constructed, rather than plainly accepting them as “natural.” This means understanding the technical and historical processes by which swarm images—or simulations—emerge and are mediated.

**The Rise of the Boids**

Craig W. Reynolds’ 1987 flock simulation is a case in point. Using software developed from Seymour Papert’s original Turtle Geometry program (called “Logo”), Reynolds invented a “model [that] has often been cited as an *urtext* of computer-assisted *biological* swarm research.”<sup>3</sup> As Reynolds stated:

Logo was first used as an educational tool to allow children to learn experimentally about geometry, arithmetic, and programming. The Logo turtle was originally a little mechanical robot that crawled around on large sheets of paper laid on the classroom floor, drawing graphic figures by dragging a felt tip marker along the paper as it moved. [...] Under program control the Logo turtle could move forward or back from its current position, turn left or right from its current heading, or put the pen up or down on the paper. The turtle geometry has been extended from the plane onto arbitrary manifolds and into 3D space. These “3D turtles” and their paths are exactly equivalent to the boid objects and their flight paths.<sup>4</sup>

Thus Papert’s turtles “learned” to fly in swarm formations by being turned into “boids” (bird-like objects) and applying the vector and object-oriented programming methods inaugurated by Logo to configure a set of simple rules for regulating their aggregate motion. Rather than attempting the cumbersome and historically intractable process of modeling the whole swarm, Reynolds’ cunning lay in programming each individual boid as a Logo turtle and setting a number of individual constraints in relation to the whole (e.g., all boids should tend toward the geometric center of the flock), thus allowing the computer to iteratively calculate the resultant aggregate of each individual boid’s movements.<sup>5</sup>

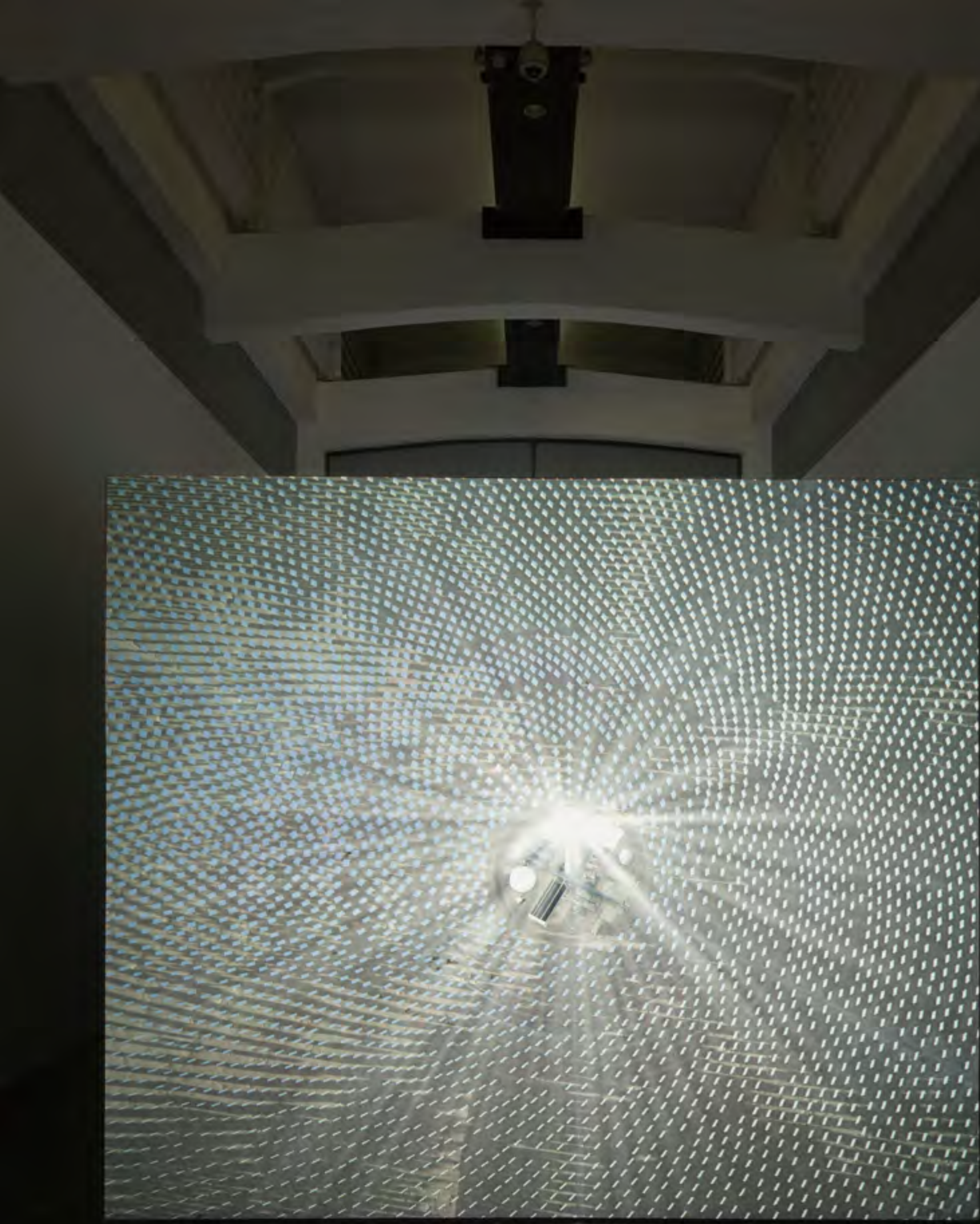
The result was surprising for Reynolds (and the world), as swarm dynamics were successfully replicated on screen, and as the boid flocks engaged in seemingly “unplanned” and intentional individual and collective behaviors, such as maneuvering around obstacles, breaking up into independent groups and then rejoining together, as well as abrupt and sudden changes in direction.<sup>6</sup>

Since the boids’ programming was geared primarily toward individual rather than collective, global properties, the simulation thus appeared to demonstrate that, as Reynolds put it, “the aggregate motion that we intuitively recognize as ‘flocking’ (or schooling or herding) depends upon a limited, localized view of the world.”<sup>7</sup> For this reason, Reynolds’ simulation became a much-cited example for the phenomena of “emergence” and “self-organization” across a number of disciplines. Crucial to this definition of “emergence” in complex systems was the impossibility to accurately determine or predict the final outcomes of the model, as these emerged out of states and variables that depended on the iterative evolution of the model itself.

Reynolds’ self-organizing aggregate of boids therefore opened up the quasi-magical possibility of reverse-engineering the “intelligent” automaton by way of the disaggregation of the boid flock—an operation that would deduce the free-willing being (boid or other) from the aggregate organic whole via a metaphysics that identified “the individual” and “the collective” as organic poles of the same “natural” system. If only such reverse-engineering were possible, Reynolds’ simulation seemed to suggest, AI might be capable of creating autonomous intelligent artificial beings.

Interestingly, though, the opposite is rather more historically accurate. The boids did not have “a mind of their own”<sup>8</sup> (as Reynolds quipped) due to the emergent properties of their programming (not exclusively, anyway), but were in fact themselves modeled on the idea of people as independent and autonomous beings that could be “aggregated” like meta-biological organisms into self-organized environments.

Not any kind of people, but a particularly susceptible kind for defining and creating new forms of life: children. And not any kind of any environment either: the US military-industrial-academic complex.









为了回应这些焦虑，建筑机器组的实验性项目（诸如 1970 年代的 SEEK）利用了基于智能体聚集程序的美学和技术特质为机器所启动的“参与性设计”提供理论支持。这会协助或控制整个设计流程，以驱散和控制城市的不满。如尼葛洛庞帝所言，通过有效地监控用户个体的行为参数，并将其以代码的形式输入全面而系统化的算法和机动程序，“城市设计可以反映出每位居民的需求和渴望”。这一过程完全不需要包括建筑师和政治家在内的“中间人”。<sup>29</sup> 将个体需求与欲望的集合通过经验和数据性系统分析“客观地”进行测量和解读，可以让城市的环境变得透明——不仅是针对个人自身，更有益于城市环境的自我管理。

尼葛洛庞帝的“参与性设计”自然会引起国防部的高度兴趣。它提出了“平复”城市环境中的暴乱和起义的可能手段，无论是在美国还是越南；因为其“自我组织”程序本身即支持系统可接受的参数，因此能将可见的外在影响隐藏起来。

然而，随着对国家安全威胁的认识的改变，与科学研究及资助相关的政治也发生了变化。1980 年代早期，安全隐患与社会不安定的来源从由美国军事—工业—学术复合体对国内外的政治“稳定性”的追求，转为美国在管制愈发宽松的国际经济市场竞争中败下阵来的风险。

1970 年代向 1980 年代的过渡预示了一个新的斗争领域；在此，直接的军事力量和情报，以及美国国防部高级研究计划对相关项目的资助失去了原有的效用。相反，新型武器与霸权在于劳动力所具备的高等能力，使其能够在彻底全球化的市场经济中维持竞争力。换言之，广义上的教育成为了国家力量的基础。日本工业力量的快速崛起和长期以来美国教育体系现出的系统性疲软困扰着政府。如何改革教育系统以让学生能够具有在新“信息时代”经济下竞争的能力，开始成为国家层面的主要焦点话题。

在这个背景下，里根总统专门成立的国家优质教育委员会（National Commission on Excellence in Education）来研究这一状况，并出具一份报告。这份名为《危机中的国家》（*A Nation at Risk*）的报告作于 1983 年，在随后关于教育的本质和资金来源的政治争议中成为极具影响力的战略性修辞武器，为新保守主义对维护美国全球霸权而尝试进行的教育改革奠定了基础。

报告并没有关注如何以更全面的资助解决美国“平庸的教育质量”<sup>30</sup>，而是将美国教育系统的不足——譬如过去 20 年来由种族和经济原因造成的教育排他性所导致的城市居民的不满，置换为更加抽象而去历史化的“问责”（accountability）问题（考核与绩效的标准）。报告暗示性地将美国教育质量的“骤降”原因归结于民权运动造成的反种族隔离举措。<sup>31</sup>

据此，里根总统宣称美国教育质量问题由约翰逊总统在“向贫穷开战”期间开展的联邦教育项目导致，因而呼吁彻底废除美国教育部。里根上任后，在教育界迅速实施了一系列大范围的去集中化、去管制化、私有化、削减资助的教育系统改革。于是，1960 年代和 1970 年代的镇压和排挤所导致的全国性“城市危机”的根源，被转移至教育和就业领域。随着教育愈发成为新保守主义运动的攻击对象，去工业化的工业城市逐渐兴起。这些城市将工作在全球范围内进行外包，剥削他国的廉价劳动力。

这些具体的教育政策并没有直接影响到麻省理工学院。虽然麻省理工学院通常无视研究项目在政治层面的意义，但在美国转向基于“信息时代”的新生产模式的过程中起到了切实的推动作用。在这个背景下，媒体实验室寻求资助的新策略并非仅是这一转折的征兆——不仅反映它，更是切实体现它。

1970 年代晚期和 1980 年代，美国国防部高级研究计划局对麻省理工学院最具实验性的研究项目逐渐减少资助。于是，尼葛洛庞帝转而向私有企业索取资金。这一转向也反映了企业界的新趋势：为了扩展自己的业务，媒体、工业、计算机企业之间展开紧密的合作，形成大型的集群。

这是一个企业界发生剧变的时代，新的媒体和科技公司不断进行合并、破产行为，互相之间展开激烈的竞争。这个日后成为媒体实验室的研究小组便将自己包装为企业在这一环境下的最佳创新“伙伴”。媒体实验室向潜在的企业赞助方提出的合作方式建立在“蓝天”（blue sky）实验研究的基础上，这一实验性项目具有设想中的竞争优势。鉴于这些项目巨大的风险性，企业们往往不愿进行自主的研发。

美国国防部高级研究计划局从前是这一“封闭的世界”的主要资金来源，但 1987 年它仅占媒体实验室经费总额的 10%。<sup>32</sup> 尼葛洛庞帝利用新媒体生态下企业的贪婪筹得了威斯纳大楼所需的 4500 万美元的资金。他总是为媒体实验室的研究员及其资助企业制造“更疯狂”的研究环境。<sup>33</sup>

drawing paper on the floor, and free to “command” the cybernetic turtle at the tip of the whole ensemble, the child learns to act as a self-directed agent; seeking his own technical means by which to satisfy his desire; as an “entrepreneur of himself,” to use Michel Foucault’s apt formulation.<sup>19</sup> In this setup, the child, via the necessary turtle, becomes an abyss of intentionality—a source of self-perpetuating procedurality and meaning arising from self-satisfaction: the child aspires to do what he wants to do, which is what the apparatus enables him to aspire to—a recursive statement in the form of the turtle-program-child assemblage that is literally “realized” through the “emergent” performativity of the drawing-programming process.<sup>20</sup> While from the perspective of the creative child, or even the seemingly “autonomous” turtle, this poetic-cybernetic assemblage might present emancipatory openings, Papert’s transcriptions of these processes into definite statements and tabulations of value (as part of formal military-industrial funding applications) close the circle by bureaucratizing it, inaugurating the era of “measurable”—and thus accountable—techno-creativity.

It was both Logo’s numerical-aesthetic enactments—the desiring self’s “magnificent” sublime recursions<sup>21</sup>—and their success achieving federal funding that led Papert to theorize the potential for eventually multiplying, clustering, and animating groups of virtual autonomous turtles themselves—and thus anticipated Reynolds’ simulation up to fifteen years in advance.<sup>22</sup>

### The Media Lab: Aggregation via Disaggregation

As Papert speculated in 1973, the idea of a “Build-An-Animal Kit” with cybernetic turtles could be taken a step further in abstraction to become the theoretical template for modeling computer-simulated, aggregate biological processes. By the mid-1980s, while Papert’s research continued to focus on the development of Constructionism, this virtual “aggregation of animals”<sup>23</sup> idea took shape as an ambitious new project headed by Marvin Minsky and Alan Kay within the new Media Lab. Called “Vivarium,” the project brought together students from different disciplines with a singular purpose:

Mission: create “life.” Enable school kids to invent and then unleash realistic organisms in whole “living” computerized ecologies—learn about the universe’s creation by doing some of their own. The animals they create would behave, learn, even evolve independently.<sup>24</sup>

The Vivarium drew its students, skills, and resources for aggregating “whole ‘living’ computerized ecologies” from another aggregation process: the Media Lab’s agglomeration of disciplines under the single roof of the new Wiesner Building opened in 1985. A veritable brainchild of Nicholas Negroponete (Director of the Architecture Machine Group at the AI Lab), the Wiesner Building represented the culmination of a general dynamic of disciplinary convergence at MIT. This integrative drive was not just the result of MIT’s academic institutional-disciplinary dynamics, but reflected broader dynamics of national and international economic, political, and also aesthetic reconfigurations. By 1973, MIT’s leadership had begun to consider ways to integrate the arts, technology, and sciences across campus. Negroponete’s alluring ambitions for MIT to be “at the cutting edge of both art and technology,”<sup>25</sup> together with his academic and reputational links—including his close ties to the military-industrial-research complex and the philanthropic apparatus of MIT—were decisive in his securing the leadership position to establish the aggregation machine that would become the Media Lab.

MIT’s early postwar ties to the federal defense establishment had provided the AI Lab and others (including Negroponete) an almost informal and patron-like relationship to easy funding<sup>16</sup>—a state of affairs characterized by historian Paul Edwards as a “closed world,” due to the close-knit and elitist allocation of government’s research capital through highly discretionary networks of association.<sup>27</sup> In this context, the projects promoted by Negroponete at the time, all heavily funded through federal military research, ought to be read in light of the increasing security anxieties posed by both national and international urban-political struggles of the 1960s and 1970s.<sup>28</sup>

Addressing these concerns, the experimental projects of Arc Mac (such as SEEK, 1970) leveraged the aesthetics and technics of agent-based aggregations to theorize a machine-enabled “participatory design” that would assist or take over the entire design process as a way of









图废除机构、政治或历史的自由主义视角上，正如集群所允诺的那样。这一转型不仅要求超越人类之外的、对主体性的大规模再创造，亦需要一个新的方式来呈现、想象和操控地缘政治本身。

By the late 1970s and into the 1980s, DARPA's funding toward MIT's most experimental research had dwindled. Negroponte, however, responded to this challenge by turning to private industry. This shift also reflected a new reality for industry: the convergence of media, industrial, and computing companies into large conglomerates with a vital interest in expanding their businesses.

The future Media Lab thus presented itself as a perfect innovation “partner” for a media-business landscape on the cusp of momentous corporate shifts, a period of new media and technology agglomerations, bankruptcies, and intense competition. The deal offered by the Media Lab to prospective corporate sponsors was predicated on the perceived competitive advantage of access to “blue-sky” experimental research that corporations could not usually afford the risk to do themselves.

Although DARPA—the previous “closed world’s” primary funding body—accounted for only 10 percent of the Media Lab’s funding in 1987,<sup>23</sup> Negroponte managed to raise the requisite \$45 million for the Wiesner Building by leveraging the voracious, corporate new media ecology against itself, providing an always “crazier” environment for the Lab’s researchers and their corporate voyeurs.<sup>33</sup>

As funding became decentralized and more competitive, so did the kinds of projects emerging from the Lab: each one more and more quirky, more and more “out there”—a veritable “zoo” dutifully shepherded by Negroponte—in which cybernetic and digital turtles, as well as fish, termites, and public school children all played on display for the sake of corporations, acting as indirect insurance agents against the disruptive technological innovations—aka “capitalism”—they themselves were involved in producing. Mobilizing the real and imaginary mortal fears embedded in decentralized systems—technological, organic, and economic—the Media Lab found its own way of guiding the “invisible hand” of the market’s unruly forces by taking potential funders on the ride of the capitalist sublime, and then offering them the hope of a further lease on artificial life, for a small donation.

How can you peer ten years along a technological trendline that might devour or starve your present cash cows? How can you explore the crossover technologies where entire new businesses are being born without becoming one of the stillborn? You read in the *Wall Street Journal* or the *Boston Globe* how former industrial backwater Massachusetts is booming, with unemployment down to 3.6 percent and a state budget surplus, and it’s all being attributed to MIT. Then Negroponte shows up keynoting somewhere with video demos of MIT researchers test-piloting the information technologies at the edge of the possible, flying in formation around a pattern vague and shifting but emerging, hypnotic... and you buy in.<sup>34</sup>

#### Liberalism’s “Demo or Die”<sup>35</sup>: For a New Geopolitical Visuality

Interestingly, this “buy in” necessitated, and was constituted by, an infrastructure of display: the Media Lab’s corporate voyeurism, the *Wall Street Journal*, the *Boston Globe*, and the conference’s stage upon which Negroponte would be “keynoting.” On the one hand, this infrastructure of display was the instrument for a particular kind of invisibilization: the sudden disappearance of the jobs that had made Massachusetts into an “industrial backwater” in the first place—a disappearance congruous with the school defunding policies. The infrastructure of display sustained this elision as it became animated by Negroponte’s “demos”: the “emerging, hypnotic,” and shifting flights in formation around vague patterns, Negroponte’s “world-class salesmanship,” together with the newspaper statistics and the stage lighting, were all designed to produce—in combination—a somewhat magnificent aesthetic effect in which, returning to Burke, one would be “so dazzled as to make it impossible to attend to that exact coherence and agreement of the allusions, which we should require on every other occasion.”<sup>36</sup> Except that “magnificence,” on this and every other occasion, became the rule.

In this infrastructural, mixed-media circuit of labs, newspapers, and demos, a profusion of images and numbers conjured the strong impression of the vital importance—literally a matter of life and death—of becoming a part of the system. The effects, credibility, and especially, the capital flowing through the circuit constituted a self-organizing, self-stabilizing organism—if you “bought in.”

Joining this quasi-organic infrastructure produced an economy of “sense”—an aesthetic experience on one level, but also in terms of the promise of absolute meaning it implied at another: higher returns, solving public education, inventing the future, saving the world.

Swarms, as endlessly repeated icons of this imagined community, were a performative operator in its techno-cultural infrastructure. The Media Lab both recirculated these kinds of images and their affective qualities, and aided in the technical-historical construction of the idea of human collectives as organic compounds of individual self-interests that would naturally self-organize and aggregate through capitalist collaboration and competition.

Meanwhile, as this swarm-like model of production continues to proliferate, on the other side of the river from the Media Lab remains Hennigan School, where Papert conducted his 1980s techno-pedagogical experiments, and which is still suffering the consequences of the defunding policies first begun by Reagan and then continued by other administrations.<sup>37</sup> This is a cruel irony for Papert’s radical intentions: he had foreseen a total revolution in schooling through the rejection of the curriculum system, standardization and testing methods, and even teachers, in favor of a model where children could explore what they wanted and how they wanted, limited only by the technological environment available. In contrast, computing was incorporated into schools as another subject in itself, with its own curriculum, teacher, and means of testing. The result, Papert concluded, was that the computer had been “thoroughly assimilated to the way you do things in school”<sup>38</sup>—institutional over-regulation had stifled the possibility of a much more radical change, where school might be entirely dissolved, if not utterly transformed. However, Papert still argued in the late 1980s that this transformation was not historically or politically driven, but was the result of the new availability of tools—whose full blossoming the education authorities were hampering.

The fact that these environments became the model for a whole economy of higher education—and thus, of the “information age” economy at large—is shown by the Media Lab’s funding dynamics and its obsession with decoding the organic relations of collectives through artificial life projects, like simulated swarms. Each time these funding mechanisms and organicist spectacles were enacted—recursively, one for the other—the liberal creed of sovereignty and self-preservation was replayed again like a techno-cultural mantra.

If it is possible to revive Papert’s vision of transformation today, what must first be overcome is his, in retrospect, naïve faith in the power of technological mediation to “disrupt” and “autonomize”—tropes which, with the help of the Media Lab and others, have now become fully integrated into part of the spectacle of the capitalist imaginary. But this cannot be done from the same liberal perspective of attempting to “do away” with institutions, politics, or history, as the swarm promises to do. Not only would this transformation require a wholesale re-invention of subjectivity beyond the liberal notion of the human, it would also require a new way of figuring—representing, imagining, operationalizing—geopolitics itself.



## 尾注 Endnotes

#### 模型场 Model Farm

<sup>[1]</sup>本杰明·布拉顿：《堆栈：软件与主权》（麻省理工学院出版社，2015年）。Benjamin Bratton, *The Stack: On Software and Sovereignty* (Cambridge, MA: MIT Press, 2015).

<sup>[2]</sup><http://www.faz.net/aktuell/feuilleton/debatten/the-digital-debate/shoshana-zuboff-secrets-of-surveillance-capitalism-14103616.html>.

<sup>[3]</sup>关于一位“设计伦理学家”对于这些机制及其在数字交通体系中的角色的看法, 参见网址:<https://medium.com/@tristanharris/how-technology-hijacks-peoples-minds-from-a-magician-and-google-s-design-ethicist-56d62ef5edf3#.6ei0i3v07>.For the reflections of a ‘design ethicist’ on these mechanisms and their role in driving digital traffic, see: <https://medium.com/@tristanharris/how-technology-hijacks-peoples-minds-from-a-magician-and-google-s-design-ethicist-56d62ef5edf3#.6ei0i3v07>.

<sup>[4]</sup>吉尔贝•西蒙栋：《精神与集体的个性化》(巴黎：Aubier 出版社，2007年)。Gilbert Simondon, *L'individuation psychique et collective* (Paris: Aubier, 2007).

<sup>[5]</sup>贝尔纳•斯蒂格勒：《关系生态学与数码之药》，选自《文化机器》，第13期, 第2页: http://www.culturemachine.net/index.php/cm/article/view/464。Bernard Stiegler, “Relational Ecology and the Digital Pharmakon,” *Culture Machine* 13, p. 2. < http://www.culturemachine.net/index.php/cm/article/view/464>.

<sup>[6]</sup>同上。Ibid.

<sup>[7]</sup>斯蒂格勒：《技术与时间 1: 爱米比修的过失》（加利福尼亚州的斯坦福: 斯坦福大学出版社，1998年）。See Stiegler’s *Technics and Time, Vol. 1: The Fault of Epimetheus* (Stanford, CA: Stanford University Press, 1998).

<sup>[8]</sup>斯蒂格勒：《关系生态学与数码之药》，第5页。Stiegler, “Relational Ecology,” p. 5.

<sup>[9]</sup>吉尔•夏特莱：《像猪一样生活和思考：市场民主中嫉妒与无聊的刺激》（法文版初版于1998年；法尔茅斯与纽约: Urbanomic and Sequence 出版社），2014年。参见《隐喻的武术：吉尔•夏特莱访谈》；< https://www.urbanomic.com/document/gilles-chatelet-mental-ecology/>。Gilles Châtelet, *To Live and Think Like Pigs: The Incitement of Envy and Boredom in Market Democracies* [1998] (Falmouth and New York: Urbanomic and Sequence Press, 2014). See also “A Martial Art of Metaphor: Two Interviews with Gilles Châtelet,” < https://www.urbanomic.com/document/gilles-chatelet-mental-ecology/>.

<sup>[10]</sup>夏特莱：《像猪一样生活和思考：市场民主中嫉妒与无聊的刺激》，第161页。Châtelet, *To Live and Think Like Pigs*, p. 161.

<sup>[11]</sup>参见夏特莱：《像猪一样生活和思考：市场民主中嫉妒与无聊的刺激》之《方法论的个人主义》，第160–164页。See Châtelet, “Methodological Individualism,” *To Live and Think Like Pigs*, pp. 160–64.

<sup>[12]</sup>夏特莱：《像猪一样生活和思考：市场民主中嫉妒与无聊的刺激》，第49页。Châtelet, *To Live and Think Like Pigs*, p. 49.

<sup>[13]</sup>同上，第62–63页。Ibid., pp. 62–63.

<sup>[14]</sup>同上，第67–68页。Ibid., pp. 67–68.

<sup>[15]</sup>斯蒂格勒：《关系生态学与数码之药》，第2页。Stiegler, “Relational Ecology,” p. 2.

<sup>[16]</sup>夏特莱：《像猪一样生活和思考：市场民主中嫉妒与无聊的刺激》，第132页。Châtelet, *To Live and Think Like Pigs*, p. 132.

<sup>[17]</sup>吉尔•德勒兹：《控制社会附言》，选自《十月》，第59期（1992年冬），第3–7页。Gilles Deleuze, “Postscript on the Societies of Control,” *October* 59 (winter, 1992), pp. 3–7.

<sup>[18]</sup>斯蒂格勒：《关系生态学与数码之药》，第13页。Stiegler, “Relational Ecology,” p. 13.

<sup>[19]</sup>同上。Ibid.

<sup>[20]</sup>同上。

#### 集群与地缘政治想象 Swarms and the Geopolitical Imagination

<sup>[1]</sup>西蒙•派珀特：《教会儿童思考：人工智能备忘录编号 247》（剑桥：麻省理工学院出版社，人工智能实验室，1971年），第1页。网址: http://stager.org/articles/teachingchildren.html [2014年10月1日]。Seymour Papert, “Teaching Children Thinking. Artificial Intelligence Memo Number 247” (MIT Cambridge, Artificial Intelligence Lab, 1971), p. 1. Available online at <http://stager.org/articles/teachingchildren.html> [accessed October 1, 2014].

<sup>[2]</sup>埃德蒙•伯克：《论崇高与美概念起源的哲学探究》，詹姆斯•T•波顿编辑（诺特丹与印第安纳州：圣母大学出版社，1958年），第2部分，第78页。Edmund Burke, *A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful*, ed. James T. Boulton (Notre Dame, IN: University of Notre Dame Press, 1958), part II, p. 78.

<sup>[3]</sup>塞巴斯蒂安•菲尔肯：《动物科技：集群作为文化技术》，载于《理论、文化和社会特刊：文化技术》，编辑: 杰弗里•温斯洛普—杨、依琳卡•义乌拉斯库、朱丝•帕里卡（伦敦、纽约: 萨奇期刊, 2013年11月），第30页。Sebastian Vehken, “Zootechnologies: Swarming as a Cultural Technique,” in *Theory, Culture, & Society, Special Issue: Cultural Techniques*, eds. Geoffrey Winthrop-Young, Ilinca Iurascu, and Jussi Parikka (London & New York: Sage Journals, November 2013), p. 30.

<sup>[4]</sup>克雷格•雷诺兹：《鸟群、兽群和鱼群: 分散的行为模式》，载于《计算机图像学》，第21卷, 第4期,（1987年7月），第28页。Craig W. Reynolds, “Flocks, Herds, and Schools: A Distributed Behavioral Model,” *Computer Graphics* Vol. 21, No. 4 (July 1987), p. 28.

<sup>[5]</sup>同上，第30页。Ibid., p. 30.

<sup>[6]</sup>同上，第27页。Ibid., p. 27.

<sup>[7]</sup>同上，第30页。Ibid., p. 30.

<sup>[8]</sup>雷诺兹：《鸟群、兽群和鱼群: 分散的行为模式》，第27页。Reynolds, “Flocks, Herds, and Schools,” p. 27.

<sup>[9]</sup>西蒙•派珀特：《头脑风暴：儿童、计算机及强有力的概念》（纽约：基本图书，1980年），第36页。Seymour Papert, *Mindstorms: Children, Computers, and Powerful Ideas* (New York: Basic Books, 1980), p. 36.

<sup>[10]</sup>同上，第206页。Ibid., p. 206.

<sup>[11]</sup>同上，第19页。Ibid., p. 19.

<sup>[12]</sup>西蒙•派珀特：《教儿童成为数学家与教儿童数学：人工智能备忘录编号 249》（剑桥：麻省理工学院出版社，人工智能实验室，1971年），第4页。网址：http://hdl.handle.net/1721.1/5837 [2014年10月20日]。Seymour Papert, “Teaching Children to Be Mathematicians Vs. Teaching About Mathematics. Artificial Intelligence Memo Number 249” (MIT Cambridge, Artificial Intelligence Lab, 1971), p. 4. Available online at <http://hdl.handle.net/1721.1/5837> [accessed October 20, 2014].

<sup>[13]</sup>派珀特，《头脑风暴》，第68页。Papert, *Mindstorms*, p. 68.

<sup>[14]</sup>西蒙•派珀特：《运用科技促进教育：人工智能备忘录编号 298》（剑桥麻省理工学院，人工智能实验室，1973年），第27页。网址: http://hdl.handle.net/1721.1/6213 [2014年10月20日]。Seymour Papert, “Uses of Technology to Enhance Education. Artificial Intelligence Memo Number 298” (MIT Cambridge, Artificial Intelligence Lab, 1973), p. 27. Available online at <http://hdl.handle.net/1721.1/6213> [accessed October 20, 2014].

<sup>[15]</sup>娜塔丽•辛克莱：《美国几何课程的历史》（夏洛特、北卡罗来纳州: 信息时代出版社, 2008年），第73页。

Nathalie Sinclair, *The History of The Geometry Curriculum in the United States* (Charlotte, NC: Information Age Pub., 2008), p. 73.

<sup>[16]</sup>派珀特：《头脑风暴：儿童、计算机及强有力的概念》，第64页。Papert, *Mindstorms*, p. 64.

<sup>[17]</sup>派珀特：《运用科技促进教育：人工智能备忘录编号 298》，第25–26页。Papert, “Uses of Technology,” pp. 25–26.

<sup>[18]</sup>派珀特：《教会儿童思考：人工智能备忘录编号 247》，第1页。Papert, “Teaching Children Thinking,” p. 1.

<sup>[19]</sup>参考米歇尔•福柯：《生命政治的诞生（法兰西学院演讲系列 1978-1979）》，（贝辛斯托克：帕尔格雷夫•麦克米兰出版社，2008年）。尤其参考《讲座九: 1979年3月14日》，第226页。See, Michel Foucault, *The Birth of Biopolitics: Lectures at the Collège De France, 1978–79* (Basingstoke: Palgrave Macmillan, 2008). In particular, see “Lecture 9: March 14, 1979,” p. 226.

<sup>[20]</sup>派珀特：《头脑风暴：儿童、计算机及强有力的概念》，第71–74页。Papert, *Mindstorms*, pp. 71–74.

<sup>[21]</sup>同上，第93页。Ibid., p. 93.

<sup>[22]</sup>派珀特：《运用科技促进教育：人工智能备忘录编号 298》，第68页。Papert, “Uses of Technology,” p. 68.

<sup>[23]</sup>同上。Ibid.

<sup>[24]</sup>斯图尔特•布兰德：《媒体实验室：在麻省理工发明未来》（纽约：维京出版社, 1987年），第98页。Stewart Brand, *The Media Lab: Inventing the Future at MIT* (New York: Viking, 1987), p. 98.

<sup>[25]</sup>尼葛洛庞帝：《媒体实验室的起源》,第151页。Negroponte, “Origins of the Media Lab,” p. 151.

<sup>[26]</sup>布兰德：《媒体实验室：在麻省理工发明未来》，第162页。Brand, *The Media Lab*, 162.

<sup>[27]</sup>保罗•N. 爱德华兹：《封闭的世界：计算机和话语政治在冷战时期的美国》（剑桥、马萨诸塞州: 麻省理工学院出版社, 1997年）。Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: MIT Press, 1997).

<sup>[28]</sup>参见费丽丝蒂•斯科特：《话语、寻找、互动》，载于《第二次现代主义：麻省理工学员、建筑和“技术社交”的时刻》，编辑: 阿林达姆•杜塔（剑桥、马萨诸塞州: 麻省理工学院出版社, 2013年），第392–393页。See Felicity Scott, “Discourse, Seek, Interact,” in *A Second Modernism: MIT, Architecture, and the “Techno-Social” Moment*, ed. Arindam Dutta (Cambridge, MA: The MIT Press, 2013), pp. 392–93.

<sup>[29]</sup>尼葛洛庞帝：转引自斯科特《话语、寻找、互动》，第362、365页。Negroponte quoted in Scott, “Discourse, Seek, Interact,” pp. 362, 365.

<sup>[30]</sup>国家优质教育委员会：《危机中的国家：教育改革训令：提交给国家和部长的报告, 美国教育部》（华盛顿特区: 国家优质教育委员会, 1983年），第5页。The National Commission on Excellence in Education, *A Nation at Risk: The Imperative for Educational Reform: A Report to the Nation and the Secretary of Education, United States Department of Education* (Washington, DC: National Commission on Excellence in Education, 1983), p. 5.

<sup>[31]</sup>派珀特：《头脑风暴：儿童、计算机及强有力的概念》，第71–74页。Papert, *Mindstorms*, pp. 71–74.

<sup>[32]</sup>同上，第11页：“如今我们学校和大学普通毕业生的教育水平不如 25 或 35 年前的毕业生, 那时完成高中和大学学业的人口比例较现在更少。这一事实的负面影响不应被过分低估。”Ibid., p. 11: “The average graduate of our schools and colleges today is not as well-educated as the average graduate of 25 or 35 years ago, when a much smaller proportion of our population completed high school and college. The negative impact of this fact likewise cannot be overstated.”

<sup>[32]</sup>布兰德：《媒体实验室：在麻省理工发明未来》，第163页。Brand, *The Media Lab*, p. 163.

<sup>[33]</sup>“如今我从我们的企业合作者口中得到的最多评论就是‘请更疯狂一些’。事实上，我们对企业的价值完全在于我们的疯狂, 尽可能地冒险, 做他们可能不会做的事情。”参见尼葛洛庞帝《媒体实验室的起源》，第156页。

“[T]he comment I get the most these days from our industrial partners is ‘be crazier.’ In fact, the value to corporations is very much at the lunatic fringe, going out on a limb as much as possible, doing things they might not.” Negroponte, “Origins of the Media Lab,” p. 156.

<sup>[34]</sup>布兰德：《媒体实验室：在麻省理工发明未来》，第9页。Brand, *The Media Lab*, p. 9.

<sup>[35]</sup>同上，第3页。Ibid., p. 3.

<sup>[36]</sup>伯克：《论崇高与美概念起源的哲学探究》，第78页。Burke, *A Philosophical Enquiry*, p. 78.

<sup>[37]</sup>根据州的官方数据, 2014年, 亨尼根小学学生的学业表现处于其所在类别的倒数 20%。参见《关于教学的报告》(RTL) : 学校报告卡, 2013–2014 学年度, 詹姆斯•W. 亨尼根小学。网址: http://www.bostonpublicschools.org/school/hennigan-elementary-school [2014年10月15日]。As of 2014, Hennigan School was in the lowest 20 percent performing of schools of its category, according to official state statistics. See *Report on Teaching and Learning* (RTL): School Report Card, School Year 2013–2014. James W. Hennigan School. Available at <http://www.bostonpublicschools.org/school/hennigan-elementary-school> [accessed October 15, 2014].

<sup>[38]</sup>西蒙•派珀特和保罗•弗莱雷对话：《学校的未来》；讲稿见网址: http://www.papert.org/articles/freire/freirePart1.html [2014年10月15日]。Seymour Papert and Paolo Freire in conversation, “The Future of School,” transcript available online at <http://www.papert.org/articles/freire/freirePart1.html> [accessed October 15, 2014].



## 制作鸣谢

## Production Credits

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演员：Conor Lovett, Esther Balfe, Emmanuel Obeya
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动态捕捉现场助理: Martin Michal.k
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角色摄影 (广州)：ITR Space / Hitomi Ko, Javi Miqueleiz
交叉偏振摄影 (广州)：Wong Suk Ki

<b>《场，俄克拉荷马州的普赖尔小溪，2015》</b>
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<b>《太阳能储备，内华达州的托诺帕，2014》</b>
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Producer: Werner Poetzelberger
Programmer: Helmut Bressler
Actors: Conor Lovett, Esther Balfe, Emmanuel Obeya
Motion Capture, Rigging, Additional Motion Editing: Bohemia Interactive / Štěpán Kment
Motion Capture Editing: Laura Millar
Motion Capture On Set Assistance: Martin Michal.k
3D Character Development:
Preproduction / 3D-Modelling / Cloth-Simulation / Texturing / Rigging / Animation Editing: arx anima
Character Creation / Project Lead: Martin Hebestreit
Character Rigging / Technical Lead: Benedikt Lutz
Shoot Producer (Hong Kong & Guangzhou): Matthew Kwang
Shoot Producer (Dunhuang): Cesar Mejias Olmedo
Character Shoot (Guangzhou): ITR Space / Hitomi Ko, Javi Miqueleiz
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Programmer: Helmut Bressler
3D Modeler: Max Loegler
Project Photographer: Travis Hall
Installation Development: Jakob Illera / Inseq, Vienna
Game Engine: Unigine

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Installation Development / Technical Design: Jakob Illera / Inseq Design
Game Engine: Unigine

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