Top: Constant in the labyrinth. Constant exhibition, Gemeentemuseum, The Hague, 1965. © Constant/Fondation Constant/VG Bild-Kunst, Bonn, 2018.

Bottom: "Games are forbidden in the labyrinth." From the *Situationist Times*, no. 4 (1963).

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Constructed Situations, Dynamic Labyrinths, and Learning Mazes: Behavioral Topologies of the Cold War

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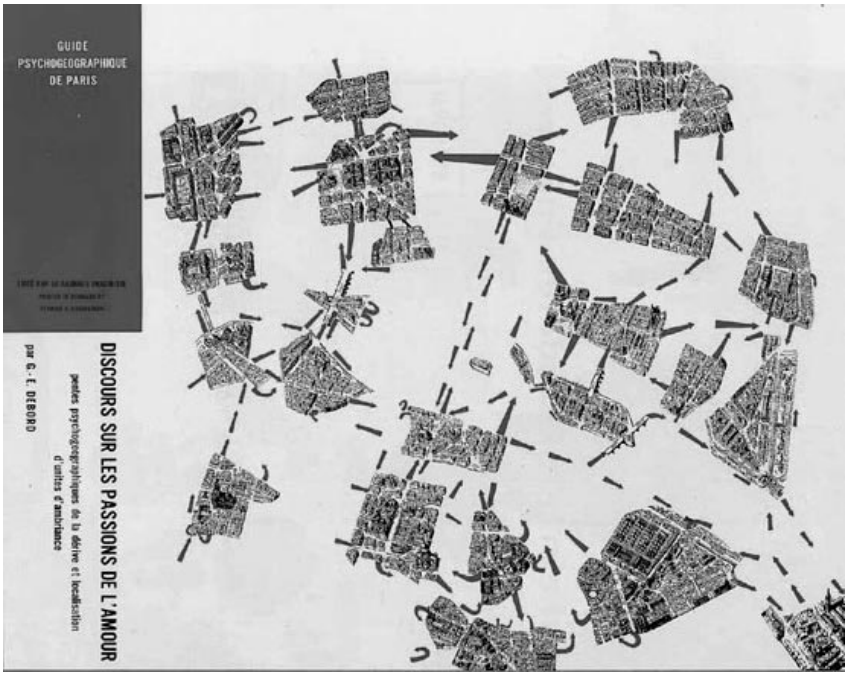
An "Educational Labyrinth"

Contained in the personal archives of Asger Jorn is a two-page, typewritten document titled "Projet pour un labyrinthe éducatif" (Project for an educational labyrinth), signed by Guy Debord and dated December 8, 1956. Debord conceived this project for an exhibition at the Taptoe Gallery in Brussels—the *Première Exposition de Psychogéographie*—that was organized by Asger Jorn's International Movement for an Imaginary Bauhaus and the International Lettriste movement, cofounded by Debord. The exhibition, with contributions by Jorn, Ralph Rumney, and Yves Klein, would ultimately take place in February 1957, but without the participation of Debord, who withdrew due to a momentary disagreement with Jorn.[1] The aborted project thus went the same way as a later attempt, undertaken by the Situationist International, to construct a labyrinth, which, this time, was to be installed at the Stedelijk Museum during the spring of 1960. However, the negotiations between the Stedelijk Museum and the Situationist International broke down, leading to the publication of an accusatory text, "The World as Labyrinth," in the fourth issue of the situationists' journal.[2] If curator and museum director Willem Sandberg had dared to descend into the labyrinth, they wrote, he "would have been able to find himself or to lose himself alongside us."[3]

This perhaps makes a good anecdote, but my goal here is not merely to add another footnote to the already impressive literature on the history of the Situationist International. Instead I am drawn to Debord's proposal as one instance in a larger genealogy of topological practices in contemporary art.[4] What drew my attention as I patiently shuffled through Jorn's voluminous papers was the odd conjunction of the two words in the title of Debord's manuscript: *labyrinth* and *educational*. The situationists made fun of the signs posted in the Jardin des Plantes in Paris, forbidding one to play in the labyrinth. Why then was Debord interested in such a serious game as an



Guy Debord. *Guide psychogéographique de Paris: Discourse sur les passions de l'amour* (Psychogeographical guide to Paris: Discourse on the passions of love), 1957.

educational labyrinth?[5] What might his maze have to teach the individual who ran its gauntlet?

To start, Debord's title is a bit of a misnomer. This learning maze, to borrow a term from the field of behavioral sciences, was not meant to imprint a normative pattern of conduct on its users. That is, there was no problem to be solved, no reward waiting at the end of the labyrinth, no reinforcement of any purposeful mode of activity. Quite the opposite: if any behavior was to be "favored" in the labyrinth, it was one of *unlearning* or *deconditioning*. Debord wrote that the labyrinth was to create a "violent derangement" (*dépaysement violent*) of the visitor's situational awareness, although he offered only a few tantalizingly brief cues as to how this psychophysical decentering might be brought about. Not only were the meandering corridors to induce a state of bewilderment in the visitor, "making orientation truly impossible," but the décor of the maze was meant to amplify this effect by covering the corridor walls with slogans and inoperative street numbers, while lighting the space in a strongly uneven manner. False windows were to present the visitor with enlarged photographic views of various urban landscapes or "completely different subjects," while the corridors were to be given disconcerting names, such as rue Perfide, rue de la Dérive, avenue de la Terreur, chemin de la Guerre Civile, or Plage [*sic*] Magnétique. Everywhere, "useless directional signs" were to point in opposing directions, and numerous maps were to be strewn about which, rather than providing a plan of the actual labyrinth, represented the "psychogeographic currents" of various cities.[6]

This *dépaysement* of the visitors in the educational maze, however, was to be effected not only by its physical structure

and décor. The visitors' behavior was to be secretly manipulated by the intervention of a covert group of "psychographic comrades" who wandered the maze.[7] Acting as if they were lost, they would "systematically" accost passersby, orchestrating a series of disturbing encounters by handing their targets sealed letters with "unsettling or disturbing texts" or inviting them to rendezvous in a "less frequented" quarter of Brussels. Finally, if the visitors managed to locate the exit of the maze, they would find Debord seated in the last room, absorbed from morning to evening in playing, as he writes, a "spectacular" version of the *Kriegsspiel*, which "reunites the advantages of chess and poker." A war game, that is, that combined the ludic categories of *agon* and *alea*, strategy and chance, just as the visitors' aleatory passage through the maze was inflected by a stealthy tactic of distraction and deregulation, which was to unleash an intense, if transient, moment of adventure.

The Behavioral Turn

How effective Debord's educational labyrinth might have been is anyone's guess, although a later variant, constructed by Constant in 1965, would fall short of its aim. What is of immediate significance, however, is the specific type of experimental situation that Debord imagined: a situation that was not limited to the field of situationist practice but had a wider, apparatical application in contemporary social studies. Indeed, one question that may be asked is how this proto-situationist maze can be situated within a broader late-1950s field of experimental models of group behavior, in particular within the postwar discipline of behavioral studies in the United States, which studied group dynamics not only to diagram the complex processes of social interaction—as in a sociogram—but also to predict, guide, and control the minds and conduct of social agents by establishing a set of "rationalized" protocols for decision making.

The *behavioral turn* made in both the human sciences and certain neo-avant-garde practices during the 1950s was focused primarily on the environmental determinants of human conduct rather than on the internal processes of the (un)conscious mind.[8] That is, instead of the introspective method of earlier psychological research, the behavioral sciences promoted a purely empirical observation of the responses of the human subject (or lab rat) to external stimuli. In its most elemental form, the behavioral turn has its roots in prewar behaviorist theory, which, in the United States, originated with John Watson's "Behaviorist Manifesto" of 1913.[9]

Behaviorism in its so-called classical, prewar phase was exclusively focused on the outward patterns of behavior in its test subjects, whether human or rodent, observing their learn-

ing process in relation to a specific task within a delimited environment—such as the rat maze, the prototypical educational labyrinth. The behaviorists were interested only in the collection of quantifiable data, measuring input and output of a system. They were not concerned with what went on in the subject's mind as it was put through the steps of the learning test. The process of consciousness was placed in brackets.[10] Hence, behaviorists were confident that the behavior of the lab rat was not fundamentally different from that of the human subject: all behavior, whether human or animal, was to be explained in terms of the same stimulus-response system. As Watson writes in his behaviorist manifesto, for scientific purposes there exists "no dividing line between man and brute."[11] In Watson's view, psychology is nothing else but a "purely objective experimental branch of natural science" and its theoretical goal should be "the prediction and control of behavior."[12] The white mouse trapped in Watson's laboratory maze and forced to endlessly run its corridors in search of food was already laying down tracks for the postwar subject of behavioral studies.[13]

However, the general program of behavioral studies cannot be reduced to this behaviorist theory of the conditioned reflex but (as has recently been argued) must be situated within the contested realm of "Cold War rationality."[14] To be sure, postwar behavioral studies would not completely "discard all reference to consciousness," as Watson (known for his polemical statements) demanded. Watson went quite far in rejecting such basic, psychological concepts as sensation, perception, affection, emotion, and volition because, as he claimed, they were merely speculative in nature, relating to mental states that are not available to "objective" observation.[15] The constructivist model of subjectivity advanced in the behavioral sciences had its counterpart in the postwar neo-avant-garde. Fascination with "learning mazes" was not limited to the Situationist International, although my focus here is on the work of Debord, Jorn, and Constant.[16]

The situationist movement, at least during the first phase of its existence, would address in its own critical fashion Watson's original contention that the behaviorist's "theoretical goal is the prediction and control of behavior."[17] I do not mean to imply that the situationists were responding directly to Watson's words. The extent of their knowledge of behaviorist psychology is not well documented; however, consciously or not, their practice appropriates several of its concepts and methods, if not always following their "proper" application. And so, when Watson exhorts, "if psychology would follow the plan I suggest, the educator, the physician, the jurist and the business man could utilize our data in a practical way, as soon

as we are able, experimentally, to obtain them," the situationists would agree—if only to counter the manner in which the experimental data was "utilized" by the educators, physicians, jurists, and businesspeople of their day. In short, situationist practice performed a *détournement* of the ideological project of the behavioral sciences and, in particular, behaviorism.

To establish the groundwork, however, I need to pose a question of a more technical, if curious, nature: What was the methodological nature of the experimental apparatus of the behavioral sciences, and to what extent does the situationists' practice—which they deemed "experimental"—share or even adopt certain of its features? That this is not a far-fetched question can be gleaned from an editorial in the first issue of the situationists' journal.[18] "The Struggle for the Control of the New Techniques of Conditioning" takes up a discussion of Sergei Chakhotin's study on propaganda and behavioral control, *The Rape of the Masses*.[19] Dedicated to Ivan Pavlov (his former teacher) and H.G. Wells, Chakhotin's book contains an extensive exposition of the "objective psychology" of Pavlovian behaviorism and its theory of the conditioned reflex. In a bizarre fashion, Chakhotin attempts to synthesize Marxism and behaviorism, alleging that behaviorist techniques of persuasion, as employed by the Nazi propaganda machine, are not intrinsically evil. Rather, he claims, they have merely been applied to the wrong end: "To rapidly build socialism, the true democracy, one must employ the same [fascist] method of provoked obsession, which functions here no longer by fear, but by enthusiasm, joy, and love. A violent propaganda of nonviolence!"[20] With this astonishing assertion, Chakhotin launches his own behaviorist program of "politics as biological science," replacing the Marxist focus on labor relations with one based on "affective relations" between individuals. Emotional bonds, the behaviorist assures us, can be "objectively" forged in contrast to the "mass hypnosis" theory of psychoanalysis he is keen to refute. Chakhotin concludes that socialists must adopt an "experimental politics" in which both savants and politicians conduct research on the masses according to laboratory protocols: collecting and collating data, organizing modes of action, and, finally, learning to control the effect of these programmed actions. In establishing the objective "laws" of human behavior, Chakhotin is convinced, such an experimental politics will assure that each political campaign fully achieves its projected target.[21] A dirigist mode of politics if there ever was one.

That the situationists would crib notes from this rather crude, behaviorist take on radical politics may seem strange, although the Soviet montage school had already followed a similar path.[22] Nevertheless, the editorial takes the challenge of

Chakhotin's book seriously. The author observes that since the initial appearance of Chakhotin's book the psychotechnical mastery of "the mechanisms of behavior" had seen steady advancement. To support this contention, the editorial cites the pervasive use of "hidden persuasion" techniques in film and radio advertising, as well as a newspaper story that, although found to be "suspect in many ways," is elaborately described. The story told of a certain Lajos Ruff, who claimed to have been brainwashed by the Hungarian police. His indoctrination process consisted not only of solitary confinement but the "projection of absurd or erotic films that became confused with other constructed scenes [such as] visitors that addressed him as a hero of the resistance," a fully fictitious role that was presented in another set of films. What interests the author of the situationist editorial is the capacity of a controlled environment to transform an individual's beliefs and behavior without the exertion of direct, physical violence. Elsewhere the editorial mentions a research report of the Canadian Defense Board analyzing the degradation of the mental and physical abilities of test subjects who had been secluded for extended periods of time and deprived of almost all sensory input.[23] One of the documents, which was declassified only in 2005, states that the original research assignment was given

> to cast light on the peculiar confessions elicited from prisoners by the Communists: peculiar because in some cases no physical duress seemed to have been applied and because some of the prisoners seemed to have undergone genuine changes of attitude, in the acceptance of their captors' philosophy and point of view.[24]

This passage seems to encapsulate all the Cold War hysteria about Communist mind control.[25] In painstaking detail the researchers carefully recorded the test subjects' gradual deliverance to an impaired sense of judgment, showing, in particular, an intense fascination with the participants' tendency to hallucinate. In a table attached to the report, the researchers quantify in elaborate detail the various "feelings" the test subjects experienced during and after their isolation, ranging from boredom, irritability, and nausea to confusion and insomnia. Implying a retro-engineering of the human mind—which output is caused by which input?—the authors observe that the disturbance of the test subjects' mental processes increases their vulnerability to propaganda, and they conclude that "efficiency of thinking" and "emotional stability" are dependent on our presence within a variegated sensory environment. Without a "normal" dose of stimulation, "intelligence, judgment, and moral values might disintegrate."[26] Debord would have had no trouble converting that statement into its opposite: our over-

TABLE V

Time in (hrs.)	Feelings During Stay					Feelings When Released				Means of Passing Time				Willing to Return		Stay Helped By Records		Main Reason Given for Stopping	Post-Cubicle Effects (up to 24 hours)								
	Boredom	Fatigue	Nausea	Restlessness	Irritability	Giddy	Tired	Nausea	Visual disturb.	Sing & whistle	Exercise & fidget	Talk & count	Explore - limbs	Yes	No	Yes	No		Confusion	Absent-minded	Talkative	Nausea	Dizziness	Fatigue	Insomnia	Visual disturb.	Irritability
135½	X			X	X	X			X		X			X		X		Tired	X							X	
127¾	X			X		X	X	X	X	X	X	X	X	X		X		(pre-arranged)		X	X						
113½		X		X	X	X	X	X	X	X					X	X		(pre-arranged)		X					X		X
106½	X			X		X		X	X						X	X		(pre-arranged)		X					X		X
102½	X			X		X					X	X	X	X			X	Lost motivation			X	X	X	X	X	X	
96½	X		X	X	X		X	X	X	X	X		X	X		X		Bothered by hallucinations	X								X
93	X	X		X		X	X		X		X		X	X		X		(pre-arranged)	X	X				X			X
91	X			X	X	X	X	X	X			X			X	X		(pre-arranged)		X				X			
86	X						X				X	X		X		X		Discomfort, annoyances									
80			X	X	X	X	X	X	X	X	X	X		X			X	(pre-arranged)	X				X				
79½	X			X	X	X				X	X	X	X	X		X		(pre-arranged)	X	X					X		
70½	X			X	X	X			X	X	X	X	X		X	X		Bored, tense, worried									
76	X			X		X				X	X		X		X	X		Bored, "worked-up"									
74½	X		X	X		X		X	X	X	X	X		X			X	Constipated, restless		X							
69½	X			X	X	X	X			X	X	X	X	X			X	"Attack" (fit)									
66½				X	X	X					X	X		X		X		(pre-arranged)									
63	X			X		X				X	X			X		X		Frustrated, time estimate off			X				X		
63				X	X	X			X		X		X		X	X		Restless	X						X		X
60	X		X	X	X	X		X	X	X		X	X		X	X		Discomfort, constipation, boredom, sex-frustration				X					X
53	X	X		X	X	X	X	X	X	X	X	X	X	X		X		Physical discomfort				X		X			
51½	X			X	X	X	X	X	X	X	X	X	X	X		X		Wanted activity		X				X		X	X
50½	X			X		X			X	X	X		X	X		X		Tense									
47½		X		X	X	X	X	X	X		X		X		X		X	Restless, uncomfortable						X			X
38	X				X	X			X	X	X				X	X		Depressed		X							
32½	X			X		X			X		X		X		X	X		Restless, uncomfortable		X							
30½										X	X	X	X		X	X		Panic; suffocation		X						X	
15				X		X	X		X			X			X	X		Panic; "restricted"		X	X						
14				X							X	X			X		X	Fear; restlessness									
	20	4	4	25	15	24	12	11	19	16	23	16	16	15	13	22	6		6	12	4	3	2	6	6	4	8

Subjects' descriptions of their feelings and reactions during and after isolation. Data from post-cubicle interview.

"Subjects' descriptions of their feelings and reactions during and after isolation. Data from post-cubicle interview." From D.O. Hebb and Woodburn Heron, *Effects of Radical Isolation upon Intellectual Function and the Manipulation of Attitudes* (1955).

stimulation by the commodified spectacle of life is what *integrates* us into a normative system of "intelligence, judgment and moral values." So, what is to be done?

Taking a page from Chakhotin's book, the situationist editorial takes these examples of brainwashing not as a warning but as a call to arms. If the "repressive use of the construction of ambiance" shows an alarming advancement in behaviorist techniques of social regulation, the situationists suggest these same techniques are not nefarious in themselves but may be directed toward another purpose. And so, the editorial jubilantly announces that the situationists are to take up the gauntlet thrown down by the state apparatus of control (on both sides of the Iron Curtain) and actively join a "race between the free artists and the police in the experimentation and development of new techniques of conditioning."[27] Nevertheless, the situationists were aware of entering the race with a distinct disadvantage. Debord's educational labyrinth and the "psychogeographic" excursions or *dérives* into the urban environment were meant to ensure that the situationists, in an "experimental" fashion, developed their own arsenal of psychological techniques, albeit with the aim of provoking the mental states of confusion, disorientation, or *dépaysement* that had spooked the Canadian researchers.[28] The situationist invention of the new discipline of psychogeography—"the study of the specific effects of the geographical environment, consciously organized or not, on the emotions and behavior of individuals"—must, in this context, be seen as the counterpart of the *psycho*-graphic methods of the behavioral sciences.[29] During the late 1950s, Debord harbored the hope that it would be possible to draw up a kind of scenario, to develop a notational system for the transformation of affective relationships between individuals and their environment: a combinatory "calculation of possibilities" of various ambiances.[30] Through constant experimental conduct

within the cultural sphere of everyday life, the situationists expected to sharpen the precision of their behavioral techniques of intervention.[31]

By 1961, however, Constant and Jorn had left the situationist movement, and the aesthetic project of developing an experimental politics of behavior was mostly in the past. One of Debord's early interlocutors, Henri Lefebvre, had always been less sanguine about its potential. Writing in the early 1960s, Lefebvre foresaw the contours of a future *society of control*, to borrow Gilles Deleuze's term, emerging in the midst of urban life—that is, the very terrain on which the situationists were plotting their escape from the spectacular logic of capital:

> In "industrial society," urban life becomes peopled by innumerable signallings [*sic*]. Each programs a routine, exactly like a calculator, regulating patterns of conduct and behavior. We may well ask ourselves whether one day the entire set of signals will not constitute a sort of gigantic machine which will not need to be built, but which cyberneticists will simply formulate and put into action using existing connections and signallings, regulating society and its everyday life. . . . Perhaps it will give the men trapped within the prison of its machine a splendid impression of spontaneity and harmony. And this is what it will be: kindly towards the average socially adapted ("balanced") individual, pitiless toward the "deviant."[32]

What Lefebvre outlines here in such dramatic terms is a process of *informatization* of the behavioral sciences—one that was actually already underway. The importance of this passage is that it highlights a genealogical trajectory running from the urban grid to the digital network, which Friedrich Kittler would later elaborate in an equally determinist fashion.[33] Yet, rather than collapsing these separate topologies of the city and the computer into one continuous media history of technologies of "control and command," I prefer to tarry a while longer with some of the abiding questions of the 1950s: What, precisely, does "human behavior" consist of? How is it structured? Under what conditions can it be modified? And, finally, why did the maze, or more specifically the network, become such a dominant, spatial figure of behavioral experimentation? What forces of individuation or deindividuation were thought to course through this topological field of nodes and pathways?

The Constructed Situation

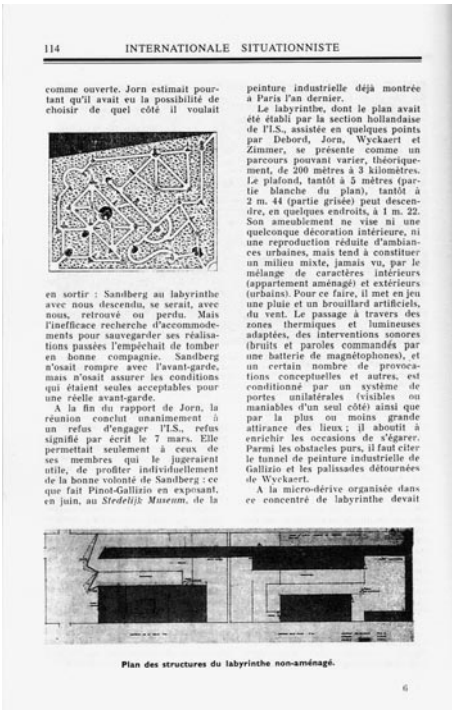
If the *dérive* explored the dynamic of small groups against the immense background of the city, the purpose of the educational labyrinth was to reduce the intractable urban fabric to a confined, controlled space (even though the solicitation for a

rendezvous connected the maze to its outside).[34] This seclusion allowed for a more calculated, if not totally predictable, form of group interaction. The nature of this experimental program coincides with what Debord would write a few months later in the founding document of the Situationist International, the *Rapport sur la construction des situations* (Report on the construction of situations):

> our central idea is that of the construction of situations, that is to say, the concrete construction of momentary ambiances of life and their transformation into a superior quality of passion. We must develop a methodical intervention [*intervention ordonnée*] rooted in the constant interaction of two complex factors: on the one hand the material setting of life [*décor matériel de la vie*] and on the other hand the modes of behavior that are not only induced by this setting but are also capable of transforming it in turn.[35]

The constructed situation, in short, not only provided a method for engaging in "experimental behavior"—as the *dérive* did—but also made it possible to alter, as it were, the dynamics of the experimental situation from within.[36] The situation was the experiment and the experiment the situation.

But does this mean that the situationist "constructed situation" completely collapses the spectacular distance between observer and observed, or is a new relationship between inside and outside inscribed within the (relatively) closed system of the maze during one's passage through its winding corridors? Debord is not satisfied to leave everything to chance. An active involvement of the participants, whom Debord calls "pleasure-seekers" (*viveurs*), was to be stimulated by a degree of external interference. Debord drew upon a scientific model of the research institute (similar to the Bureau de Recherches Surréalistes), as can be determined from his "Preliminary Problems of the Construction of a Situation," published in the first issue of the *Internationale situationniste*.[37] Here the situationists are described as a "specialized" team of researchers who are (momentarily) subordinated to a director or *metteur en scène* who is charged with conceiving of the elementary layout of a situation—the *décor*—in which certain encounters will take place between unwitting participants.[38] The director is also responsible for the orchestration of certain interventions by the situationist team within the event in order to spur the passive spectators into action. Debord's view of the experimental project of the Situationist International—which engaged in the research, analysis, and inventorying of the affective relationships of subjects to their social and urban environment—was without doubt based on an analogy to the organizational



114 INTERNATIONALE SITUATIONNISTE

comme ouverte. Jorn estimait pourtant qu'il avait eu la possibilité de choisir de quel côté il voulait

en sortir : Sandberg au labyrinthe avec nous descendu, se serait, avec nous, retrouvé ou perdu. Mais l'inefficace recherche d'accommodements pour sauvegarder ses réalisations passées l'empêchait de tomber en bonne compagnie. Sandberg n'osait rompre avec l'avant-garde, mais n'osait assurer les conditions qui étaient seules acceptables pour une réelle avant-garde.

A la fin du rapport de Jorn, la réunion conclut unanimement à un refus d'engager l'I.S., refus signifié par écrit le 7 mars. Elle permettait seulement à ceux de ses membres qui le jugeraient utile, de profiter individuellement de la bonne volonté de Sandberg : ce que fait Pinot-Gallizio en exposant, en juin, au *Stedelijk Museum*, de la peinture industrielle déjà montrée à Paris l'an dernier.

Le labyrinthe, dont le plan avait été établi par la section hollandaise de l'I.S., assistée en quelques points par Debord, Jorn, Wyckaert et Zimmer, se présente comme un parcours pouvant varier, théoriquement, de 200 mètres à 3 kilomètres. Le plafond, tantôt à 5 mètres (partie blanche du plan), tantôt à 2 m. 44 (partie grisée) peut descendre, en quelques endroits, à 1 m. 22. Son ameublement ne vise ni une quelconque décoration intérieure, ni une reproduction réduite d'ambiances urbaines, mais tend à constituer un milieu mixte, jamais vu, par le mélange de caractères intérieurs (appartement aménagé) et extérieurs (urbains). Pour ce faire, il met en jeu une pluie et un brouillard artificiels, du vent. Le passage à travers des zones thermiques et lumineuses adaptées, des interventions sonores (bruits et paroles commandés par une batterie de magnétophones), et un certain nombre de provocations conceptuelles et autres, est conditionné par un système de portes unilatérales (visibles ou maniables d'un seul côté) ainsi que par la plus ou moins grande attirance des lieux ; il aboutit à enrichir les occasions de s'égarer. Parmi les obstacles purs, il faut citer le tunnel de peinture industrielle de Gallizio et les palissades détournées de Wyckaert.

A la micro-dérive organisée dans ce concentré de labyrinthe devait

Plan des structures du labyrinthe non-aménagé.

6

INTERNATIONALE SITUATIONNISTE 155

pratiques par le détournement de *blocs affectifs d'ambiance* anciennement définis (le château, par exemple). L'emploi du détournement, dans l'architecture comme

pour construire des situations, marque le réinvestissement des produits qu'il s'agit de soustraire aux fins de l'actuelle organisation économique-sociale, et la rupture avec le souci formaliste de créer abstraitement de l'inconnu. Il s'agit de libérer d'abord les désirs existants, de les déployer dans les dimensions nouvelles d'une réalisation inconnue.

C'est ainsi que les recherches dans la voie d'un art direct des situations viennent d'avancer sans doute considérablement avec la première ébauche d'une notation préalable des lignes de force des événements d'une situation projetée. Il s'agit de schémas, d'équations où les participants pourraient choisir quelles *inconnues* ils vont jouer, sérieusement, sans spectateurs, et sans autre but que ce jeu. Voici assurément un prototype d'arme efficace dans la lutte contre l'aliénation, bonne en tout cas pour rompre avec les affligeantes conventions du libertinage ; une première reprise de l'avance sur la voie fouriériste des « parcours de bonheur ». Il faut ajouter que nous ne soutenons aucune forme souhaitable ou garantie de bonheur. Et aussi que ces schémas, plus ou moins précisés et complétés, ne peuvent servir que de piste de départ pour sauter dans l'inconnu ouvert par un arrangement calculé d'événements. Ces schémas sont encore une application du *principe situationniste de la catapulte*, observé au cours de la dérive des 29, 30 et 31 mai à Bruxelles et Amsterdam. L'expérience a fait apparaître en ce cas qu'une très forte accélération de la traversée de l'espace social, organisée temporairement et sous des prétextes utilitaires par exemple, pouvait avoir pour effet de projeter brusquement les sujets, au moment où l'accélération cesse, dans une dérive qu'ils parcourent sur leur vitesse acquise. Bien évidemment, on ne doit pas perdre de vue que toute expérience qui peut être montée à partir de bases restreintes, en dépit de sa valeur en renseignements et aussi en propagande, étant seulement *à l'échelle du laboratoire*, à un degré infinitésimal de l'ensemble social, présentera non seulement une différence d'échelle mais une *différence de nature* par rapport aux constructions futures de la vie. Mais ce laboratoire hérite de toutes les créations d'une sphère culturelle épuisée ; et en prépare le dépassement concret.

Voici donc les ultimes avant-postes de la culture. Au-delà, commence la conquête de la vie quotidienne.

9

Left: Map of André Le Nôtre's Labyrinth of Versailles (above) and plan for situationist labyrinth at Stedelijk Museum (below). From *Internationale situationniste*, no. 4 (June 1960).

Right: Map of Hampton Court Maze. From *Internationale situationniste*, no. 5 (December 1960).

apparatus of anthropological and psychological research. The constructed situation, quite concretely, was their experimental laboratory, a term the situationists would literally employ in their writing. More important, however, Debord was concerned to develop a *para*-scientific practice of the avant-garde that could act as a countermodel to the discipline of sociology, which was maligned for affirming the condition of the passive, alienated subject within spectacular society through its own adoption of the position of a disinterested or even indifferent observer.[39] Hence, the situationists were much closer to the methods of cultural anthropologists, who practiced a form of *participant observation*, than to those of sociologists, who applied more quantitative and statistical modes of research. In this aspect, as well, the approach of the situationists resembled the new field of behavioral studies.[40]

The liberation of the passions that Debord sought was to be realized through the development of a combinatory logic of ambiances, varying the affective relation of individuals to their environment. The situationist *viveurs* and their environment were to be treated as entangled, malleable elements: both conditioned and conditioner at the same time. In his *Rapport sur la construction des situations*, for instance, Debord advises that "one must study, with the knowledge and the material means at one's disposal, which organization of location, which choice of participants, and which provocation of events agrees with the desired ambiance."[41] We might conjecture, therefore, that this constant variation of the constructed situation operated as a kind of *combinatorial topology*: "We shall play upon topophobia and create a topophilia," the situationists declared

in 1960, envisioning the creation of a new architecture through the *détournement* of already existing "affective blocks of ambiance."[42] And although the editorial refers to castles as an example of the "anciently defined" forms of ambiance to be appropriated, an unidentified diagram of a maze is printed alongside the text. Clearly the image of the labyrinth serves here as yet another example of an ancient, ambient structure, which, in this case, derives from a "labyrinth-cult."

At least it does if we believe Gustav René Hocke's *Die Welt als Labyrinth*, which was one of the situationists' favorite readings.[43] Hocke's aim is to situate the labyrinth as cultural symbol in a historical "chain of motifs" (Motiv-Kette)—a kind of Warburgian *Nachleben der Antike*. As Hocke notes, the labyrinth theme underwent an "explosive" rebirth within the mannerist and Baroque art of the sixteenth and seventeenth centuries before a long decline in modernity. Whereas the mannerist maze is celebrated as a "map of the mysterium" (*Landkarte des Mysteriums*), spiritual metaphor of the unfathomable, hidden weave of the universe or the world-as-knot (*Welten-Verknotung*), the "decadence" (the author's words) of modern art would be sealed by a mere decorative application of the motif. The situationists had little truck with Hocke's gnostic concept of the mannerist maze, just as they vehemently opposed the postwar "decadence" of surrealism, which they accused of dabbling in esoteric modes of knowledge. Which is not to say the situationists were not fascinated by the Baroque *Irrgarten*. Rather, they were to juxtapose its wandering pathways with more modern circuits—the functionalist grid of urban planning and the automated networks of information technology—that were geared to a disenchantment of the labyrinth, divesting it of all its "monstrous" secrets.

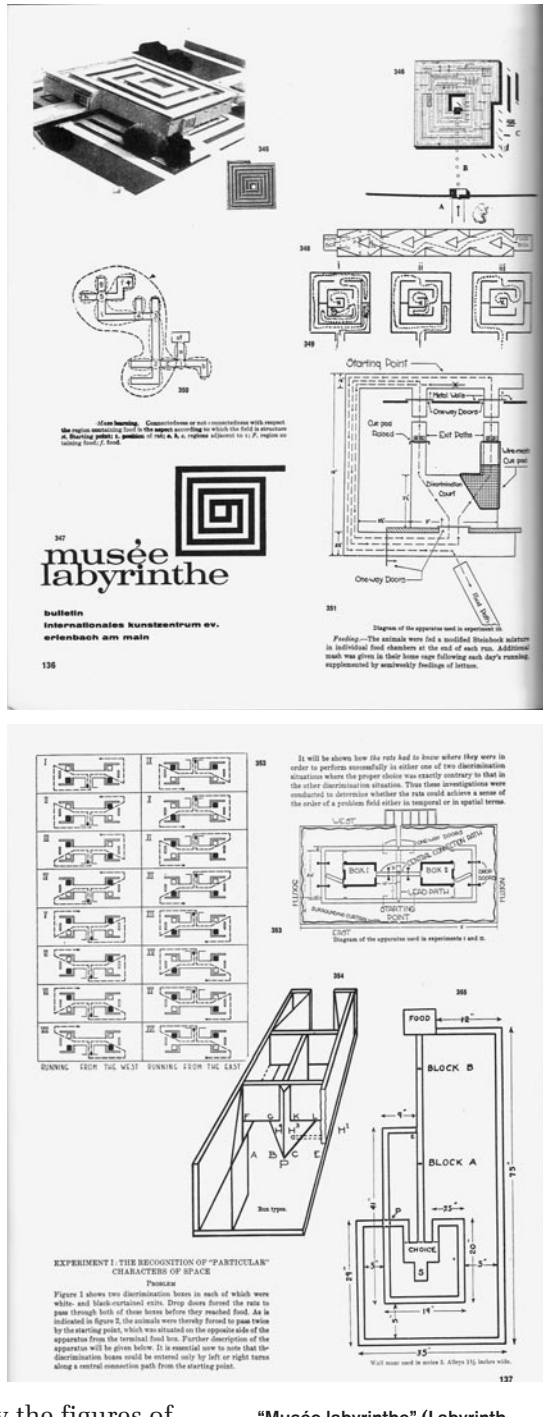
The Behavioral Maze

In the fourth issue of the *Situationist Times*, dedicated to the theme of labyrinths, a double-page, spiral diagram of Le Corbusier's Musée labyrinthe is printed alongside various diagrams of the rat mazes that were a staple of behavioral laboratories.[44] This magazine was published in 1964, after its editor, Jacqueline de Jong, had been expelled by Debord, yet the exploration of various topological figures, such as interlaced patterns, labyrinths, rings, chains, and knots, spread across three of its issues, reflects a discussion that had been initiated by Jorn in 1960 but would be cut short by his own departure from the situationist group in 1961.[45] Is this juxtaposition of images simply a visual pun, or something more than a fortuitous combination of maze images?

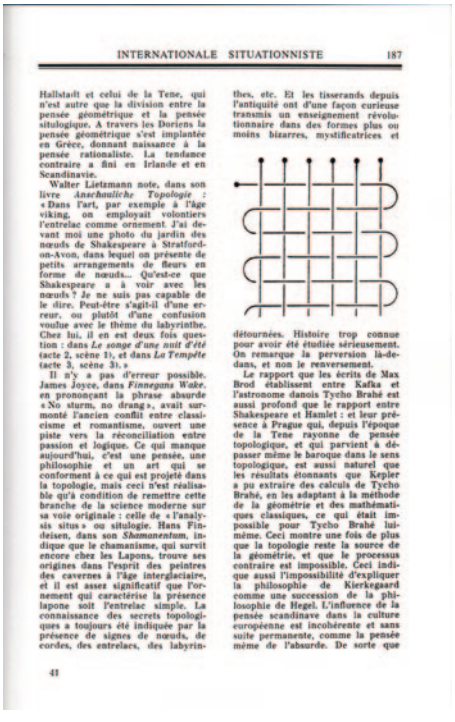
An answer to this question can be found in Jorn's attraction to the topic of topology, although what is significant is the very

historicity of his interest, not its methodological function within the strict framework of situationist theory. That is, what is relevant here is not "reading" the motif in terms of cultural symbolism but comprehending the maze as a distinctly contemporary model of the emergent, networked apparatuses of social power and control. Seen as such, it is the modern mathematics of topology (or, more accurately, graph theory) that allows a rationalization of the *Irrgarten*, a submission of the errancy of the maze to algorithmic order. The genealogy of the maze in the contemporary period, in its intersections with the instrumental fields of behavioral studies and topology, is more potent than any historical *Motiv-Kette* can grasp. As a result, whereas my history originated in a situationist mania for mazes, it is but one symptom, if one of the more interesting ones, of a much wider production of labyrinthine structures in postwar artistic practice that would last into the 1970s.

In a convoluted essay, "La création ouverte et ses ennemis," Jorn outlines his proposal to redefine the situationist project within a "topological" or "situological" framework, reaching back to Gottfried Wilhelm Leibniz's initial proposition of an "analysis situs": a positional geometry to complement metric geometry.[46] A critical art practice, Jorn offers, must disturb the "functionalist" grid of modern, urban space (which makes all things equivalent) by exploring a differential topology that "creates and unmakes coordinates at will." In this fashion, the linear, "oriented plane" on which the capitalist system asserts its forces of exploitation and division may be resisted. In this text, Jorn does not offer any concrete proposals for what a situological practice would consist of, although he comments that "the knowledge of secret topologies" is indicated by the figures of knots, strings, and mazes and that since antiquity weavers have transmitted a revolutionary learning of form that is "bizarre, mystifying and subversive." Ultimately, Jorn would turn his topological research in the direction of cultural history. In 1961, he founded the Scandinavian Institute of Comparative Vandalism (SICV) with the aims of constructing a kind of counter-archive to the dominant history of Western art and of document-



"Musée labyrinthe" (Labyrinth Museum). From the *Situationist Times*, no. 4 (1963).



INTERNATIONALE SITUATIONNISTE 187

Hallstadt et celui de la Tene, qui n'est autre que la division entre la pensée géométrique et la pensée situlogique. A travers les Doriens la pensée géométrique s'est implantée en Grèce, donnant naissance à la pensée rationaliste. La tendance contraire a fini en Irlande et en Scandinavie.

Walter Lietzmann note, dans son livre *Anschauliche Topologie* : « Dans l'art, par exemple à l'âge viking, on employait volontiers l'entrelac comme ornement. J'ai devant moi une photo du jardin des nœuds de Shakespeare à Stratford-on-Avon, dans lequel on présente de petits arrangements de fleurs en forme de nœuds... Qu'est-ce que Shakespeare a à voir avec les nœuds ? Je ne suis pas capable de le dire. Peut-être s'agit-il d'une erreur, ou plutôt d'une confusion voulue avec le thème du labyrinthe. Chez lui, il en est deux fois question : dans *Le songe d'une nuit d'été* (acte 2, scène 1), et dans *La Tempête* (acte 3, scène 3). »

Il n'y a pas d'erreur possible. James Joyce, dans *Finnegans Wake*, en prononçant la phrase absurde « No sturm, no drang », avait surmonté l'ancien conflit entre classicisme et romantisme, ouvert une piste vers la réconciliation entre passion et logique. Ce qui manque aujourd'hui, c'est une pensée, une philosophie et un art qui se conforment à ce qui est projeté dans la topologie, mais ceci n'est réalisable qu'à condition de remettre cette branche de la science moderne sur sa voie originale : celle de « l'analysis situs » ou situlogie. Hans Findeisen, dans son *Shamanentum*, indique que le chamanisme, qui survit encore chez les Lapons, trouve ses origines dans l'esprit des peintres des cavernes à l'âge interglaciaire, et il est assez significatif que l'ornement qui caractérise la présence lapone soit l'entrelac simple. La connaissance des secrets topologiques a toujours été indiquée par la présence de signes de nœuds, de cordes, des entrelacs, des labyrinthes, etc. Et les tisserands depuis l'antiquité ont d'une façon curieuse transmis un enseignement révolutionnaire dans des formes plus ou moins bizarres, mystificatrices et

détournées. Histoire trop connue pour avoir été étudiée sérieusement. On remarque la perversion là-dedans, et non le renversement.

Le rapport que les écrits de Max Brod établissent entre Kafka et l'astronome danois Tycho Brahé est aussi profond que le rapport entre Shakespeare et Hamlet : et leur présence à Prague qui, depuis l'époque de la Tene rayonne de pensée topologique, et qui parvient à dépasser même le baroque dans le sens topologique, est aussi naturel que les résultats étonnants que Kepler a pu extraire des calculs de Tycho Brahé, en les adaptant à la méthode de la géométrie et des mathématiques classiques, ce qui était impossible pour Tycho Brahé lui-même. Ceci montre une fois de plus que la topologie reste la source de la géométrie, et que le processus contraire est impossible. Ceci indique aussi l'impossibilité d'expliquer la philosophie de Kierkegaard comme une succession de la philosophie de Hegel. L'influence de la pensée scandinave dans la culture européenne est incohérente et sans suite permanente, comme la pensée même de l'absurde. De sorte que

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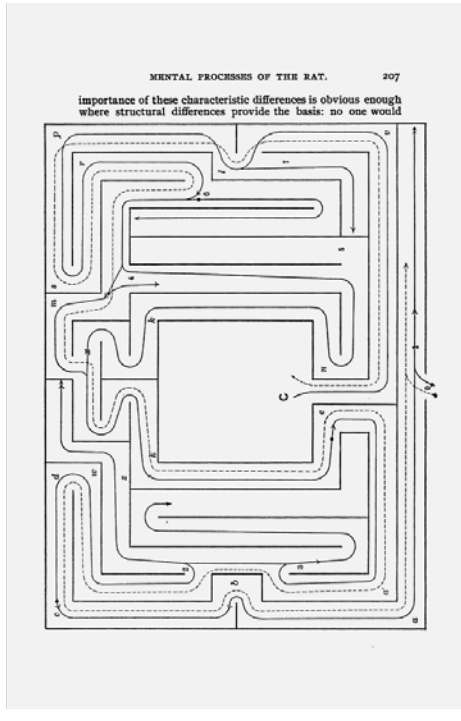


MENTAL PROCESSES OF THE RAT. 207

importance of these characteristic differences is obvious enough where structural differences provide the basis: no one would

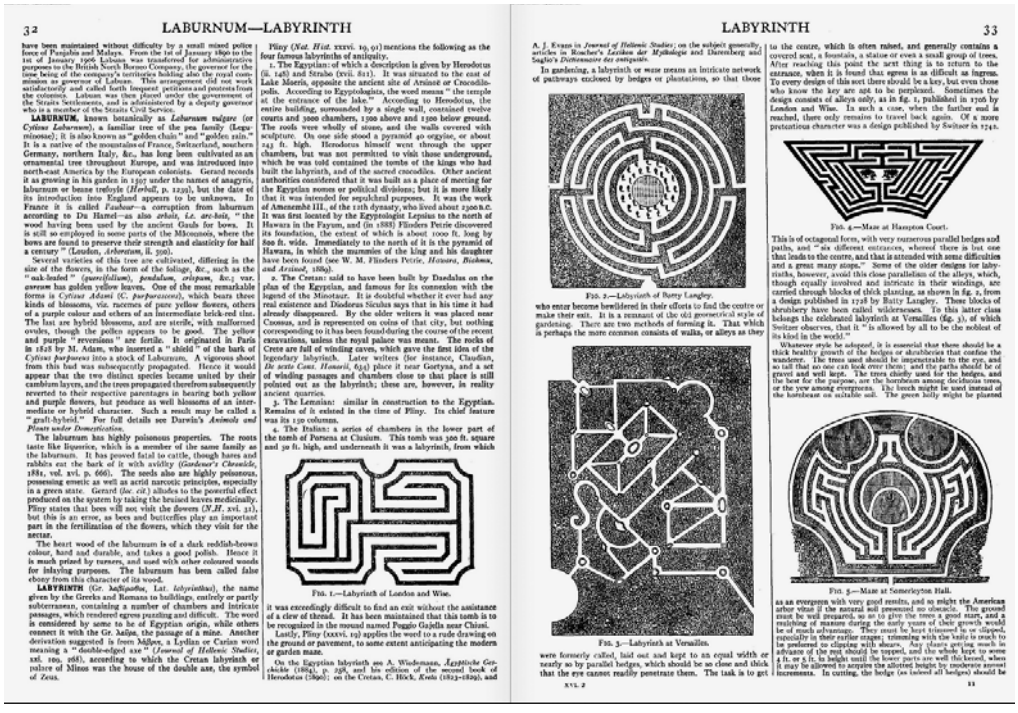
Left: Weaving diagram. From Asger Jorn, "La création ouverte et ses ennemis," *Internationale situationniste*, no. 5 (December 1960).

Right: Rat maze. From Willard S. Small, "Experimental Study of the Mental Process of the Rat II," *American Journal of Psychology* 11, no. 2 (January 1900).

ing the topological patterns, such as knots and interlacing, typical of Nordic ornamentation.[47]

With this additional aspect of Jorn's topological research in mind, we are now well positioned to explore the implicit meaning of the juxtaposition of the Corbusian museum labyrinth and the behaviorist rat maze. The latter is the missing link in Hocke's *Motiv-Kette*. If Hocke laments the disenchantment of the maze motif in the modern era, the rat maze is meant to unlock, once and for all, the human "mysterium" of spatial orientation. First introduced into psychological laboratories during the late 1890s, the device of the rat maze would become a cornerstone of prewar, behaviorist research and continued to be a common instrument of psychological laboratories far into the 1950s. Between the prewar and the postwar periods, however, a major shift in the understanding of the human process of spatial learning would occur. So how did behavioral studies conquer the maze?

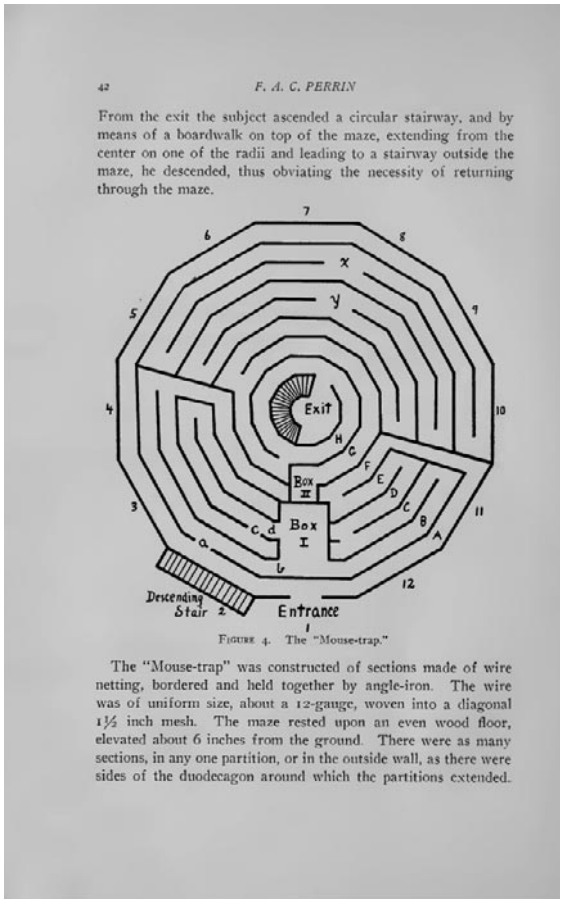
Debord would probably have been pleased to learn that the first rat maze, constructed by the experimental psychologist Willard S. Small at the turn of the century, was an adaption of the Baroque labyrinth at Hampton Court Palace from 1690.[48] This was the same maze diagram that was illustrated in the fifth issue of the *Internationale situationniste* without any identifying caption. According to Small, the rat maze was meant to resemble the home-burrow of rats, appealing to the "rat's propensity for winding passages" and thus not only conforming to "the sensori-motor experience of the animals" but falling "in with their constructive instinct relative to home building."[49] The rat maze was not just a set piece of the behaviorist



laboratory; it also provided a kind of artificial habitat for the animals: a constructed situation in more than one sense. From here it would be but a small step to compare the behavior of the rat threading its way through the maze with that of the human individual wandering the city labyrinth.

The success of the rat maze among academic researchers was almost immediate, as it seemed to reduce the complexity of human psychology to a series of seemingly blind mechanisms.[50] As the decades passed, more and more fanciful rat mazes were constructed, such as the Elevated Plus Maze and the Double-Alternation Tridimensional Spatial Maze. Even human subjects were on occasion let loose in the maze and put through the paces of behavioral experimentation.[51] The aim of all such tests—animal or human—was to examine the process of spatial learning. How does an organism master the maze problem, acquire a sense of orientation, and manifest a mode of purposive behavior? Does the organism, for instance, proceed by a random procedure of trial and error, as proposed by classical behaviorists who explained way-finding on a purely automatic sequence of stimulus and reflex? Or, to the contrary, is it necessary to postulate more complicated schemas of conditioning or even the contribution of some introspective function of the mind, as was the case with neobehaviorism after the Second World War? Ultimately, the question was not simply how an organism familiarized itself with an environment but how the behavior of this organism might subsequently be controlled and its habits engineered.

If the early experiments took place in learning mazes of relatively complex design, by the 1930s and 1940s the mazes



42 F. A. C. PERRIN

From the exit the subject ascended a circular stairway, and by means of a boardwalk on top of the maze, extending from the center on one of the radii and leading to a stairway outside the maze, he descended, thus obviating the necessity of returning through the maze.

FIGURE 4. The "Mouse-trap."

The "Mouse-trap" was constructed of sections made of wire netting, bordered and held together by angle-iron. The wire was of uniform size, about a 12-gauge, woven into a diagonal 1½ inch mesh. The maze rested upon an even wood floor, elevated about 6 inches from the ground. There were as many sections, in any one partition, or in the outside wall, as there were sides of the duodecagon around which the partitions extended.

Opposite: Encyclopedia entry for "labyrinth," showing Hampton Court Maze at top right. From *Encylopedia Brittanica*, 11th ed. (1911).

Above: "The 'Mouse-trap.'" From F.A.C. Perrin, *An Experimental and Introspective Study of the Human Learning Process in the Maze* (1914).

had become less Baroque in configuration, reduced to the simple "T-maze." The rat was now allowed only a binary choice between right and left, a setup that was more amenable to statistical analysis. Indeed, the field of behavioral studies was to undergo a new mode of rationalization around this time.[52] Discussing the implication of behavioral and social sciences within the Cold War politics of the United States, the recent collective study *How Reason Almost Lost Its Mind* is careful to posit the notion of Cold War rationality as a field of contestation rather than a unified system of thought. The ideal of Cold War rationality was to manage the risks and contingencies of human competition and conflict, whether economic, political, or military, reducing complex situations to a set of optimal, logical solutions. Rationality was to take over from human reason, replacing the all-too-human proneness to committing errors in judgment with a series of rule-governed procedures of behavior. Hence the continuing dominance of the rat maze in postwar laboratories: the maze allowed behavior to be broken down into a sequence of binary "choice points" to find the exit. As a result, the rat maze was an emblematic site where the automatisms of behaviorism would gradually give way to the automated protocols of an algorithmic society.

Both the situationists and behavioral scientists focused on a circumscribed, experiential situation as an object of observation and control. The very term *situation* was employed within the social sciences to describe the mise-en-scène of their experimental method, which not only sought to replicate everyday activities but allow a modicum of control over the participants in the experiment. "Thus," the authors of *How Reason Almost Lost Its Mind* write, "the situation was a methodologically defined space for exploring how Cold War rationality, defined as an ongoing argument about the best way to operationalize rational features of human social life within a constituted system, could be found in something *resembling* real life and (potentially) made to operate in other situations."[53] Cold War rationality sought to achieve an axiomatization of human behavior, producing a more optimized system of social, economic, and political interaction.[54] Doubting the ability of human reason, on its own, to hold up under intense pressure, Cold War rationality was to program human behavior by an

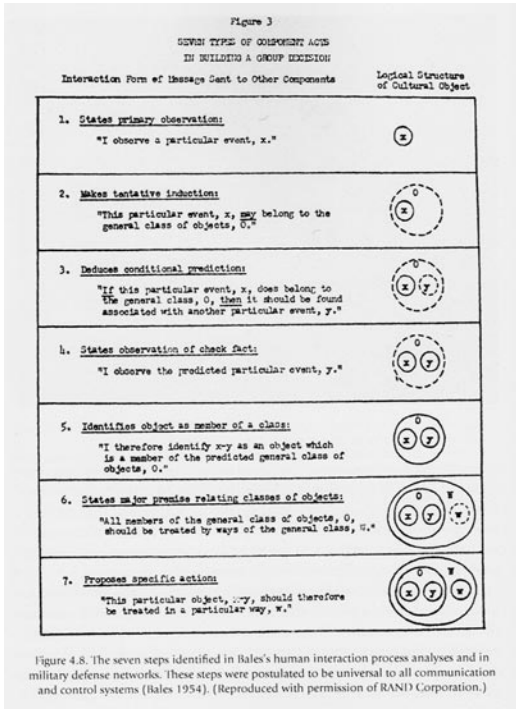


Figure 3

SEVEN TYPES OF COMPONENT ACTS IN BUILDING A GROUP DECISION

Interaction Form of Message Sent to Other Components	Logical Structure of Cultural Object
1. States primary observation: "I observe a particular event, x."	x
2. Makes tentative induction: "This particular event, x, may belong to the general class of objects, O."	O (x)
3. Deduces conditional prediction: "If this particular event, x, does belong to the general class, O, then it should be found associated with another particular event, y."	O (x) (y)
4. States observation of check fact: "I observe the predicted particular event, y."	O (x) (y)
5. Identifies object as member of a class: "I therefore identify x-y as an object which is a member of the predicted general class of objects, O."	O (x) (y)
6. States major premise relating classes of objects: "All members of the general class of objects, O, should be treated by ways of the general class, W."	O (x) (y) W
7. Proposes specific action: "This particular object, x-y, should therefore be treated in a particular way, w."	O (x) (y) W (w)

Figure 4.8. The seven steps identified in Bales's human interaction process analyses and in military defense networks. These steps were postulated to be universal to all communication and control systems (Bales 1954). (Reproduced with permission of RAND Corporation.)

"Seven Types of Component Acts in Building a Group Decision." From Robert Freed Bales, "Social Interaction," RAND Paper P-587 (1954).

infallible "sequenced protocol of rules" that were basically algorithmic in nature and could be "executed without discretion or judgment."[55] In accordance with the cybernetic tenets of human-machine symbiosis, within the new paradigm of the behavioral sciences it would make no difference whether a certain operation was performed by clerk or machine: the outcome would (or should) always be the same. The novel fields of interdisciplinary research that had emerged during the Second World War—cybernetics, game theory, decision theory, operations research, automatization processes—were to provide the basis for this formalized conception and governance of human behavior.

Not all scientists, theoreticians, and policy makers agreed on how human behavior could be optimized. But the concept of the situation provided the behavioral sciences with a consistent methodology of experimentation: complex, "real-life" tasks were enacted in small groups while their decision-making process was broken down into discrete steps and translated into a set of algorithmic protocols. The behavioral sciences, that is, made no distinction between animal and human being—as in classical behaviorism—*or* between human being and computer. The content of the specific task, whether strategizing a conflict or the playing of a game, was less important than arriving at a generalized notion of "rational" human behavior. The rules that were detected in specific group situations, it was thought, could be applied to any situation, whether of an economic or military nature.

Future art, as Debord once said, would have to be a transformation of situations, or it would be nothing. Yet behavioral researchers did not think all that differently during the Cold War. They possessed their own version of the constructed situation, "marking out a set of laboratory-like scenarios and quasi-laboratory situations" that "included 'special rooms' rigged with recording devices and secret adjoining observational facilities where scenarios could be played out under close study."[56] Such special rooms allowed a group of test subjects to be closely monitored and assured that the physical conditions of the social experiment remained consistent from one iteration to the next. More important, however, the behavioral researcher often flouted the classical protocols of detached observation. The situation of behavioral research was often an arena for participant observation, allowing the experimenter, like the situationist "director," to exert control over their test subjects, modulating their responses and conduct by means of feed-

back.[57] Should any "anomalies" or "deviances" appear within the functioning of the group, then "these errors—ultimately invaluable for programming—could be counteracted, smoothed out via feedback, or redirected."[58]

Of course, one does not want to overstate the similarities between the two versions of the constructed situation. Both relied on teamwork, participatory observation of small groups, scalability (i.e., the molecular group as model of a molar whole), and combinatory analysis (or *analysis situs*, to use Leibniz's term) of the reciprocal relations between individuals and their environment. But if Debord, like the behavioral scientists, wanted to exert control over his experimental subjects, he did not seek to "operationalize rational features of human social life within a constituted system."[59] The situationist's "world as labyrinth" was based on a principle of disorientation, whereas the behavioral sciences were concerned to fix the "world in a matrix" according to the algorithmic model of game theory.[60] Game theory, quite literally, prescribed "standards of behavior" on the basis of a combinatorial set of rules or strategies, "telling [each participant] how to behave in every possible situation of the game."[61]

Game theory was keen to tame chance, as were the behavioral sciences in general.[62] Risk was to be brought under mathematical control, just as cybernetics and information theory sought to maintain a fragile order in a universe that was seen as probabilistic in nature.[63] Equilibrium was always under threat of entropic dissolution. The situationists, in contrast, were more eager to explore the dynamics of disequilibrium. To this end they kept the twin aspects of ludic activity—strategy and chance, *agon* and *alea*—in play, as in Debord's *Kriegsspiel*, but without putting blind faith in the subversive nature of surrealism's notion of "objective chance." Disorder had to be constructed; it could not result from spontaneous action. Furthermore, disorder had to be created over and over again to prevent the mechanisms of disequilibrium from seizing up and becoming captured by the normalizing forces of capitalism. (In this regard, the situationists did not seem to consider the capitalist cycles of crisis as the automotive engine of historical dialectics; at least, not without tampering with some of its motor parts.) Therefore, the situationists were keen to exclude all forms of (profitable) competition from games:

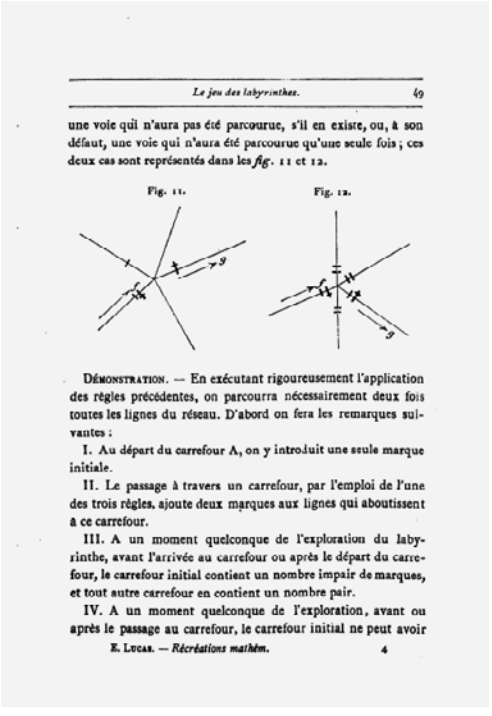
> The question of winning or losing, until now almost inseparable from ludic activity, appears linked to all other manifestations of tension between individuals for the appropriation of goods. The importance given to making gains in a game, whether it concerns a concrete mode of satisfaction or, more often, an illusory one, is the evil product of an evil society.[64]

As Johan Huizinga claimed, *homo ludens* had degenerated into *homo oeconomicus* once games became played only for profit. In dictating how to maximize one's economic behavior, game theory went a step further, giving life to *homo algorithmus*.

Dynamic Labyrinth

Perhaps the maximizing strategies of game theory could have found purchase in Debord's *Kriegsspiel*, but they would have been of little use in navigating his educational labyrinth. Yet, the maze, like the parlor games examined by John von Neumann and Oskar Morgenstern, was precisely one of the original testing grounds of the mathematization of human behavior. As one mathematician writes, Ariadne's thread was possibly the first nonnumerical algorithm in history: apply a simple rule, repeatedly, like laying down the thread, and the problem of the maze will be solved.[65] One of the favorite puzzles in the popular "recreational math" books of the late nineteenth century was how to develop a foolproof method of navigating a labyrinth without a map. Procedures such as the "algorithm of Trémaux" were premised on the idea that all that was necessary to demonstrate "a labyrinth is never inextricable" was to transform its topography—the direction and length of its corridors, the twists and turns of its passageways—into a topological diagram consisting of nodes and edges.[66] Once the "jeu des labyrinthes" was transposed into the terms of graph theory, "le promeneur égaré," mentioned by Debord, would never get lost again.

This trick was invented by Leonhard Euler in 1736 while solving another problem of recreational math: the so-called seven bridges of Königsberg.[67] Euler's revolutionary discovery is usually seen as the origin of the related mathematical fields of topology and graph theory, which explains why an image of the seven bridges appears in Jorn's essay "La création ouverte." Ultimately, graph theory would become a dominant mathematical tool to analyze the distributary traffic of people, goods, and data within urban and technological networks. This fact prompts Kittler, in hyperbolic fashion, to state that "topology and graph theory do not just describe modernity—they started it in the first place." Graph theory and topology, he asserts, are the dominant, modern techniques of real abstraction, capable of reconfiguring all spatial structures—"trees and stars, junctions and bridges, rings and hubs, regions, countries and maps"—into elementary diagrams of calculation and control, organizing reality in medial terms of commands, addresses, and data.[68]



Le jeu des labyrinthes. 49

une voie qui n'aura pas été parcourue, s'il en existe, ou, à son défaut, une voie qui n'aura été parcourue qu'une seule fois ; ces deux cas sont représentés dans les *fig.* 11 et 12.

Fig. 11. Fig. 12.

DÉMONSTRATION. — En exécutant rigoureusement l'application des règles précédentes, on parcourra nécessairement deux fois toutes les lignes du réseau. D'abord on fera les remarques suivantes :

I. Au départ du carrefour A, on y introduit une seule marque initiale.

II. Le passage à travers un carrefour, par l'emploi de l'une des trois règles, ajoute deux marques aux lignes qui aboutissent à ce carrefour.

III. A un moment quelconque de l'exploration du labyrinthe, avant l'arrivée au carrefour ou après le départ du carrefour, le carrefour initial contient un nombre impair de marques, et tout autre carrefour en contient un nombre pair.

IV. A un moment quelconque de l'exploration, avant ou après le passage au carrefour, le carrefour initial ne peut avoir

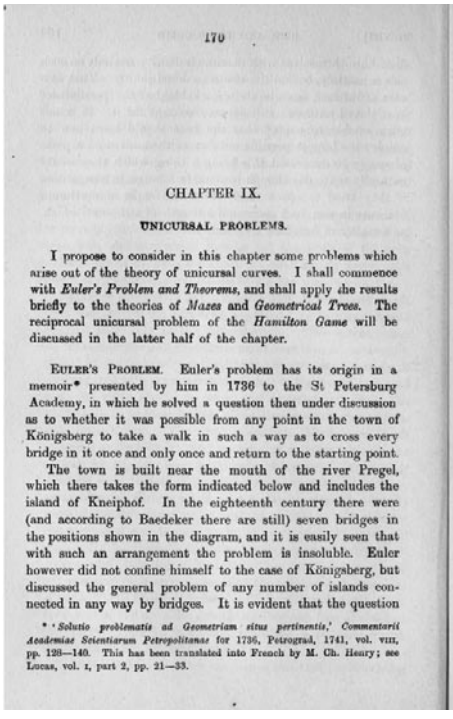
E. Lucas. — *Récréations mathém.* 4

Above: Charles Pierre Trémaux's solution to the labyrinth. From Édouard Lucas, *Récréations mathématiques* (1891).

Opposite, top: "Euler's Problem." From W.W. Rose Ball, *Mathematical Recreations and Essays* (1892).

Opposite, bottom left: The Seven Bridges of Königsberg. From Asger Jorn, "La création ouverte et ses ennemis," *Internationale situationniste*, no. 5 (December 1960).

Opposite, bottom right: Graph-theoretical diagram of Hampton Court Maze. From N.L. Biggs, E.K. Lloyd, and R. Wilson, *Graph Theory, 1736–1936* (1976).



170

CHAPTER IX.

UNICURSAL PROBLEMS.

I propose to consider in this chapter some problems which arise out of the theory of unicursal curves. I shall commence with *Euler's Problem and Theorems*, and shall apply the results briefly to the theories of *Mazes* and *Geometrical Trees*. The reciprocal unicursal problem of the *Hamilton Game* will be discussed in the latter half of the chapter.

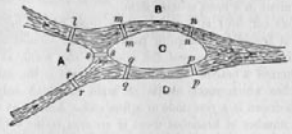
EULER'S PROBLEM. Euler's problem has its origin in a memoir* presented by him in 1736 to the St Petersburg Academy, in which he solved a question then under discussion as to whether it was possible from any point in the town of Königsberg to take a walk in such a way as to cross every bridge in it once and only once and return to the starting point.

The town is built near the mouth of the river Pregel, which there takes the form indicated below and includes the island of Kneiphof. In the eighteenth century there were (and according to Baedeker there are still) seven bridges in the positions shown in the diagram, and it is easily seen that with such an arrangement the problem is insoluble. Euler however did not confine himself to the case of Königsberg, but discussed the general problem of any number of islands connected in any way by bridges. It is evident that the question

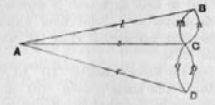
* '*Solutio problematis ad Geometriam situs pertinentis*,' *Commentarii Academiae Scientiarum Petropolitanae* for 1736, Petrograd, 1741, vol. VIII, pp. 128—140. This has been translated into French by M. Ch. Henry; see Lucas, vol. I, part 2, pp. 21—33.

CH. IX] UNICURSAL PROBLEMS 171

will not be affected if we suppose the islands to diminish to points and the bridges to lengthen out. In this way we



ultimately obtain a geometrical figure or network. In the Königsberg problem this figure is of the shape indicated below, the areas being represented by the points *A*, *B*, *C*, *D*, and the bridges being represented by the lines *l*, *m*, *n*, *p*, *q*, *r*, *s*.



Euler's problem consists therefore in finding whether a given geometrical figure can be described by a point moving so as to traverse every line in it once and only once. A more general question is to determine how many strokes are necessary to describe such a figure so that no line is traversed twice: this is covered by the rules hereafter given. The figure may be either in three or in two dimensions, and it may be represented by lines, straight, curved, or tortuous, joining a number of given points, or a model may be constructed by taking a number of rods or pieces of string furnished at each end with a hook so as to allow of any number of them being connected together at one point.

The theory of such figures is included as a particular case

INTERNATIONALE SITUATIONNISTE 189

Tous les axiomes sont des fermetures à l'encontre de possibilités non désirées, et contiennent par ce fait une décision volontaire illogique. L'illogique qui nous intéresse à la base de la géométrie d'Euclide se joue entre les axiomes suivants : — les choses qui se superposent l'une à l'autre sont égales ; — le tout est plus grand que la partie. — Cette absurdité se voit par exemple au moment où nous commençons à appliquer la définition de la ligne, longueur sans largeur.

Si l'on superpose deux lignes, l'une égale à l'autre, il doit résulter ou bien deux lignes parallèles (ce qui montre que l'égalité n'est pas parfaite et absolue, ou que la superposition ne l'est pas) ; ou bien l'union des lignes en une seule. Mais si cette ligne est plus longue qu'une seule des lignes, ou si elle a acquis de la largeur, c'est que les lignes n'étaient pas égales. Mais si les lignes sont absolument égales, le tout n'est pas plus grand que la partie. Ceci est d'une logique indiscutable, mais si c'est vrai, nous sommes dans l'absurdité puisque la géométrie métrique est basée justement sur l'axiome que le tout est plus grand que la partie.

On compte dans la géométrie métrique avec l'idée que deux grandeurs égales sont identiques. Mais deux choses ne peuvent jamais être identiques, parce que cela veut dire que ce serait une seule chose.

Si l'on doit identifier un assassin devant un juge, il ne suffit pas que ce soit un individu exactement pareil à celui qui a commis le crime, son frère jumeau ne peut pas le remplacer dans cette circonstance. On peut être sûr qu'il n'y a pas d'égaux, pas de répétition, comme dans l'expérience des ponts de Königsberg. Dans la géométrie, une identité de grandeur et de position exclut toute considération quantitative. Mais comment est-il possible de réduire un nombre infini de lignes de grandeurs égales en une seule ligne, qui n'est pas plus grande qu'une seule de ces lignes, par superposition ; alors qu'il est impensable de diviser une ligne en deux, égales toutes deux à la ligne divisée ?

Si l'on déplace une ligne de sa position, en même temps qu'on la laisse dans sa position, on ne crée pas deux lignes, mais une surface. La superposition, qui démontre que deux lignes sont égales, ne peut être pratiquée sans que la dualité disparaisse : on ne peut plus égaler. Une seule ligne est égale à rien. Ce qui prouve que l'idéalisme absolu de cette formule de l'absence d'épaisseur dans la ligne d'Euclide n'a aucune réalité.

Si l'on modernise le procédé en employant la formule de congruence, ou d'une identité de grandeur et forme, en excepiant la position dans l'espace, la preuve par superposition n'est plus possible.

Nous pouvons réduire mille points en un seul point par superposition, et ce point est égal à un des mille points. Mais on ne peut pas multiplier un point en le laissant à sa place, et le déplacer en même temps. Cela ferait une ligne. Mais le volume ? On ne peut superposer deux volumes identiques que dans l'imaginaire. On peut le faire seulement avec deux volumes fantomatiques, sans volume réel. Ce caractère abstrait est la force et la faiblesse de la géométrie d'Euclide. Le manque d'abstraction dans la topologie n'est qu'une faiblesse.

Mille fois zéro ne font que zéro, et de zéro on ne peut rien extraire. L'emploi de la géométrie d'Euclide est dans ce sens unilatéral et irré-

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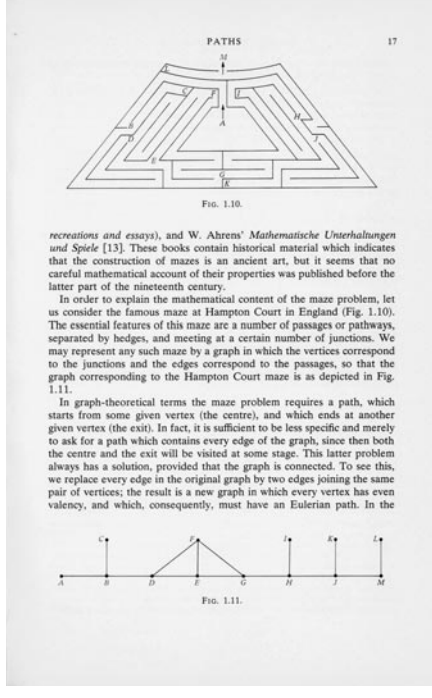


PATHS 17

FIG. 1.10.

recreations and essays), and W. Ahrens' *Mathematische Unterhaltungen und Spiele* [13]. These books contain historical material which indicates that the construction of mazes is an ancient art, but it seems that no careful mathematical account of their properties was published before the latter part of the nineteenth century.

In order to explain the mathematical content of the maze problem, let us consider the famous maze at Hampton Court in England (Fig. 1.10). The essential features of this maze are a number of passages or pathways, separated by hedges, and meeting at a certain number of junctions. We may represent any such maze by a graph in which the vertices correspond to the junctions and the edges correspond to the passages, so that the graph corresponding to the Hampton Court maze is as depicted in Fig. 1.11.

In graph-theoretical terms the maze problem requires a path, which starts from some given vertex (the centre), and which ends at another given vertex (the exit). In fact, it is sufficient to be less specific and merely to ask for a path which contains every edge of the graph, since then both the centre and the exit will be visited at some stage. This latter problem always has a solution, provided that the graph is connected. To see this, we replace every edge in the original graph by two edges joining the same pair of vertices; the result is a new graph in which every vertex has even valency, and which, consequently, must have an Eulerian path. In the

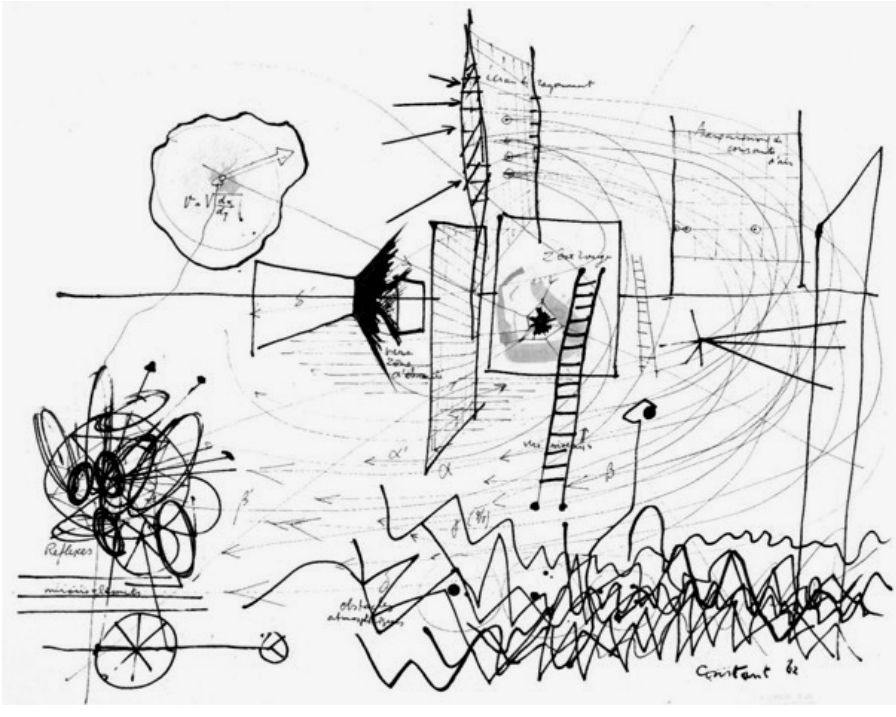
FIG. 1.11.

So, in truth, the situationists did not enter a two-way race between the avant-garde and the behaviorist police. A third contender had to be reckoned with—*homo algorithmus*—although the situationists were not always capable of recognizing this figure's face.[69] They would find themselves in competition not only with the biopolitical technologies of behaviorism but with the new "mathematics of man," to use

Claude Lévi-Strauss's ominous phrase.[70] In an essay of 1954, the anthropologist had heralded the arrival of a new methodology in the social sciences that was based on a mathematics of quality not quantity, relationality not measurement. According to Lévi-Strauss, it drew sustenance from the combinatorial logic of set theory, group theory, and topology. To this list we may add graph theory.[71] Lévi-Strauss singles out his own struggle to articulate a theory of marriage rules as a point in case. He had achieved a breakthrough only once a mathematician had shown him how to express the problem in relational rather than quantitative terms. He still cannot contain his surprise by this insight, marveling at how the mathematician did not need to grasp the "intrinsic nature of the phenomenon studied" in order to solve the problem. The question—What is marriage?—was of no relevance to the structural outcome, just as the actual, topographical configuration of the bridges of Königsberg had no bearing on Euler's answer to the recreational puzzle. With great relief, Lévi-Strauss notes that the social sciences are in the process of divesting themselves of "the hopelessness of the 'great numbers'—the raft to which the social sciences, lost in an ocean of figures have been helplessly clinging; its ultimate object is no longer to plot progressive and continuous movements in monotonous graphs."[72] But, then, he did not reckon with the link between the combinatorial logic of the new mathematics of man and the arrival of *homo algorithmus*.[73]

Lévi-Strauss also affirms a second premise of the mathematics of small groups: its scalability. He tellingly gives the example of game theory that would base macropolitical strategies on the micropolitical tactics of two- or three-party parlor games. And if Chakhotin proposed that behaviorism and Marxism could be brought into alignment, Lévi-Strauss presents an equally preposterous idea that game theory, in its analysis of competitive strategies, is able to correlate a liberal theory of *homo oeconomicus* with Marxist dialectics. If Lévi-Strauss saw any problem with the ideological implications of game theory, he did not say as much in this essay. For him, the new math was merely a neutral scientific instrument; it came with no politics attached.

Clearly, however, this position does not hold up. Behavioral studies had not abandoned the social engineering project of behaviorism. If anything, that project had been intensified in the face of those "peculiar confessions" of allegiance that were extracted on the other side of the Iron Curtain. In terms of the new mathematics of man, one might suggest that the behavioral sciences pursued a *topology of politics*. That is, what combination of individual moves is the most effective, if not profitable, in any given social situation? It helped that graph theory, in subduing the maze-puzzle of recreational mathematics, had



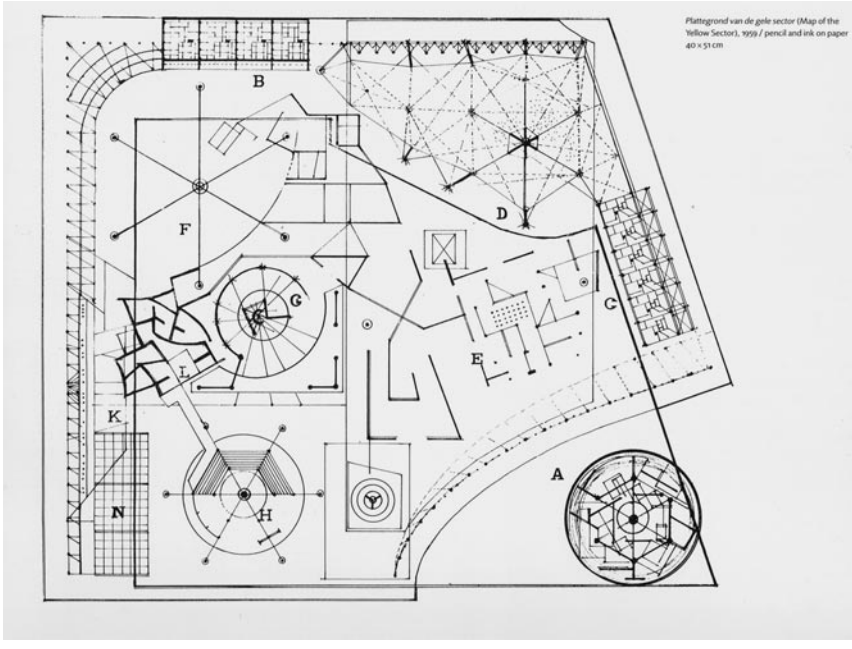
Constant. *Labyratorium*, 1962. Collection Gemeentemuseum Den Haag. Photographer: Tom Haartsen. © Constant/Fondation Constant/VG Bild-Kunst, 2018.

already turned the labyrinth into a calculable matrix of possibilities. *Homo algorithmus* ruled out all play in the maze, straightening out its confusing passages and blind alleys into tree diagrams.

The situationists, on the other hand, were more invested in a *recreational politics of topology*. That is, how can one modulate and transform the habitual patterns of everyday life? How to keep behavior in flux? Against the algorithmic order that seeped into the tortuous passages of the modern maze, the situationists sought to marshal a variable model of spatiality, a kind of countertopology of infinite variation—a means to disrupt rather than standardize behavior. The maze provided, therefore, the perfect "labyratorium" for such an undertaking, as it was the experimental site where the regime of Cold War rationality attempted to axiomatize human life. To achieve disorientation or control: all depended on whether one was affiliated with a "Laboratory of Social Relations" or a "Research Bureau for Unitary Urbanism."

Constant announced the foundation of the Situationist Research Bureau in 1959 with the aim "to carry out teamwork and study practical solutions." Although, in contrast to existing types of architectural teamwork, collective practice in this case was not meant to forge a unity but to create an "infinite quantity of variable elements."[74] This project would not come to fruition, yet by this time Constant was already designing his plans for a constructed situation on a monumental, even global scale in which Jorn's situological game of constant variation was to have a permanent home.

"Dynamic labyrinth" was how Constant described New



Constant. Map of the Yellow Sector, New Babylon, 1959. Collection Gemeentemuseum Den Haag. Photographer: Tom Haartsen. © Constant/Fondation Constant/VG Bild-Kunst, 2018.

Babylon, the constantly modulating nature of his city of the future, which he began to envision around 1957.[75] Like Debord's educational labyrinth but on a much grander scale, New Babylon was intended to create changing situations for the modification of behavior, to create a flexible décor of free play. In doing so, New Babylon drew upon the situationist program of unitary urbanism, which Constant defined in 1960 as "a deliberate intervention aimed at . . . a transformation of our habits, or rather of our way of life or lifestyle, and, connected with this, a profound change in the way our material environment is produced, a dynamic urbanism."[76] New Babylon provided the setting for a nomadic mode of life that is lived as a perpetual *dérive*, a "network of huge links," as Constant described the future city in which there would be no "a priori links between anyone" and life would become "an endless journey across a world that is changing so rapidly that it seems forever other."[77] New Babylon was to function as a self-regulating machine, spawning a web of megastructures that would span the globe, ending nowhere and knowing no frontiers.

New Babylon can also be viewed as the deliberate inversion of another utopian city plan; namely, Le Corbusier's Ville Radieuse, which, due to its functionalist separation of the different dimensions of everyday life—work, housing, transportation, leisure—was associated by the situationists with the kind of rationalized, abstracted space of modernity that Jorn attacks in "Le création ouverte." Among the situationists, Le Corbusier became a kind of shorthand for functionalism in general and was singled out as a favorite target of ridicule. In the pre-situationist journal *Potlatch*, for instance, one reads, "But today, when we are informed that Le Corbusier longs to *abolish the street*, the prison becomes the model for housing . . . Here's the

program: life definitely divided up into closed blocks, into communities under observation; the end of opportunities for insurrections and encounters; automatic resignation."[78] Likewise, Constant would claim that the functionalist ideal was to transform the city into a "perfectly organized labor camp," thereby anticipating Michel Foucault's penitentiary model of disciplinary power.[79]

New Babylon was to institute a *détournement* of Le Corbusier's "labor camp." Consider, for instance, how New Babylon adopts Le Corbusier's motif of the pilotis, or supporting pillars, that raise the hulking megastructures above the surface of the earth. If in the case of Le Corbusier the pilotis allowed the creation of a sunny parkland stretching below the units of habitation, Constant rejected this pastoral vision of the garden city as masking the true purpose of the functional city, which was to be a "gigantic center of production, geared to the efficient transport of workers and goods."[80] Instead, the megastructures of New Babylon were to house a labyrinthine space in which no permanent distinction between inside and outside, private and public existed.[81] New Babylon was to exist as an artificial and flexible environment of movable walls. Even the climate could be controlled at will, negating the natural rhythm of days and seasons. Manipulating its infinite decor, the New Babylonians would act out their desires in the form of a collective game:

> [The walls] are used to construct veritable labyrinths of the most heterogeneous forms in which one finds special halls for radiophonic games, cinematographic games, psychoanalytical games, erotic games, games based on chance and on coincidence. . . . New Babylonians play a game of their own devising, against a backdrop they have designed themselves, together with their fellow townspeople. That is their life, therein lies their artistry.[82]

And so one would wander adventurously from one chamber to the next, through spiraling staircases and meandering passages, moving from a quiet room to a loud room, a room of echoes (with radiophonic games) to a room of images (with cinematic games), a room of erotic games to a room of rest. An extended stay in these labyrinthine spaces, Jorn proposes in analogy to Chakhotin's behaviorist politics, would have the "tonic effect of a brainwashing" and must be frequently undertaken to erase the harmful effects of habit formation.[83]

To inhabit New Babylon was to be permanently lost or, even better, to be relieved of any need to seek one's bearings. No one roaming its ever-shifting corridors would ever be able to find his or her way back. In New Babylon mechanization takes command, but as a liberating force, freeing its citizens of the

regularities of behavior and, one must presume, any anchorage in an individual or shared past. No Ariadne's thread or algorithmic rule would orient behavior in this ever-shifting, dynamic labyrinth. Or, in the terminology of graph theory: to draw a connected diagram of its variable space was not possible. Graph theory differentiates among three possible types of labyrinth: unicursal and multicursal labyrinths and the network proper.[84] The first type is the most ancient and leads the walker from the perimeter by way of a single, winding path to the center of the labyrinth. Conversely, the multicursal labyrinth, which is of later, Baroque origin, presents the explorer with a choice of several possible pathways, many of which lead to a cul-de-sac, forcing one to retrace one's steps. In the unicursal labyrinth it is impossible to get lost, but that possibility most definitely exists in the multicursal labyrinth.

By contrast, the third kind of maze has no singular entrance or exit; it does not consist of a closed walk and potentially extends infinitely in all directions. This type of maze is best called a "network" and it can be subdivided into centralized, decentralized, and distributed kinds.[85] When we speak today of a network structure, such as the internet, we generally mean an acentric, distributed system in which all nodes are connected to one another. Factually, such statements are not wholly accurate, however. First, the internet is not a static but a dynamic system—its configuration of links is constantly changing. Second, according to the power law of distribution, certain nodes will attract more traffic than others; that is, they will be more "connected." The topology of the internet is therefore complicated: it is not simply horizontal or rhizomatic but also contains a tendency toward becoming vertical and hierarchical. The current Twitter storms of U.S. President Donald Trump illustrate once again what Alexander Galloway and Eugene Thacker argued in 2007: namely, that unilateralism and multilateralism, sovereignty and networked power are always articulated in relation to each other.[86] The internet, that is, hosts competing topologies of power. And this should come as no surprise, since networked power, Galloway and Thacker argue,

> is based on a dialectic between two opposing tendencies: one radically distributes control into autonomous locales; the other focusses control into rigidly defined hierarchies. All political regimes today stand in some relation to networks. So, it is possible to have unilateralism and networks, a fact that makes the American regime so beguiling.[87]

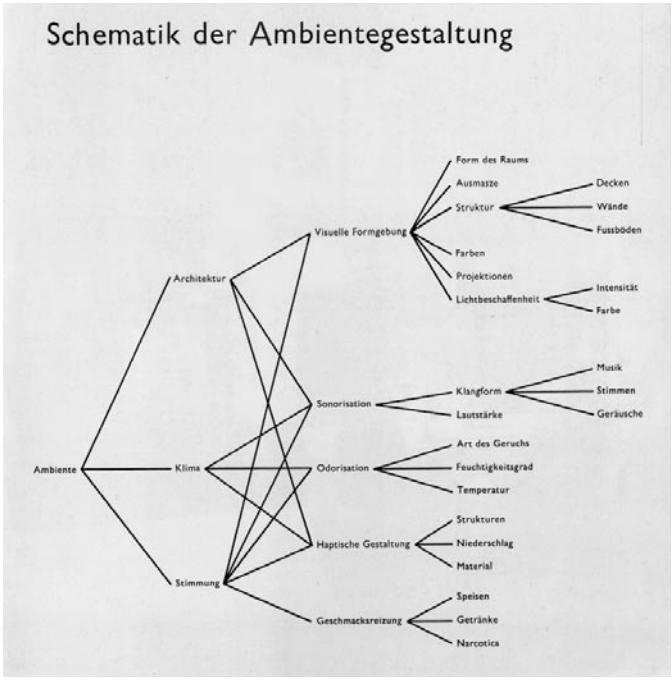
My juxtaposition of the two kinds of situations leads to a similar conclusion: To speak about networks in terms of ideology or technology alone is not sufficient. We must learn to "think topologically," to reflect not only on a topology of politics but

on a politics of topology.

Significantly, then, in the *Situationist Times*, the unicursal plan of Le Corbusier's Musée à croissance illimitée (Museum of Infinite Growth), also known as the Musée labyrinthe, is juxtaposed with the learning mazes of behavioral science.[88] Le Corbusier's museum reduces time to a simple, linear mode of spiraling accumulation—an elemental diagram of capitalist ideology if ever there was one. The multicursal, behavioral maze, on the other hand, may be more complicated, but it can also be reduced to the algorithmic, linear logic of Ariadne's thread. What counts is not the actual layout of the maze but how the pathways and intersections (or, in the terminology of graph theory, the vertices and edges) are connected. In the words of one mathematician, the calculating individuals who enter a maze, whether architectural, informatic, or otherwise, can draw an advantage from their state of nearsightedness. Rather than just stumbling through the maze by a process of trial-and-error (as classical behaviorism understood spatial learning), they can proceed by unwinding and rewinding a (virtual) thread through the network of branching pathways, gradually gaining control over the combinatorial space they explore.[89] This is the "archaism" of graph theory; it is a return to an ancient Cretan idea that had fallen into forgetfulness. How is one to choose a route across the labyrinth or, in contemporary terms, master the immense, logical networks of information? The algorithm must be myopic, lacking an overview of the whole, but nevertheless be able faultlessly to find its way. Or, the algorithm must be able to follow us without avail as we move through a networked space.

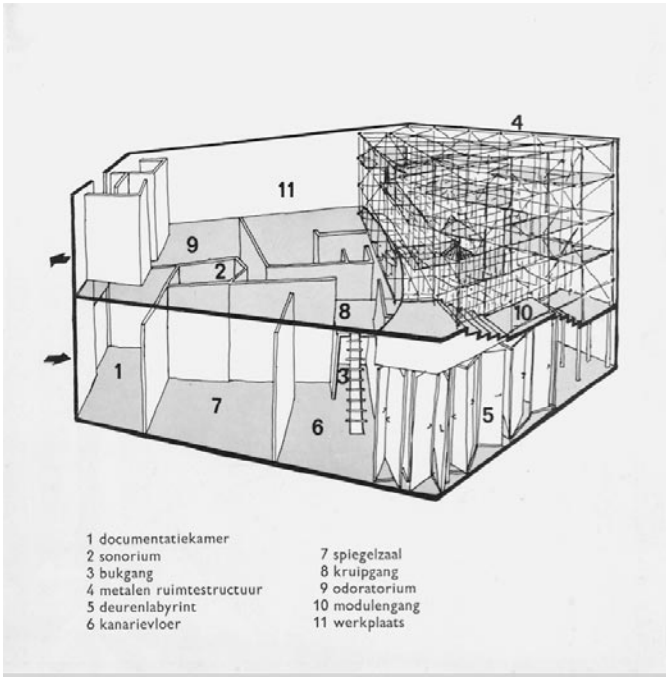
The Electronic Rat

Two decades ago Gilles Deleuze wrote of the society of control that the disciplinary regime of surveillance had been replaced by a networked power of informatic control.[90] To a certain extent, New Babylon anticipated this development from the closed, stratified space of discipline to the open, smooth spaces of control, if only as its counterimage: the constant flux of the dynamic labyrinth was not "solvable" in any behaviorist or informatic sense. This infinitely modulating décor could not be captured by the algorithms of the "shortest path," "traveling salesman," or "Hamilton cycles" on which, for instance, current routing maps are based. (Although New Babylon would not have been able to outsmart Global Positioning System technology.) Nevertheless, New Babylon arguably contained its own dialectic of networked power: namely, the ludic playground that was lifted above the earth on Le Corbusier's pilotis could exist only thanks to the existence of a fully automated system below ground. New Babylon was to come into existence



only after a cybernetic, rather than political, revolution: the full automatization of industrial labor. Constant shared both Karl Marx's conviction that machines would one day free humanity from toil and Norbert Wiener's prediction in *The Human Use of Human Beings* (1950) that most forms of labor would become automatized in the near future.[91] Nevertheless, Wiener also had his doubts. He worried that the second generation of cybernetic machines were as likely to benefit humanity as they were to devolve into coercive "machines of governance."[92]

Wiener's dystopian view of the future would be expressed more fully just five years later (in 1955) in Philip K. Dick's short story "Autofac," which exploits the new idea of the "lights out" production facility. In Dick's futuristic narrative, humanity survives a catastrophic global war only to lose control of the automatized, subterranean factories, which rapidly proceed to deplete the earth's resources. Engaging in fierce competition with one another for the last remaining materials, the "autofacs," rather than achieving a state of perfect homeostatic balance with their environment, engage in an all-out machine war, waged from their telluric base. Taken together, New Babylon and "Autofac" form two opposite and contrasting images to the "subterranean" architecture of the Cold War, which planned for humanity's survival underground by building a rat's warren of nuclear bunkers, missile silos, transportation tunnels, and communication cables. New Babylon's elevation aboveground of an artificial playground for a "worldless people," and its burial of a technological "world without us" belowground, failed to foresee the actual coming, environmental catastrophe.[93] Divided into two systems of social and machinic feedback, one wildly oscillating, the other strictly controlled, how could New Babylon's expenditure of energy have been balanced against its exterior: the earth's surface, which, if not used for transportation purposes, was to be returned to a "virgin state." Constant predicted that by 2060 the world population would exceed 7 billion (a number that has already been surpassed) and that New Babylon, at some point, might have to enclose the entire globe to provide living space for all of humanity. Constant might have wanted New Babylon to oppose *homo ludens* to *homo oeconomicus* (or, more specifically, *homo algorithmus*), but the



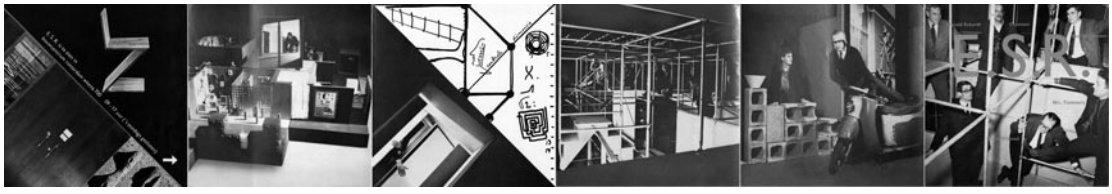
Opposite: Constant. Schema of Ambient Construction, 1965. © Universiteit van de Socio-Ruimte van Nic. Tummers.

Above: Constant and Nic Tummers. Elevation of ESR (Experiment Studio Rotterdam), 1965. © Universiteit van de Socio-Ruimte van Nic. Tummers.

project did not differentiate itself from a basic logic of capitalism: the infinite process of primitive accumulation. Constant placed all his faith in technological progress: "The world has acquired a new dimension; nature's role is played out; nature now is simply raw material, controlled by human beings and used in accordance with their needs."[94] In New Babylon one might play, therefore, not to the end of days but to the end of the world, since the megalopolis was not only a "spatiovore," as Constant called one of the early Perspex and wire models, but an omnivorous autofac.

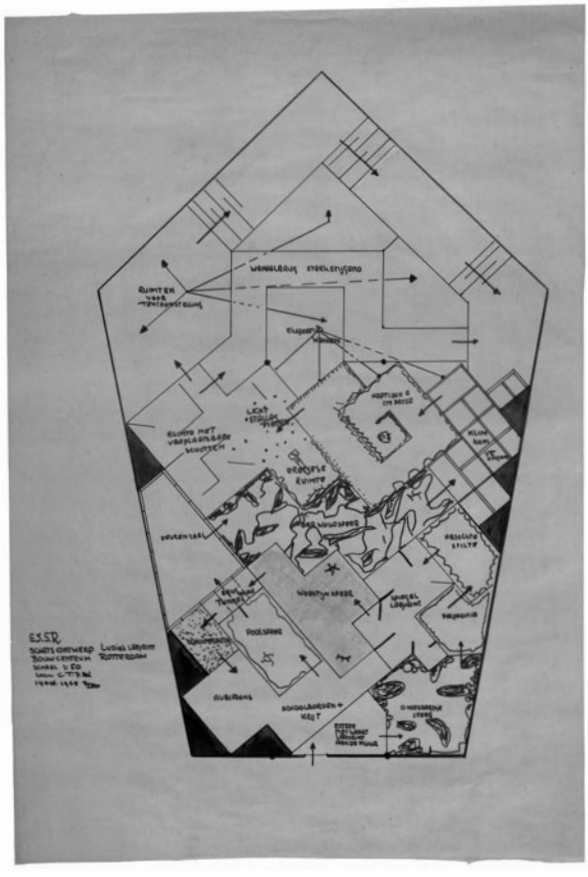
Environmental destruction was to go hand-in-hand with the decomposition of human nature. Habitat and habitus were declared to be enemies of the future *homo ludens*. That is, Constant was confident that his New Babylon would function as an educational labyrinth in Debord's sense of the word—albeit on a molar rather than molecular scale. "Habits, the totality of which constitute a social 'model of behavior,' are what, in utilitarian society, privilege a static way of life, they are so many automatisms. However, the dynamism of a life of permanent creation excludes all automatism . . . the New Babylonian who creates his life cannot exhibit repetitive behavior."[95] So long, that is, as the new cybernetic automatisms are literally buried underground, supporting the nonpurposeful behavior of the nomadic population above.

Only once was Constant forced to admit that his faith in the future potential of *homo ludens* might be misplaced. Unlike Debord's labyrinth, Constant got the chance to build an actual labyrinth and test the behavior of its participants. In 1965, he gathered a team to construct the Experiment Studio Rotterdam (ESR) in the Dutch harbor city.[96] Based on Constant's arboretic "Schema of Ambient Construction" (*Schematik der Ambientegestaltung*), the multisensorial, two-story structure consisted of eleven intersecting spaces: a documentation room, a sonorium, a low passage, a metal structure connecting the two floors, a door labyrinth, a "canary floor," a mirror room, a crawlspace, an odoratorium, a module space, and a workspace.[97] Because the team members were extremely keen to record the reactions of the visitors, the ESR was highly reminiscent of the experimental situation of the behavioral sciences. To this effect, so-called albiphones were installed on which

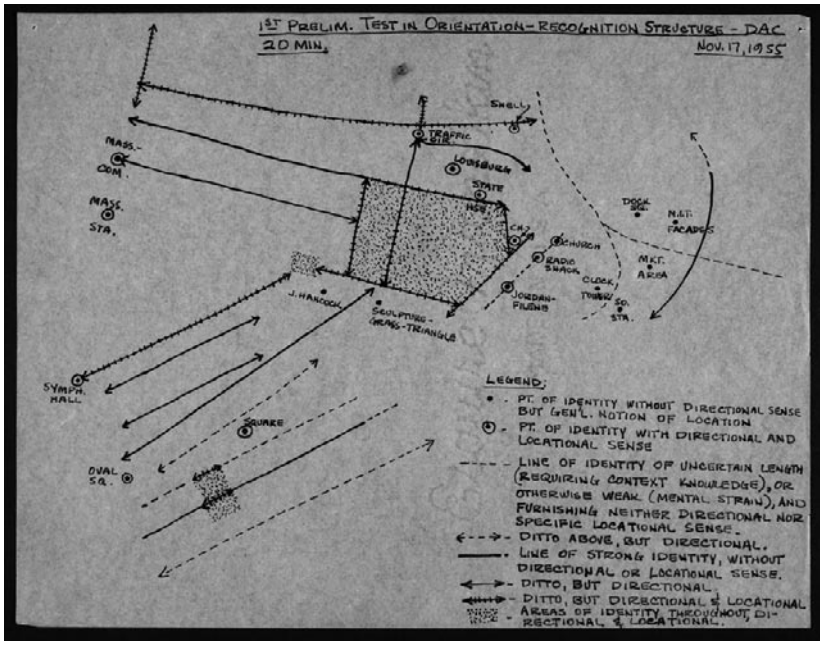


messages could be left, survey forms were distributed within the studio, and engineering students from the University of Delft were employed to systematically question the visitors.

On the basis of this material, the sociologist Derk de Jonge wrote an article, "Reactions to Some Abnormal Spatial Structures," for the Dutch architecture journal *Bouw*.[98] De Jonge compared the ESR, incongruously, to another behavioral experiment conducted at a Dutch university, one that took place in empty, closed rooms without any sensory stimulation, similar to the research into boredom conducted by the Canadian Defense Board that was outlined in the 1958 situationist editorial. Constant accused de Jonge's study of lacking sufficient academic rigor and said its conclusion that the visitor responded in an overwhelmingly negative fashion to the disorienting environment of ESR was predictable. Constant did not expect that "homo faber would immediately transform into homo ludens by simply entering a certain space."[99] However, he complains vehemently of de Jonge's concept of freedom, which the latter states is dependent on one's ability to orientate oneself in a space and make choices based on this overview. At this point, Constant points out that the test subjects who were placed in bare rooms during the other experiment reacted in an even more negative manner. Still, despite feelings of alienation and anxiety among the visitors to ESR, they responded to the door labyrinth, Constant contradicts de Jonge, in the most favorable manner, which shows that "disorientation not only creates a feeling of uncertainty, but also excites the desire to explore." If contemporary individuals respond in such an "inhibited" and "frustrated" manner to "abnormal" spaces, Constant alleges, they cannot be taken as a norm in the design of a truly liberating, human environment, as urban studies assumed.[100]



We might smell a rat on both sides of this argument. For instance, the sociologist, in his debate with Constant, calls upon the "open-ended order" advocated by the urbanist Kevin Lynch, who advocated a mode of urban planning that would



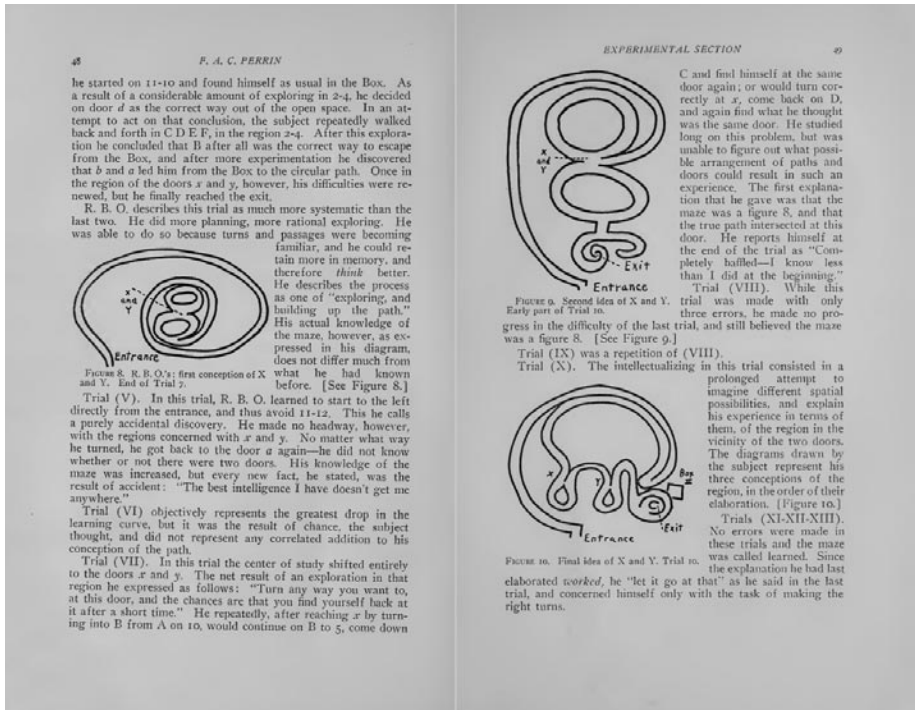
Opposite, top: ESR (Experiment Studio Rotterdam) pamphlet, ca. 1965. © Universiteit van de Socio-Ruimte van Nic. Tummers.

Opposite, bottom: Ground plan of ESR (Experiment Studio Rotterdam), 1965. © Universiteit van de Socio-Ruimte van Nic. Tummers.

Above: "First Preliminary Test in Orientation-Recognition Structure—DAC, 20 Min., Nov. 17, 1955." Kevin Lynch Papers, MIT Libraries.

leave sufficient room for variation and surprise *within* the organized totality of a city. In this respect, the *Image of the City* presents a dialectical image of Constant's dynamic labyrinth and its nemesis, the striated grid of "functionalist" design.[101] The one analyzes urban space from without, while the other imagines it from within. Lynch, adopting a form of participant observation, straddles the two approaches.[102] Lynch's urbanist theory was based on a neobehaviorist principle; namely, Edward Tolman's concept of the cognitive map.[103] What must have recommended this notion to Lynch was that it broke with the purely physiological approach of classical behaviorism. Neither mechanistic nor introspective, Tolman advanced a *field* theory of psychology whereby feedback mechanisms between subjects and their milieu actively construct "a tentative, cognitive-like map of the environment."[104] Tolman's was a Gestaltist brand of behaviorism far removed from the "muscle-twitch" mechanisms of prewar behaviorism, and it allowed Lynch to fault modern cities for their lack of a clearly organized yet variable topology of nodal points, built perspectives, and natural boundaries. Not only a disorderly but also a highly standardized environment, Lynch maintained, could induce a state of neurosis—a radical sense of disorientation.

Lynch conducted his research by asking subjects to draw, from memory, mental maps of their urban surroundings. The resulting drawings, which are quite marvelous in themselves, deliver a topological rather than topographical representation of the cityscape, differentiated into vectors and localities, nodes and edges. The approach was not wholly new, having already been put in place by behaviorist researchers, if on the limited scale of the human maze. Similarly, Lynch's mnemonic maps might beg comparison with the psychogeographic maps



48 F. A. C. PERRIN

he started on 11-10 and found himself as usual in the Box. As a result of a considerable amount of exploring in 2-4, he decided on door *d* as the correct way out of the open space. In an attempt to act on that conclusion, the subject repeatedly walked back and forth in C D E F, in the region 2-4. After this exploration he concluded that B after all was the correct way to escape from the Box, and after more experimentation he discovered that *b* and *a* led him from the Box to the circular path. Once in the region of the doors *x* and *y*, however, his difficulties were renewed, but he finally reached the exit.

R. B. O. describes this trial as much more systematic than the last two. He did more planning, more rational exploring. He was able to do so because turns and passages were becoming familiar, and he could retain more in memory, and therefore *think* better. He describes the process as one of "exploring, and building up the path." His actual knowledge of the maze, however, as expressed in his diagram, does not differ much from what he had known before. [See Figure 8.]

FIGURE 8. R. B. O.'s: first conception of X and Y. End of Trial 7.

Trial (V). In this trial, R. B. O. learned to start to the left directly from the entrance, and thus avoid 11-12. This he calls a purely accidental discovery. He made no headway, however, with the regions concerned with *x* and *y*. No matter what way he turned, he got back to the door *a* again—he did not know whether or not there were two doors. His knowledge of the maze was increased, but every new fact, he stated, was the result of accident: "The best intelligence I have doesn't get me anywhere."

Trial (VI) objectively represents the greatest drop in the learning curve, but it was the result of chance, the subject thought, and did not represent any correlated addition to his conception of the path.

Trial (VII). In this trial the center of study shifted entirely to the doors *x* and *y*. The net result of an exploration in that region he expressed as follows: "Turn any way you want to, at this door, and the chances are that you find yourself back at it after a short time." He repeatedly, after reaching *x* by turning into B from A on 10, would continue on B to 5, come down

EXPERIMENTAL SECTION 49

C and find himself at the same door again; or would turn correctly at *x*, come back on D, and again find what he thought was the same door. He studied long on this problem, but was unable to figure out what possible arrangement of paths and doors could result in such an experience. The first explanation that he gave was that the maze was a figure 8, and that the true path intersected at this door. He reports himself at the end of the trial as "Completely baffled—I know less than I did at the beginning."

Trial (VIII). While this trial was made with only three errors, he made no progress in the difficulty of the last trial, and still believed the maze was a figure 8. [See Figure 9.]

FIGURE 9. Second idea of X and Y. Early part of Trial 10.

Trial (IX) was a repetition of (VIII).

Trial (X). The intellectualizing in this trial consisted in a prolonged attempt to imagine different spatial possibilities, and explain his experience in terms of them, of the region in the vicinity of the two doors. The diagrams drawn by the subject represent his three conceptions of the region, in the order of their elaboration. [Figure 10.]

FIGURE 10. Final idea of X and Y. Trial 10.

Trials (XI-XII-XIII). No errors were made in these trials and the maze was called learned. Since the explanation he had last elaborated *worked*, he "let it go at that" as he said in the last trial, and concerned himself only with the task of making the right turns.

Above: Mnemonic maps of the "Mouse-Trap Maze" drawn by test subjects. From F.A.C. Perrin, *An Experimental and Introspective Study of the Human Learning Process in the Maze* (1914).

Opposite: Claude Shannon with his maze-solving machine, 1951.

of the situationists but for the fact that the latter were more interested in exploring, rather than plugging, the disorientating gaps or "vortices" within the city labyrinth.[105] Lynch grants that "there is some value in mystification, labyrinth, or surprise in the environment," but only on condition that one's basic mental map is not disturbed and the confusion occurs only within a small region of a "visible whole."[106] Like the sociological critic of Constant's ESR, Lynch is confident that "complete chaos without hint of connection is never pleasurable."[107]

Are we then to decide between two antithetical types of mental mapping: Lynch's image of an open-ended order or Constant's image of "an immense social space that is forever other"?[108] Underlying both is a (neo-)behaviorist model of subjectivity that found its most radical expression in yet another maze-like, constructed situation; namely, Claude Shannon's automated maze-solving machine—dubbed the "Theseus maze-solving mouse."[109] In this case, however, neither human nor animal participation was required. Presented at the 8th Cybernetics Conference in 1951, the situation consisted of a five-by-five square grid through which a sensing figure moved by orderly search procedures in order to find its "food source" at an electric socket. This electronic rat could imitate a pathological state of nervous tremor. When caught in a reflexive loop, the machine was said "to have established a vicious circle, or a singing condition."[110] The machine suffered a neurosis of the cybernetic neural net: a machinic simulation of the experience of total disorientation. Despite this faulty circuit, Shannon's electronic rat elicited the admiration of the chairman of the cybernetic conference, Warren McCulloch: "Like a

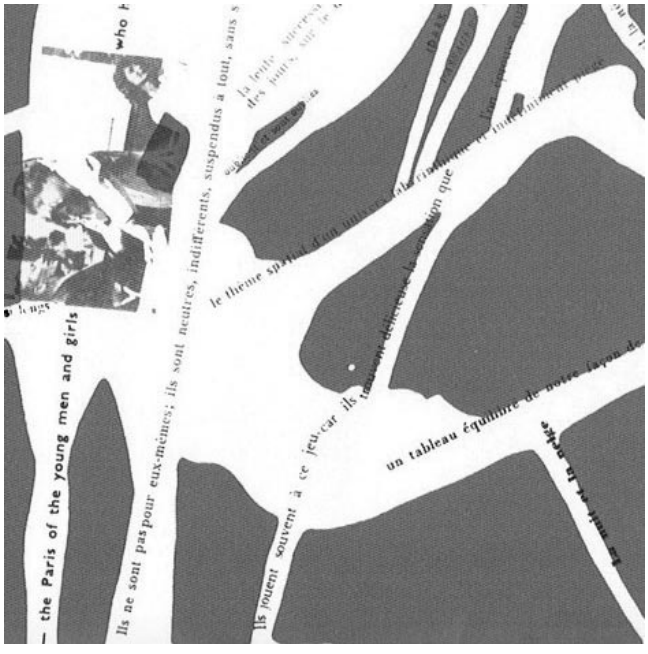
man who knows the town, so [the electronic rat] can go from any place to any other place, but doesn't always remember how he went."[111] This comment might seem to anticipate Lynch's theory of urban orientation, but it also suggests another conclusion, one closer to the algorithmic principles of Cold War rationality. The electronic rat-man required no lived memory, as an algorithmic subroutine directed its movements. However, Tolman had already conceived of a more contemporary, technological analogy for his cognitive map:

> The central office itself is far more like a map control room than it is like an old-fashioned telephone exchange. The stimuli . . . are not connected by just simple one-to-one switches to the outgoing responses. Rather, the incoming impulses are usually worked over and elaborated in the central control room into a tentative, cognitive-like map of the environment, indicating routes and paths and environmental relationships, which finally determine what responses, if any, the animal will finally release.[112]

Comparing the brain to a "map control room" sounds no less ominous than identifying it with a telephone exchange. Both remind us of the various situation rooms of Cold War, high-tech surveillance.[113]

What we can take away, finally, from this account of the postwar, behavioral turn is that the two older characters—*homo ludens* and the behaviorist rat-man—cannot be thought without a third character of more recent derivation: the electronic rat-man whose organic memory has been replaced by algorithms. This liquidation of lived memory is what the situationists viewed as the most drastic effect of a spectacular society (although, to speak of an "informatic society" would be more correct). And this seems to present an immediate paradox, since the *dérive* was occasionally recommended as an effective technique to lose oneself: "The Situationists place themselves in the service of the necessity of forgetting," seeing themselves as being in league with the only class that "theoretically" had no past: the proletariat.[114] There are moments, however, when a more nuanced version of the situationist *viveur* shines through.

The individual who embarked on a situationist *dérive* was not unlike one of Wiener's purposeful cybernetic organisms, which persists as a fragile pattern of information against all

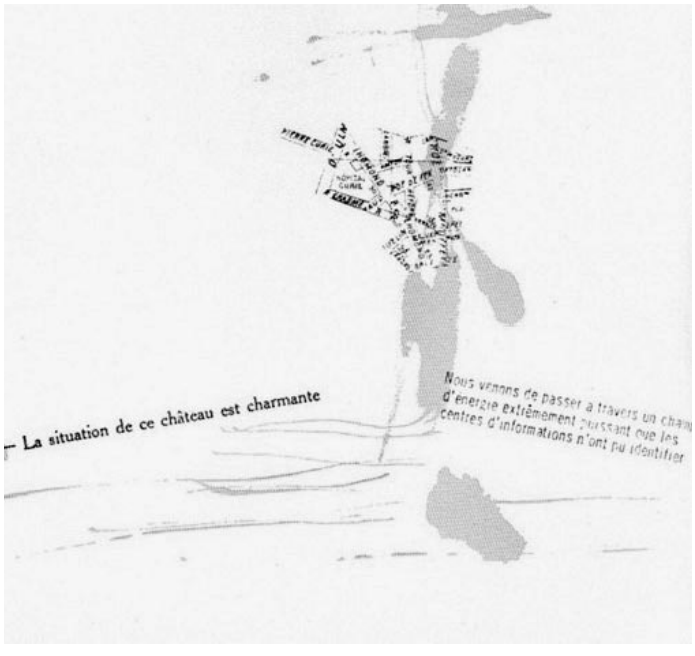


Above: Guy Debord. *Mémoires: Structures portantes d'Asger Jorn*, 1958–1959. Detail.

Opposite: Guy Debord. *Mémoires: Structures portantes d'Asger Jorn*, 1958–1959. Detail.

odds—"whirlpools in a river of ever-flowing water."[115] Countervortices within a swirling environment, the cybernetic organism has to go with the flow, precisely to resist the dissolving pull of entropy. Likewise, the situationist *viveur* must at all times remain sensitive to those currents and turbulences that lead to and from "certain zones of great discomfort." The *dérive*, as Debord notes, "includes, at the same time, this release [*laisser aller*] and its necessary contradiction: the control of psychogeographical variations by the knowledge and calculation of their possibilities."[116] Pure chance is to be kept at bay, just as the cybernetic organism must fight entropy while remaining open to its surroundings. In Debord's *Mémoires* we catch a glimpse of the kaleidoscopic consciousness of this drifting self who exists as a mobile node within a dynamic network of deindividuation: "But one has naturally comprehended that these ambiguities owe nothing to psychology, they are born of interferences between situations."[117] The person on a *dérive* dies many deaths in the urban labyrinth: "All these influences succeed one another, superimpose themselves or become entangled."[118] Consciousness forms a metastable "network of recollections, obsessions, indistinct thoughts, reflections, apprehensions," which disrupts the linearity of mere voluntary memory, of a "*mémoire à accès rapide*." Indeed, the very structure of Debord's *Mémoires*, a collage of found phrases merged with the interlacing skein of Jorn's blots and drippings, evokes the operations of a behavioral organism interfacing with an urban network, pulsing with affective stimuli and informational data. The city is sensed as "a field of extremely potent energy" that one must tap into while avoiding capture by the command "centers of information."[119]

Suggestive as this collage text might be, it was Constant (and to a lesser extent Jorn), rather than Debord, who would attempt to combine cybernetics and Marxism, feedback loops and dialectics. Constant would never resolve the inner tensions between *homo ludens*, *homo oeconomicus*, and *homo algorithmus*. But why should he? That New Babylon, rather than, say, an updated version of the Fun Palaces of the 1960s, brings these tensions to the surface is exactly what should recommend the project to us.[120] The significance of the behavioral turn is to have transformed the "world as labyrinth" into a potent field of struggle between those who would liberate the monster at its



center and those who wished to tame it—or, in contemporary terms, to oppose those who advocate "letting go" and those who require a password at every intersection. And so, the antitypes of Constant's New Babylon, on the one hand, and Lefebvre's giant "signaling machine," on the other, mark the outer limits of this battlefield or *Kriegsspiel*: maze, prison, or both at the same time?

But what about the rodent that escaped the maze? Tolman recounts the incident of a lab rat who, after learning an alley maze, pushed back the cover of the box and ran directly across the top to the goal box containing its food. The rat's behavior was still primed to the laboratory situation: it was not deviant, simply more efficient. The thought of the rat scampering across the top of the maze prompted Tolman's brainchild of the cognitive map, putting the rat, as it were, right back into the box, generating further input and output. The "recreational" hazards of orientation that the situationists wished to exploit were tamed by the maze-solving algorithms of Cold War rationality. Through our everyday practices of searching and linking, the cognitive map became a digital map, and Ariadne's logical thread tethered us all the stronger to the web of communicative capitalism.[121] Rat-man, it appears, has become locked in a prison-maze of his own making as social network analysis produces metrics of group behavior on an infinitely finer level than any behaviorist ever dreamed of and we engage in a battle with social media to exert our right to be forgotten.

Notes

1. A third organizing party was the so-called London Psychogeographic Committee, which consisted only of Ralph Rumney. On the invitation card Debord is still listed with a series of five "Psychographic Maps of Paris." Furthermore, the invitation card announces the inclusion of "anonymous collective paintings," a "mad psychographic drawing," and photographs by Michèle Bernstein and Mohamed Dahou.

2. "Die Welt als Labyrinth," *Internationale situationniste*, no. 4 (June 1960). See also the correspondence between Constant, Jorn, and the director of the Stedelijk Museum, Willem Sandberg, in the archives of the Stedelijk Museum in Amsterdam and the Museum Jorn in Silkeborg. Jorn comes to the defense of Sandberg in "Sur l'anti-situation d'Amsterdam" (1960), in *Discours aux pingouins et autre écrits*, ed. Marie-Anne Sichère (Paris: École nationale supérieure des beaux-arts, 2001), 267–74. All translations are my own, unless otherwise noted.

3. Two years later, in 1962, the Stedelijk Museum would host a labyrinth exhibition, *Dylaby* (short for Dynamic Labyrinth), organized by Jean Tinguely and Daniel Spoerri, which, not surprisingly, would become an object of derision among those involved in the original 1960 project. Constant recollected in a later interview that, in the eyes of the Situationist International group to which he briefly belonged, *Dylaby* could only be viewed as "a caricature of our plan, a popularized version, divested of its theoretical background. Even the title, dynamic labyrinth, originated in our journals." Max Arian, "Constant in opstand," *De groene Amsterdammer*, 17 January 1996, https://www.groene.nl/artikel/constant-in-opstand.

4. Two previous installments of this project have been published in *Grey Room*: "Beyond the Line, or a Political Geometry of Contemporary Art," *Grey Room*, no. 57 (Fall 2014): 24–49; and "Topological Pathways of Postminimalism," *Grey Room*, no. 25 (Fall 2006): 32–63.

5. For the sake of convenience, I shall often refer to these figures as "situationists," despite the occasional difference in positions between Debord, Jorn, and Constant. Others have sufficiently examined the reasons for their parting of ways at the beginning of the 1960s. The literature on the Situationist International is too extensive to cite in full here, but besides the texts elsewhere in these notes, useful resources include Anselm Jappe, *Guy Debord* (Berkeley and Los Angeles: University of California, 1999); Vincent Kaufmann, *Guy Debord: Revolution in the Service of Poetry* (Minneapolis: University of Minnesota Press, 2006); McKenzie Wark, *The Beach beneath the Street: The Everyday Life and Glorious Times of the Situationist International* (London: Verso, 2011); and the various essays collected in Tom McDonough, ed., *Guy Debord and the Situationist International* (Cambridge, MA: MIT Press, 2002).

6. According to the invitation card to the Taptoe exhibition, Debord originally proposed to exhibit five "Plans psychogéographique de Paris": "Paris sous le neige," "The Naked City," "Axe d'exploration et échec dans la recherche d'un Grand Passage situationniste," "Discours sur les passions de l'amour," and "The most dangerous game." Two of these psychogeographic maps would be produced in Copenhagen during the following May.

7. According to a slightly later version of "Projet pour un labyrinthe éducatif," reprinted in Guy Debord, *Oeuvres*, ed. Jean-Louis Rançon and Alice Debord (Paris: Gallimard, 2006), 284.

8. For more on the history of psychology, see Kurt Danziger. *Constructing the Subject: Historical Origins of Psychological Research* (Cambridge, UK: Cambridge University Press, 1990).

9. John Watson, "Psychology as the Behaviorist Views It," *Psychological*

Review 20 (1913): 158–77. While behaviorism continued to dominate the postwar field of behavioral sciences, a more refined paradigm of neobehaviorism emerged in the work of Edward C. Tolman, B.F. Skinner, and Clark L. Hull. See John A. Mills, *Control: A History of Behavioral Psychology* (New York: New York University Press, 1998); and Laurence D. Smith, *Behaviorism and Logical Positivism: A Reassessment of the Alliance* (Stanford, CA: Stanford University Press 1986). Watson was not the first to question the possibility of introspection but was one of the most radical in his rejection. On this basis, Immanuel Kant, in his *Metaphysical Foundation of Natural Science* of 1786, had already contradicted the possibility of psychology as a science.

10. For my purposes, a discussion of the extent to which Watson and his followers ruled out introspection altogether is not necessary. During the subsequent decades, the main antagonists of behaviorism would be psychoanalysis, Gestalt theory, and phenomenology.

11. Watson, 158.

12. Watson, 158.

13. On the transformation of psychology into a social science, see Dorothy Ross, *Modernist Impulses in the Human Sciences, 1870–1930* (Baltimore: Johns Hopkins University Press, 1994).

14. Paul Erickson et al., *How Reason Almost Lost Its Mind*: *The Strange Career of Cold War Rationality* (Chicago: University of Chicago Press, 2013).

15. Again, Watson's behaviorist theory is rather crude, and later neobehaviorists such as Tolman would recognize the mediatory role of the mind.

16. To name a few, Fluxus, GRAV, Hélio Oiticica, and various land artists all developed labyrinth projects. See also my article on Bruce Nauman: "Corridors, Tunnels and Mazes: Bruce Nauman and the Spaces of Behavioral Control," in *Bruce Nauman Contemporary*, ed. Eva Ehninger et al. (Basel: Schaulager, 2018), 185–212.

17. I am following the classic periodization of the situationist movement into an avant-gardist phase (1957–1962), which included artists such as Jorn, Constant, Giuseppe Pinot-Gallizio, and the Spur group, and a postaesthetic phase in which the artists either left or were expelled and the movement's exclusive focus was on political theory and action. See, among others, Peter Wollen, "Bitter Victory: The Art and Politics of the Situationist International," in *On the Passage of a Few People through a Rather Brief Moment in Time: The Situationist International 1957–1972*, ed. Elisabeth Sussman (Cambridge, MA: MIT Press, 1989).

18. "La lutte pour le controle des nouvelles techniques de conditionnement," *Internationale situationniste*, no. 1 (June 1958): 6–8.

19. Serge Chakhotin, *Le viol des foules par la propagande politique*, 2nd ed. (Paris: Gallimard, 1952). Originally published in 1939, it was suppressed soon thereafter by the Nazis. In 1952 a new, enlarged French edition was published. An English translation appeared in 1940.

20. Chakhotin, 497.

21. Chakhotin, 496–97.

22. In many strategies of the historical avant-garde, such as Soviet montage theory, the ideal of spectator "activation" could facilitate a positive link between behaviorist conditioning and violent action—think, for instance, of Sergei Eisenstein's comment about setting off firecrackers under the seats of the spectators. In 1926 Vsevolod Pudovkin directed a documentary about Pavlov, *Mechanics of the Brain*. To develop this point further, one would need to disentangle the various strands of psychotechnics, reflexology, and behaviorism in the Russian context, but for some fascinating clues see Margarete Vöhringer, "A Concept in Application: How the Scientific Reflex Came to Be Employed against Nazi Propaganda," *Contributions to the History of Concepts*

6, no. 2 (Winter 2011): 105–23.

23. Although no source is given, the report was likely one of a series of psychological studies on the "effects of radical isolation" conducted at McGill University from 1952 to 1955.

24. D.O. Hebb and Woodburn Heron, *Effects of Radical Isolation upon Intellectual Function and the Manipulation of Attitudes*, Report no. HR 63 (Ottawa: Defense Research Board, Department of National Defense, October 1955), 1, http://cradpdf.drdc-rddc.gc.ca/PDFS/unc65/p259276.pdf.

25. See Andreas Killen and Stefan Andriopoulos, eds., "On Brainwashing: Mind Control, Media, and Warfare," special issue, *Grey Room* 45 (Fall 2011).

26. Hebb and Heron, 2.

27. "La lutte pour le controle," 6–8. I thank Lucia Allias for pointing out that the relation between behaviorism and violence underwent a transformation after the Second World War. Whereas the historical avant-garde could imagine behaviorist techniques and violent action as allies in the pursuit of social revolution, during the Cold War the American social sciences would marshal behavioral techniques of control in order to preempt and quell outbursts of social violence. This is not to say that the experiments of behavioral researchers did not inflict extreme violence on their test subjects. The cruelty of some psychological tests, such as the Stanford prison experiment, would force the U.S. government to draw up ethical guidelines for the social sciences in 1971.

28. "The dérive is intimately linked to an awareness of psychogeographical effects and to the affirmation of a ludic-constructive mode of behavior. . . . One or more persons who conduct a dérive renounce, for a shorter or longer period, their usual modes of movement and action, their relations, their proper activities of work and leisure, and let themselves be drawn by the attractions of the terrain and the encounters they find there." Guy Debord, "Théorie de la dérive," *Internationale situationniste*, no. 2 (December 1958): 51.

29. Guy Debord, "Définitions," *Internationale situationniste*, no. 1 (June 1958): 13. Today it seems as if the *détournement* of the behavioral sciences has been appropriated in turn. Almost daily, we can read in the newspapers how data firms, trawling the Internet, seek to deploy "behavioral microtargeting by means of psychographic messaging." Mathew Rosenberg, "Bolton Was Early Beneficiary of Cambridge Analytica's Facebook Data," *New York Times*, 23 March 2018, https://www.nytimes.com/2018/03/23/us/politics/bolton-cambridge-analyticas-facebook-data.html.

30. Debord, "Théorie de la dérive," 19.

31. Guy Debord, *Rapport sur la construction des situations et sur les conditions de l'organisation et de l'action de la tendance situationniste internationale* (June 1957), in *Oeuvres*, 308–28.

32. Henri Lefebvre, *Critique of Everyday Life: Foundations for a Sociology of the Everyday*, trans. John Moore, vol. 2 (London: Verso 2002), 300.

33. See Friedrich Kittler, "The City Is a Medium" (1988), *New Literary History* 27, no. 4 (Autumn 1996): 717–29.

34. More work needs to be done on the "group dynamics" of the avant-garde. In general, the situationists mimicked the "teamwork" and "small group" research of the behavioral sciences. But Debord also addressed the "participants" in his educational labyrinth as individuals who, presumably, had not yet developed any group bonds.

35. Debord, *Rapport*, 322.

36. "Définitions," 13.

37. "Problèmes préliminaires à la construction d'une situation," *Internationale situationniste*, no. 1 (June 1958), 11–13.

38. Debord wavers on this point of the specialized activity of situationist

research, stating that the position of director should never extend beyond the time span of a specific situation. "Problèmes préliminaires à la construction d'une situation."

39. Neither counterscientific nor quasiscientific, the situationist project appropriated certain scientific methods and organizational forms in order to turn them against themselves; that is, the situationists performed a *détournement* of scientific procedures.

40. In topological terms: the experimental protocols of classical science, which were honored by prewar behaviorism, established a strict separation between observing subject and observed object. This was, in part, to change after the Second World War, if not in all cases. Consider, for instance, the Canadian study on the psychological effects of isolation. The cybernetic theory of feedback would replace the topographic distinction between inside and outside with the twisted, topological figure of a Möbius strip. However, the situationists never fully engaged the notion of feedback, and Debord's theory of the spectacle would maintain, in most respects, a clearly articulated notion of social "separation."

41. Debord, *Rapport*, 325.

42. "La frontière situationniste," *Internationale situationniste*, no. 5 (December 1960): 8–9.

43. Gustav René Hocke, *Die Welt als Labyrinth: Manier und Manie in der Europäischen Kunst* (Hamburg: Rowohlt, 1967). The title of the Situationist International text about the Stedelijk Museum debacle derives from this book.

44. Le Corbusier's original design of 1939 was called Musée à croissance illimitée (Museum of Infinite Growth). The title Musée labyrinthe refers to a later proposal of 1962 to realize a version of the museum plan in Erlenbach, Germany. Besides images of mazes found in rupestrian art, Gothic church pavements, Baroque gardens, medieval city plans, children's games, and, appropriately, human physiology (i.e., the ear labyrinth), the *Situationist Times* issue also contains images of Constant's New Babylon, including diagrams of both the unrealized situationist labyrinth and the *Dylaby* exhibition. *Dylaby* is suggestively combined with a map of a secret government bunker, copied from the controversial antinuclear pamphlet *Danger! Official Secret* of 1963, which bears an uncanny resemblance to the layout of the cavern of Gortyna, once thought to be the location of the Minotaur's labyrinth.

45. The fifth issue of the *Situationist Times* contains Jorn's essay "Mind and Sense," which distinguishes between "Nordic" and "Latin" pictorial traditions on topological principles. In a press release by Jacqueline de Jong, dated 14 December 1964, Jorn is acknowledged as a major influence. A copy of the press release is kept at the Beinecke Rare Book and Manuscript Library, Yale University. The library also contains a letter from Jacqueline de Jong to Jorn, dated 21 July 1960, which provides a summary of her preliminary research on the topic of topology, acting on previous instructions from Jorn.

46. Asger Jorn, "La création ouverte et ses ennemis," *Internationale situationniste*, no. 5 (December 1960): 29–50.

47. Many of the illustrations in the *Situationist Times* are drawn from the SICV.

48. Willard S. Small, "Experimental Study of the Mental Processes of the Rat II," *American Journal of Psychology* 11, no. 2 (January 1900): 206–39. Small's source for the maze was an article on "Labyrinths" in the *Encyclopedia Britannica*.

49. Small, 208.

50. Rebecca Lemov, *The World as Laboratory: Experiments with Mice, Mazes and Men* (New York: Hill and Wang, 2005), 21.

51. Fleming Allen Clay Perrin, *An Experimental and Introspective Study*

of the Human Learning Process in the Maze (Princeton, NJ: Princeton University Press, 1914); and W. Brown, "Spatial Integrations in a Human Maze," *University of California Publications in Psychology* 5 (1932): 123–34.

52. *How Reason Almost Lost Its Mind*. See also "New Perspectives on Science and the Cold War," special issue, *Isis* 101, no. 2 (June 2010), which includes some of the same authors.

53. *How Reason Almost Lost Its Mind*, 112; emphasis in original. The authors trace the use of this term within the American behavioral sciences back to the writings of John Dewey, the topological psychology of Kurt Lewin, and the sociological reflections of Paul Lazarsfeld, although defining the term in a more systematic way in relation to experimental practice was left to behavioral scientists such as Robert Freed Bales of Harvard's Laboratory of Social Relations. Debord is usually thought to have derived the term from Jean-Paul Sartre. See, for instance, Wollen, "Bitter Victory," 30.

54. Warren Montag speaks, in relation to game theory, of "this axiomatization of human behavior, which appears to reduce 'real men' to a set of functions and submits the most purposive human action to the implacable logic of a combinatory." Warren Montag, *Althusser and His Contemporaries: Philosophy's Perpetual War* (Durham, NC: Duke University Press, 2013), 60.

55. *How Reason Almost Lost Its Mind*, 45.

56. *How Reason Almost Lost Its Mind*, 112.

57. See the discussion of Bales's use of "special rooms" at the Harvard Laboratory of Social Relations in *How Reason Almost Lost Its Mind*, 115–16.

58. *How Reason Almost Lost Its Mind*, 124.

59. *How Reason Almost Lost Its Mind*, 112.

60. John von Neumann and Oskar Morgenstern prophesized that one day it would be possible to establish a "complete set of rules of behavior in all conceivable situations," whether one is playing a game or engaged in economic activities. See John von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behavior* (Princeton, NJ: Princeton University Press, 1944), 33. Game theory, they maintained, would provide "a complicated combinatorial catalogue of solutions" (33)—a matrix of possible choices—to maximize one's profit. For more on game theory and the neo-avant-garde, see Pamela Lee, *New Games: Postmodernism after Contemporary Art* (London: Routledge, 2013).

61. Von Neumann and Morgenstern, 44.

62. I borrow the term from Ian Hacking. On the rise of probability in modern thought, see Ian Hacking, *The Taming of Chance* (Cambridge, UK: Cambridge University Press, 1990); G. Gigerenzer et al., *The Empire of Chance: How Probability Changed Science and Everyday Life* (Cambridge, UK: Cambridge University Press, 1989); Theodore Porter, *The Rise of Statistical Thinking, 1820–1900* (Princeton, NJ: Princeton University Press, 1986); and Theodore Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995).

63. For more on a specifically "post-Gibbsian," thermodynamic model of probability, see N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999); and Ilya Priogogine and Isabelle Stengers, *Order out of Chaos: Man's New Dialogue with Nature* (New York: Bantam, 1984).

64. "Contribution à une définition situationniste du jeu," *Internationale situationniste*, no. 1 (June 1958): 9.

65. Pierre Rosentiehl, *Le labyrinthe des jours ordinaires* (Paris: Seuil, 2013), 41. And if the maze was to be a playground of disorientation for the situationists, we should not forget another, ludic strand of its history, which leads straight to the digital wayfinding tools of today.

66. See Édouard Lucas, *Récréations mathématiques* (Paris: Gauthier-Villars, 1891), 46. See also Jorn's reference in "Sur l'antisituation d'Amsterdam," 273, to Christian Wiener, "Über eine Aufgabe aus der Geometria Situs," *Mathematische Annalen* 6, no. 1 (1873): 29–30, which is one of the first publications of a maze-solving algorithm.

67. Leonhard Euler, "The Solution of a Problem Relating to the Problem of Position [*Geometriam Situs*]," in *Graph Theory 1736–1936*, ed. N.L. Biggs et al. (Oxford, UK: Clarendon Press, 1976), 3–8.

68. Kittler, 139, 141.

69. For an amusing instance, see Debord's polemic against the information theorist Abraham Moles, in "Correspondance avec un cybernéticien," *Internationale situationniste*, no. 9 (August 1964): 44–48.

70. Claude Lévi-Strauss, "Introduction: The Mathematics of Man," in "Mathematics and the Social Sciences," special issue, *International Social Science Bulletin* 6, no. 4 (1954): 581–90.

71. Lévi-Strauss is relying on the concept of a "new math" that was introduced by the Bourbaki group in France. The so-called new math, which attempted to systematize mathematics on the basis of topology, set theory, and group theory, would come to dominate educational curricula in many Western countries during the 1960s.

72. Lévi-Strauss, "Introduction," 586.

73. And even less could Lévi-Strauss have foreseen the return of "big data" in the field known as the digital humanities.

74. Constant, "Inaugural Report of the Munich Conference," in Mark Wigley, *Constant's New Babylon: The Hyper-architecture of Desire* (Rotterdam: 010 Publishers, 1999), 101.

75. See Wigley, *Constant's New Babylon*; Catherine de Zegher and Mark Wigley, eds., *The Activist Drawing: Retracing Situationist Architectures from Constant's New Babylon to Beyond* (New York: The Drawing Center; Cambridge, MA: MIT Press, 1999) (in particular: Anthony Vidler, "Diagrams of Utopia," 83–91); and *Constant: New Babylon* (Madrid: Museo Nacional Centro de Reina Sofía, 2016).

76. Constant, "Unitary Urbanism," in Wigley, *Constant's New Babylon*, 132.

77. Constant, "New Babylon: Outline of a Culture [1960–1965]," in Wigley, *Constant's New Babylon*, 160–61.

78. "Skyscrapers by the Roots," *Potlatch*, no. 5 (20 July 1954), reprinted in Tom McDonough, ed., *The Situationists and the City* (London: Verso, 2009), 44; emphasis in original.

79. Constant, "Opkomst en Ondergang van de Avant-Garde," *Randstad* 8 (1964), reprinted in *Opstand van de Homo Ludens* (Bussum: Paul Brand, 1969), 28.

80. Constant, "Unitary Urbanism," 131.

81. The situationist constructed situation was never completely closed to the outside, in contrast to the experimental situation of behavioral studies. The latter's method of participant observation, at best, broke down an *internal* division between observer and participant.

82. Constant, "Unitary Urbanism," 135.

83. Constant, "Description of the Yellow Sector," in Wigley, *Constant's New Babylon*, 122.

84. Umberto Eco, *Semiotics and the Philosophy of Language* (Bloomington: University of Indiana Press, 1984), 80–81. A helpful overview of recent literature on the labyrinth is provided by Elisabeth Veel, "The Irreducibility of Space: Labyrinths, Cities, Cyberspace," *Diacritics* 33, nos. 3–4 (Fall–Winter 2003): 151–72.

85. The classic text is Paul Baran, *On Distributed Communications: 1.*

Introduction to Distributed Communications Networks (Santa Monica, CA: RAND, 1964).

86. Consider, for instance, how Trump uses social media networks to circumvent the more centralized mass media, only to further his own authoritarian position, even going so far as to invite another authoritarian regime to exploit the weaknesses of the U.S. political network in order to put "America First."

87. Alexander Galloway and Eugene Thacker, *The Exploit: A Theory of Networks* (Minneapolis: University of Minnesota Press, 2007), 19.

88. On Le Corbusier's museum, see, among others, Beatriz Colomina, "The Endless Museum: Le Corbusier and Mies van der Rohe," *Anyone* 15 (Winter 2009): 55–68. Colomina's description of this lifelong project of Le Corbusier as a "museum that is only wall," one that "could grow endlessly, absorbing and classifying the entire world outside," makes it reverberate with Constant's vision of New Babylon as a global network in which, presumably, museums would have no place.

89. Pierre Rosenthiel, "Dodécadédale," *October* 26 (Autumn 1983): 24.

90. Gilles Deleuze, "Postscript on Control Societies," in *Negotiations*, trans. Martin Joughin (New York: Columbia University Press, 1995), 177–182.

91. "Norbert Wiener compares the electronic machine to the imported slaves of antiquity." Constant, "Unitary Urbanism," 132. See also Asger Jorn, "Les Situationnistes et l'automation," *Internationale situationniste*, no. 1 (June 1958): 22–25; and Constant, "Another City for Another Life," in Wigley, *Constant's New Babylon*, 115–16. On the employment of brainwashing, see Constant, "Description of the Yellow Sector," 122.

92. Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Boston: Houghton Mifflin, 1954), 179.

93. Déborah Danowski and Eduardo Viveiros de Castro, *The Ends of the World* (Cambridge, UK: Polity, 2017).

94. Constant, "Unitary Urbanism," 133.

95. Constant, "New Babylon: Outline of a Culture," 164.

96. Besides Constant, the team consisted of the artist, and later socialist politician, Nic Tummers; the cultural official Ben Weehuizen; the photographer Bram Wisman; and the architectural historian Harald O. Eckardt.

97. Constant had built a labyrinth on two previous occasions in 1965: during his retrospective at the Gemeentemuseum in The Hague and the so-called *√2-Omgang* (with Tummers) during a group exhibition at the Stedelijk Museum. But ESR was to constitute the most ambitious project of the three.

98. Derk de Jonge, "Reacties op enige abnormale ruimtelijke structuren, *Bouw* 9 (27 February 1971): 352–54.

99. Constant, "Experiment Studio Rotterdam," in *Constant*, exh. cat. (The Hague: Gemeentemuseum, 1974), 68.

100. See Constant's entry on ESR in *Constant*, exh. cat., 67–68; and Constant's reply to de Jonge in *Bouw* 9 (27 February 1971): 355–56.

101. "It is clear that the form of a city or of a metropolis will not exhibit some gigantic, stratified order. It will be a complicated pattern, continuous and whole, yet intricate and mobile. It must be plastic to the perceptual habits of thousands of citizens, open-ended to change of function and meaning, receptive to the formation of new imagery. It must invite its viewers to explore the world." Kevin Lynch, *Image of the City* (Cambridge, MA: MIT Press, 1960), 119.

102. Lynch asserts that behaviorism has demonstrated that there is no "mystic 'instinct' of way-finding." Rather, "there is a constant use and organization of definite sensory cues from the external environment. This organization is fundamental to the efficiency and to the very survival of free-moving life." Lynch, 3.

103. For an excellent discussion of this and other aspects of Lynch's methodology, see Hashim Sarkis, "Disoriented: Kevin Lynch, around 1960," in *A Second Modernism: MIT, Architecture, and the "Techno-Social" Movement*, ed. Arindam Dutta (Cambridge, MA: MIT Press, 2013), 394–43.

104. Edward C. Tolman, "Cognitive Maps in Rats and Men," *Psychological Review* 55, no. 4 (July 1948): 192.

105. Lynch is thinking about mental images as a reciprocal process between observer and environment and not in terms of the enforced, everyday routines of individuals as mapped by the French sociologist Paul-Henry Chombart de Lauwe. See the illustration in *Internationale situationniste*, no. 1 (June 1958): 28; and its discussion in Tom McDonough, "Situationist Space," *October* 67 (Winter 1994): 58–77.

106. Lynch, 3, 6.

107. Lynch, 6.

108. Constant, "New Babylon," 165.

109. Claude E. Shannon, "Presentation of a Maze-Solving Machine," in *Cybernetics: Circular Causal and Feedback Mechanisms in Biological and Social Systems: Transactions of the Eighth Conference, March 15–16, 1951*, ed. Heinz von Foerster, Margaret Mead, and Hans Teuber (New York: Josiah Macy Jr. Foundation, 1952), 173–80. Shannon's machine is briefly discussed in Ronald R. Kline, *The Cybernetics Moment: Or Why We Call Our Age the Information Age* (Baltimore: Johns Hopkins University Press, 2015).

110. Shannon, 175.

111. Shannon, 180.

112. Tolman, 192.

113. The classic text on this topic is Beatriz Colomina, "Enclosed by Images: The Eameses' Multimedia Architecture," *Grey Room*, no. 2 (Winter 2001): 5–29.

114. "La lutte pour le controle," 8.

115. Hayles, 104. In a crucial essay of 1943, "Behavior, Purpose and Teleology," by Norbert Weiner, Julian Bigelow, and Arturo Rosenblueth, the behaviorist subject is already adjusted to a cybernetic, "black box" model of consciousness: "the behavioristic approach consists in the examination of the output of the object and of the relations of this output to the input. . . . the behavioristic method of study omits the specific structure and the intrinsic organization of the object." The authors then conclude that a "uniform behavioristic analysis is applicable to both machines and living organisms, regardless of the complexity of the behavior." Arturo Rosenblueth, Norbert Wiener, and Julian Bigelow, "Behavior, Purpose and Teleology," *Philosophy of Science* 10 (1943): 18.

116. Guy Debord, "Theory of the *dérive*," in McDonough, *The Situationists and the City*, 78.

117. "Mais on a naturellement compris que ces ambiguïtés ne doivent rien à la psychologie, elles naissent des interférences des situations." Guy Debord, *Mémoires: Structures portantes d'Asger Jorn* (Copenhagen: Situationist International, 1959), n.p.

118. "Tous ces influences se succèdent, se superposent ou s'enchevêtrent." Debord, *Mémoires*, n.p.

119. Debord, *Mémoires*, n.p.

120. Claire Bishop elaborates this point in "Palace in Plunderland," *Artforum* 57, no. 1 (September 2018): 93–96, 316.

121. See Jodi Dean, *Democracy and Other Neoliberal Fantasies: Communicative Capitalism and Left Politics* (Durham, NC: Duke University Press, 2009).