Tacit Cinematic Knowledge: Approaches and Practices

edited by Rebecca Boguska, Guilherme Machado, Rebecca Puchta, and Marin Reljić

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Scripting Organizations: How Labor Is Becoming Cinematic

Guilherme Machado

As cinematic techniques become common mediators of labor-related knowledge in contemporary corporations, scripting practices assume a prominent role in the development of social, material, and cognitive interactions at work. This article addresses the epistemological implications of current organizational uses of cinematic techniques, particularly in professional training. After a brief overview of existing organizational cinematic practices in France, it provides examples of how cinematic-epistemic templates are produced to regulate the self-realization of efficient performance in the era of post-industrial labor.

Organizational Cinematic Practices

In 2016, the third edition of the video game *Défi ingénieur* (*The Engineer Challenge*) was launched by SNCF, the French national railway company. The game featured a series of engineering problems that the company was facing at the time. It was pitched as a near-impossible game in an attempt to grab the attention of engineering students and overcome the "notoriety problem"[1] of a wide range of intellectually challenging activities in the company. On their mobile screens, players plunged into a futuristic universe and followed storylines that engaged them in engineering issues related to renewable energy, big data, and 3D printing. 180 French *écoles* participated in the game, which was credited with a major increase of applications for positions in the company's Innovation Research & Development Department.

In the early 2000s, the French wine-producing region of Burgundy funded research to develop software to teach the pruning of vines. In view of the aging population of vineyard pruners, the program was commissioned to train a new generation of rural workers, not through the representation of prescribed behaviors, but through the training of "pruning reasoning." It offered a "didactic staging of work situations" (Caens-Martin 2005) and a series of visual scenarios that engage students with different stages of plant development, so that trainees could build relevant patterns of action on their own. The software was used in several farming regions of the country and inspired versions adapted to other agricultural sectors in Europe.

In 2013, in association with the Institute for an Industrial Safety Culture, a group of large French companies launched the Safety Academy, a shared platform of ready-to-use multimedia resources to support corporate "safety cultures" (Safety Academy 2023). The platform offers a rich collection of audiovisual

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1 Personal interview with Marc Fraissinet, director of the advertising agency TBWA/Paris, on January 2, 2022. All translations by author.

material, from didactic animations to recorded conferences, designed to facilitate educational meetings, analyze work situations, raise awareness to risk, foster preventive safety methods at the organizational level and cautious behavior at work. Currently, this platform is open to any company or manager wishing to make use of its resources for the management of local organizational cultures.

These examples of the use of moving-image apparatuses for recruitment, training, and knowledge-management in various companies, regions, and industrial clusters are clearly not isolated. In France alone, one could add a whole series of audiovisual tools used on a daily basis by companies such as Accor (hospitality), Air France (airline), AXA (insurance), BNP Paribas (banking), Bouygues (construction, real estate and tele-communication), Carrefour (retail), Danone (food), EDF (energy), L'Oréal (personal care), Michelin (manufacturing), Renault (auto-mobiles), Sanofi (healthcare), TotalEnergies (oil and gas), and Veolia (water and waste treatment)—just to name just a few. In all these companies, moving-image apparatuses perform knowledge-mediation functions in the areas of sales, marketing, production, logistics, purchasing, finance, and/or related services.

Car salesmen in Renault stores receive part of their training through video games, as do financial advisors in BNP Paribas bank branches, while job seekers practice their job interviews with a free game offered by the French government agency Pôle Emploi. High school students, new hires in multinational companies, and trainee surgeons all enjoy access to increasingly sophisticated video databases to guide them and familiarize them with actual forms of labor.[2] A 2014 report revealed that the 40 companies represented on France's main stock market index, the

2   Meanwhile, in the United States of America, Walmart announced a project
      in 2018 to train one million employees with Virtual Reality. In association
      with the firm Strivr, the retail company designed scenarios to train cashiers
      to engage with customers, shelf fillers to recognize under-stocked aisles,
      store associates to manage peak hours, and so on (Pearson 2019). Immersive

CAC40, routinely use up to nine video-based games of different sorts for recruiting, training, or managing internal knowledge (Allal-Chérif et al. 2014). It goes without mentioning that screen-based data visualization and communication tools have become crucial to labor organization across industries.

Along with these image apparatuses, a whole range of cinematic narrative *techniques* play a role in labor mobilization, increasing job performance, and organization. For those who still think that the practical knowledge of labor has little to do with the imaginary worlds of cinema, a simple look into contemporary organizations would help persuade them of how corporate "information networks" are densely populated by stories and emotional rhetoric worthy of Hollywood. When developing his theory of "sensemaking" in companies, the organizational psychologist Karl E. Weick (1995) argued for the use of narrative rhetorical models to complement the usual argumentative style of managerial discourse. For him, narratives have the capacity to improve organizational communication because "people think narratively rather than argumentatively" (Weick 1995, 127). For the organizational theorists Ian I. Mitroff and Ralph H. Kilmann, who pioneered this narrative organizational perspective, stories are "the spirit of organizations" (1976, 19). When engaging corporate stories have made their way through the networks of a company, they tacitly become part of its decision making and work planning processes.

Managers were quick to learn this lesson, and when audiovisual tools became widespread, they joined this narrative organizational perspective to cinematic practices in a more systematic way than had ever been done. In 1998, knowledge management experts Thomas Davenport and Lawrence Prusak reported on a series of organizational daily practices of cinematic storytelling:

> audiovisual technologies are currently highly valued by large corporations for mass training.

Many firms already do something like this when they send videos to branch offices to be shown over lunch. In the past, they were likely to contain a speech or exhortation by a senior executive. Increasingly, though, firms distribute tapes that tell the story of an important business event, such as how a key sale was made. Knowledge is more likely to be absorbed if it adheres to the listeners' sense of ground truth, is delivered with feeling, and is placed in a context or frame that is at least partly shared by its audience. One well-known securities firm sends out a message every morning on its 'hoot and holler' network to all its brokerage agents, giving them what is called 'useful information' about a particular sale, an upcoming event, or some valuable piece of customer feedback. These messages almost always take the form of a story. At Verifone (a recently acquired subsidiary of Hewlett-Packard), where workers are widely dispersed around the world, stories of desirable business behavior are circulated electronically under the banner of 'Excellence in Action.' (Davenport and Prusak 1998, 82)

Besides the use of cinematic narrative techniques, a series of motifs from cinematic genres inform the modes of interaction at work and labor education. In its recruitment campaigns, the French National Gendarmerie draws on a body of narratological mechanisms to produce effects typical of comedy, action and documentary movies (narrative focalization and humorous breaks of expectation, heroic characters, thrilling car chases, empathetic testimonies, etc.), as well as on visual and editing techniques (unusual camera angles, tracking and aerial shots, slow motion, image/sound combinations, professional acting, fast cuts, etc.) to "inform" viewers about the organization's duties and activities.[3]

All these uses of cinematic techniques are certainly not new (Hediger and Vonderau 2009; Vignaux 2007), however, they are

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3   See the YouTube channel of the Gendarmerie Nationale (2022).

now becoming more frequent and more generalized than ever. They are also one of the allegedly innovative organizational methods that advocates proudly distinguish from old-fashioned forms of prescriptive education and hierarchical structures of power. All signs point to the fact that the future of labor requires cinematic techniques as a regular mode of knowledge mediation. To share a glimpse of a wider project of elucidating how cinematic techniques transform labor by making new regimes of discipline possible, let me take a few examples of professional training *dispositifs* that reveal some of the ways labor has become increasingly informed by cinema.

Scripting Educational Situations

One reason cinematic techniques now appear to be such relevant tools for the transmission of labor-related knowledge is that they can provide carefully designed images of *educational situations*. The circulation of standardized forms of productive behavior—as exemplified in the early 20th century by Frank Gilbreth's image-based management of efficiency (Curtis 2009; Hoof 2020; Price 1989)—is no longer the main organizational task assigned to images. Instead, managers and trainers today seek to provide aesthetic conditions under which operators can develop their own operational knowledge.

Ergonomic psychology, which developed in the last decades of the 20th century, has been both a driving theoretical force of this new framework for the organizational use of image technologies, and an indispensable practice of labor analysis for designing non-prescriptive didactic scenarios. Indeed, labor psychologists have promoted a reappraisal of the value of analyzing idiosyncratic conditions of labor in singular environments, which is opposed to the former conventional methods of analyzing labor as a manifestation of universal physiological laws (Rabinbach 1990). Largely influenced by Soviet theories of activity (Lev Vygotski and others), Western labor psychologists have stressed the importance of

taking specific social and material interactions into account in order to evaluate the *conditions of emergence* of effective behavior.

Additionally, in contrast to the behaviorist tradition, which was uninterested in the mental processes behind human action, ergonomic psychologists investigate the mind at work by analyzing the multiple, localized interactions among which the cognition of workers is distributed (Bedny and Meister 1997; Clot 1999; Rasmussen, Brehmer, and Leplat 1991). Such perspectives have brought forth new pedagogical trends that draw on psychological analyses of labor environments to develop customized professional-education *dispositifs*. As stated by one labor psychologist, "How to build *the model of the situation that will generate the relevant behavior*, what are the attributes of this model, how to promote its development and maintenance: these are questions that arise in [professional] training and that cognitive psychology can help to answer" (Leplat 2002, 25; italics added).

Psychological analyses of actual labor situations are now commonly used by educators to design training scenarios. They reveal specific settings and interactions that make real work behaviors possible. "Professional didactics is based on labor and its analysis as the starting point of training design. ... Learning from situations and through situations is thus the first organizing principle of professional didactic engineering" (Mayen, Olry, and Pastré 2017, 470).

But these didactic engineers do not merely reproduce actual labor situations by means of simulation (such *mimesis* would be of little pedagogical interest). Instead, they break down actual situations in order to create a progressive method of adapting human performance to the needs of specific labor settings. Their educational *dispositifs* are intended to stage "an organized sequence of situations designed to support learning" (Pastré 2011, 257). To promote transitions from operational incapacity

to legitimate operational knowledge, they offer scripts of paths through *problematic situations*,[4] at the end of which trainees will have autonomously developed the conceptual resources for action and decision-making necessary to manage ordinary labor situations.

This is where the articulation[5] of educational and psychological practices with moving-image apparatuses becomes so useful. There are at least three fundamental contributions that digital moving images make to professional training as it is formulated by educators trained in the school of ergonomic psychology. First, moving-image apparatuses offer the possibility of a sensory (sometimes sensorimotor) activity within a figurative space of a "great plasticity" (Mellet-d'Huart and Michel 2005, 342). This means that visual, acoustic, linguistic, and even gestural inter-actions between trainees and their environment can take place within a *scripted space*, where aesthetic affordances are minutely programmable.

Secondly, and consequently, cinematic techniques of staging and composition allow educators to design a *pedagogical progression* based on a *mimetic progress* of representations in relation to reference situations. That is, cinematic images offer the possibility of recontextualizing a set of scattered, simultaneous, or contingent events that characterize actual labor situations within the deliberately arranged space-time of representation.[6] This means that cinematic techniques enable the fictional arrangement of interactional situations into steps of progressive

4   As explained by Pierre Pastré: "[W]e seek in work situations the spots where a problem arises. A problem exists when the procedures available to the operator are insufficient to control the situation" (2016, 23).

5   Here and throughout this article, I use a vocabulary borrowed from Bruno Latour's (2001; 2006) actor-network theory.

6   For René Amalberti, this cinematic asset raises important problems of scripting: "[t]his constriction of time and events, this acceleration of reality to make it express a range of pedagogical situations imposed in the time of the training exercise, is undoubtedly the main distortion of reality and poses a series of daunting difficulties in the construction of scenarios" (2011, 3).

complexity, gradually linking trainees to the signifying entities that make up their future work environments.

Finally, cinematic records allow for situational data collection. As an epistemic archive of a company's activities, this data can be mobilized anywhere and anytime to enact transformations of the company's human workforce.

The moving-image apparatuses I have addressed throughout this essay are digital and somehow "interactive." Physical inter- action with these virtual spaces often appears to educators as a way out of "passive learning." Active learners are expected to engage in select environments to understand the wide range of *effects* their choices and actions have. Hence, the importance of algorithms for delivering simulated environmental responses to actions carried out by trainees. The "cinematic realism" sought by designers of training *dispositifs* is usually not primarily linked to the audiovisual support or content quality (i.e., to high-definition interfaces, richness of scenic details, etc.). Rather, this realism depends on the quality of *feedback scenarios* (Barot et al. 2013; Pastré 2016; Soler and Marescaux 2011). It is necessary for the environmental reactions experienced in the simulated environ- ment to reproduce an interactive dynamic with the user that is as faithful as possible to the dynamics of their reference work situations, for *learning progress* is assumed to depend directly on the trainees' capacity to assess the environmental feedback generated by their actions.

Therefore, training *dispositifs* generally embody one of the fundamental cybernetic principles for building systems of efficient behavior *self-production*, as formulated in 1950 by Nor- bert Wiener: "effective behavior must be informed by some sort of feedback process, telling it whether it has equaled its goal or fallen short" (1989, 58). Accordingly, an *autopoietic* system of behavioral efficiency emerges from circuits linking workers to environments in which "positive" and "negative" reactions are made readable by the workers. Digital figures offer a *logistics* of

information feedback and a precise *legibility* of the environmental metamorphoses that follow from user actions—since digital environments must always first be *cinematically scripted*.

Cinematic-Epistemic Templates for Situated Actions

In this context, cinematic knowledge stands for a capacity to read and assess the impacts of one's actions on a given environment. This capacity is cinematically informed insofar as it is enhanced by digital feedback scenarios.

In the aforementioned software designed to train vineyard pruners, the users' ability to visualize the consequences of their pruning decisions is configured by the software. Its *sequences of images* reduce the actual growth time of plants—which can last several years—to a few clicks. An algorithm simulates the development of the vines following the users' pruning choices, but also factors in the probability of various outcomes related to the growth characteristics of the vines, climatic and biological incidents affecting the plants, and the aging of the wood. Trainees quickly realize what constitutes "incorrect" pruning-reasoning, as the software simulates their interaction with a multiplicity of agents involved in the dynamic process of plant development over time. "The construction of probable growth and development scenarios is thus organised according to different temporalities," as the researcher who developed the scenarios explains (Caens-Martin 2005, 88). The pedagogical interest of the software is that it "compresses the response time of the plants" (Caens-Martin 2005, 101). Trainees can thus adjust their pruning strategies based on the developmental fictions produced by the software. These fictions eventually build up the users' "own" ability for self-assessment.

Feedback loops generating self-regulatory performance processes are conceived according to the capacity of cinematic

and image techniques (scripting and coding) to encompass the dynamic interactions that define a given labor environment. To get an idea of the complexity of carrying out cinematic translations of vague and minute interactions into visible (and often quantifiable) data, it is worth looking at another example, this one related to the education of surgeons.

Surgery is currently a leading area for the development of professional training technology, since like piloting aircraft and other high-risk activities, it involves a multitude of actions that need to be performed efficiently. Today, there are several companies offering screen-based surgical simulators with a view to standardizing operating procedures and performance.[7] In laparoscopic surgery training,[8] simulators apply algorithmic geometry models for the representation of anatomical surfaces. Their visual interfaces are connected to haptic force-feedback systems, thus ensuring accurate calculation of surgical performance and objective assessments of the trainees' compliance with official safety thresholds.

A simulator such as ULIS [Unlimited Laparoscopic Immersive Simulator], developed by the German company Karl Storz, allows the use of identical replicas of laparoscopic instruments for simulation. Its software provides a series of clinical scenarios arranged in an orderly and didactic series of training modules (Soler and Marescaux 2011). For a delicate exercise such as the introduction of the instruments into the patient's body, for example, once the gestures have been performed, the simulator indicates whether the instruments have crossed a blood vessel or organs that they should not have crossed, and whether or not they have achieved their objectives. It features the exact percentage of pathological

7   For example, Surgical Science in Sweden, Simbionix in Israel, Karl Storz in Germany, or the Simsurgery in the USA.
8   Laparoscopy is a type of telesurgery that involves the introduction of an optical cable into the body of a patient, which requires extensive training. The patient's internal cavity and the surgeon's actions can be observed on a screen.

cells collected (in the case of biopsy training), or the percentage of pathological tissue destroyed (in the case of thermal ablation training). Unlike previous training methods on living animals that did not provide clear visual feedback on the trainee's accomplishments, the digital simulator gives the trainees accurate feedback on the multiple effects of their actions: "[the simulator] incorporates an automatic assessment mode providing the student with a quick and clear view of the progress they are making as they learn" (Soler and Marescaux 2011, 109).

However, cinematic training *dispositifs* do not simply display data that remains concealed in traditional training methods. They do not just make explicit what was implicit in the progress of apprentices before the arrival of digitally designed figures and finely calculable simulated gestures. Cinematic techniques *stage* interactive situations, i.e., they compose, build, arrange, and code the responses of fictional environments. In so doing, they *select* the items that generate feedback information and *frame* the meaningful domain within which individual performance assessments can happen.

This selective staging practice can be evidenced by controversies among educational scriptwriters. There is not always consensus on what interactive elements should be featured in learning scenarios. Dr. Bin Zheng from the Department of Surgery of the University of British Columbia stated that an important interactive component in an operating room and an essential aspect of a surgeon's expertise, *vigilance*, was not featured or assessed in training simulators: "[w]hen observing surgical performance, it is noticeable that the senior surgeon usually keenly detects signs that may concern patient safety" (Tien et al. 2011, 658). To overcome this flaw in training scenarios, Zheng and his colleagues experimented with a scenic and technical complement that added an interactive item to the training sets—a screen where the patient's vital information was displayed, and a mobile gaze tracker to detect the frequency and duration of glances

the trainees took towards this screen. This addition, he argued, allows for a calculation of *how vigilant the trainees are*.

If Zheng's proposal is to be incorporated into training *dispositifs*, we would obviously have a slightly different cinematic template[9] for trainees to assess their performance compared to simulators that do not provide any means to read "vigilance." Or to put it differently, one could say that if apprentice surgeons are to be aware of their patients' safety cues, it is best not to rely on occasional reminders from their instructors: what is more reliable is to reconfigure the cinematic templates they use to train, to assess their own skills, to regulate their performance, and to prove (to others and to themselves) their "vigilance" as an integral part of demonstrating their expertise.

Beyond controversies about what should be included in the cinematic settings for learning particular kinds of labor, other disputes may also be noted regarding the *mise en scène* and the narrative effects of educational fictions. Scriptwriters of cinematic-epistemic templates are also careful directors of their audience's *emotional experiences*. Under the influence of contemporary labor psychology, they strive to "avoid the ruinous dualism of the cognitive and the emotional" (Clot 2008, 4).

This is apparent in the training of surgeons as well as other professionals whose "emotions" are most unquestionably involved in the efficiency of their "reasoning," from firefighters (Clifford et al. 2019) to office workers (Tichon and Mavin 2016). What Wiener once called a "feedback process" (informing a behavior whether or not it has achieved its goal) is also conceived by educational scriptwriters in its figurative details, as these are deemed to determine the trainees' emotional involvement with the outcomes of their activity.

9   The term "template" is used here in the sense of a roughly stable format that can be used by an indeterminate number of users (learners). For an approach to media formats as templates and their epistemic functions, see Jancovic, Volmar, and Schneider (2020).

Indeed, accidents due to clumsiness are often a source of serious psychological shock for surgical trainees. This is at times inevitable in the case of training on living animals. By contrast, digital simulators risk producing an opposite effect on the emotional economy of apprentice surgeons: in the absence of adverse effects, there is a risk that cinematic training results in recklessness and the "trivialisation of patient death" (Soler and Marescaux 2011, 110).

This problem of balancing shock and indifference requires didactic programming to manage the progress of affective interactions during surgical simulations: "we do not want the student to be immediately confronted in the first exercise with the handling of a hemorrhage, which is introduced in the 5th and 6th exercises" (Soler and Marescaux 2011, 110). Thus, even if the simulator in question does depict a hemorrhage due to an error in the first exercises (since it must faithfully respect the dynamics of actual labor situations), this depiction is not made *in the same way* as it is at the end of the training period. The solution found by the didactic engineers is grounded in the possibilities of cinematic *staging*:

> We therefore believe that the immediate feedback of the gesture's effectiveness and its consequences must be provided in a pedagogical and progressive way. Thus, this feedback can be *textual* in an initial learning phase, indicating for example to the student that their gesture would have led to a hemorrhage, then simulated in a realistic way in an advanced learning phase, by *simulating for example the bleeding* caused by the error. (Soler and Marescaux 2011, 111; italics added)

Here, a program incorporating both cognitive and affective interactions of trainees with their labor environment is designed through cinematic staging techniques. The plan of a media infrastructure lays the ground for the trainee to develop an autonomous capacity for action. Cinematic images, in all their plastic and semiotic variety, in all their combinations and

semantic effects, become as essential to reproducing an experi- ence of "efficiency" as to sensing the "seriousness" of a mistake.

The Tacit Regulation of Labor

Cinematic templates for professional education act as effective regulators of how apprentices recognize progress in their own performance. By mediating learners' interaction through standard figurative environments that respond to the trainee's actions according to specific patterns of visibility and legibility, they normalize paths of self-improvement and produce normalized means of performance assessment. The design of cinematic templates can thus provide a basis for self-development of performance capabilities on a massive scale.

In this context, the more cinematic techniques extend the audiovisual legibility of workplace dynamics, the more the self-production of efficiency expands across the zones shaped by cinematic feedback. The practices of scripting, staging, and coding that make cinematic-epistemic templates must then be recognized as disciplinary practices of a new sort, all the more effective because they make the shaping of operational knowledge appear as a result of an autonomous effort of activity regulation, while cinematic inputs remain largely unacknowledged, i.e., a tacit epistemic infrastructure.

Instead of considering the operational knowledge of post-industrial labor as strictly "personal knowledge," as readers of Michael Polanyi in management (Baumard 1999) or economic notions such as "human capital" (Machlup 1984) invite us to do, interactive digital learning tools show that operational knowledge is largely embodied in labor environments, and that cinematic techniques can create epistemic conditions for the docile adaptation of workers. These image apparatuses attest to an organization of labor by virtue of cinema's power to effect a deliberate pre-organization of sensibility. Evidently, cinematic creation has become an integral part of the disciplinary systems of labor.

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