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Otto Lehto  and Pablo Paniagua 

Abstract

During the twentieth century, cybernetics became entangled with the socialist and neoliberal transformations in Latin America. Both socialists and market liberals appealed to cybernetic ideas about multi-level decentralization and adaptive control to coordinate society and promote welfare. By analyzing Chile as a case study, we explore the twin experiments of cyber-socialism and neoliberalism rooted in modernism and oscillating between top-down design and partial (constrained) decentralization. We show that the modernist and cybernetic ideas of ‘designing freedom’ influenced the Allende administration (1970–1973) and the Pinochet regime (1973–1990). The former experimented with cyber-socialism through Project Cybersyn, and the latter with authoritarian neoliberalism. Focusing on the work of cybernetic scholars Stafford Beer and F.A. Hayek, we compare both regimes’ different but partially overlapping approaches to the design of constrained freedom. Several features of modernist thinking and cybernetics explain both experiments’ appeal and shortcomings. These lessons are relevant for contemporary debates about the future of liberal democracy, the information society and the compatibility of freedom with artificial intelligence (AI).

Keywords: neoliberalism; socialism; Hayek; Allende; Pinochet; cybernetics.

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1. Introduction

The spirit of cybernetics is alive and well (Novikov, 2016; Pickering, 2010). Its traces are everywhere: in science, management, politics and AI research. Norbert Wiener (1948) defined cybernetics as the field that studies ‘control and communication in the animal and the machine’. Half a century later, the influence of cybernetics has been profound (Morozov, 2014). Cyberneticians use natural and social sciences models to understand complex systems’ informational mechanisms, feedback loops and self-organizing properties to increase our control and guidance over them (Ashby, 1956; Wiener, 1948).

At its best, cybernetic ideals offered a vision of freedom and emancipation through technology, information control and less rigid decentralized control mechanisms (Wiener, 1950). For this reason, it has attracted the attention of socialists (Beer, 1971) and market liberals (Hayek, 2014). For scientists interested in collaboration and decentralization, cybernetics became the instrument to promote radical forms of self-organization (Maturana & Varela, 1980 [1972]). Yet, as our study shows, cybernetics also became related to the ‘high modernist’ (or command and control) vision that permeated the beginning of the twentieth-century’s political and economic developments (Scott, 1998). Although not all cybernetic systems are oppressive forms of organization based on control, we will show a connection and tension between cybernetic theory and technocratic attitudes toward political control.

Cybernetics also influenced how politics, social thought and economics were conceptualized in the twentieth century (Gerovitch, 2004; Lewis, 2016). Cybernetics emerged during the 1940s–1950s as an attractive way to revolutionize economic coordination and politics in a way that appealed to intellectuals from both the socialist and capitalist camps (Lewis, 2016; Morozov, 2014). For many social scientists, including Norbert Wiener (1950), F.A. Hayek (1945, 2011 [1960]) and Stafford Beer (1981 [1972], 1974), cybernetics offered a framework and an ideal towards a morally inspiring vision of a free society. At the same time, cybernetics also became an essential part of the Cold War: both sides attempted to use it to gain an advantage over the enemy (Gerovitch, 2004).

This paper explores the intersection between high modernism, cybernetics and the political economy of socialism and neoliberalism through the case study of Chile. High modernism (or modernism), following James Scott (1998), is an approach to control and guide social systems that centres on governments’ overconfidence in the ability to design and operate society from the top down by specific scientific laws to achieve particular aims. In the Chilean case, it reveals patterns of modernist top-down design supported by the belief that a well-organized and efficient society, fully legible to those at its commanding heights, should be brought about through the technocratic imposition of control parameters. In so doing, we place the political economy of cybernetics, as developed by Stafford Beer (1974, 1981 [1972]) and F.A. Hayek (2014), within the broader context of Scott’s (1998) modernism. This helps illustrate how Allende’s project and

Pinochet's counterrevolution shared key technocratic and modernist commonalities largely neglected by the literature.

The regimes of Salvador Allende (1970–1973) and Augusto Pinochet (1973–1990) stood for opposing ideologies – socialism and neoliberalism – and represented opposite camps in Cold War geopolitics. The military coup that brought an end to Allende's regime on 11 September 1973, is proof of a radical political and ethical discontinuity between the two regimes. This narrative, while correct, is slightly incomplete, missing out on relevant cybernetic and managerial aspects that connect both regimes.¹ To remedy that, this paper explores some surprising modernist continuities between the two regimes in their technocratic governance techniques, institutional practices, and – most interestingly – in their 'cybernetic' conceptions of freedom. These continuities deepen our understanding of the two regimes while illuminating contemporary issues around technocracy, democracy and freedom under a market-digital economy.

Even though both Allende's socialist and Pinochet's neoliberal projects have been well documented and studied, as far as we are aware, no single study has concentrated on the technocratic and modernist threads that unite both experiments. This is a significant gap in the literature and, therefore, the crucial contribution of this paper. We show that modernist ideas influenced the Allende administration and the Pinochet regime. The former experimented with cyber-socialism through *Project Cybersyn* (Medina, 2014), and the latter with neoliberalism through the imposition and expansion of market-based solutions to social problems (Edwards, 2023). We compare their different but partially overlapping modernist approaches and technocratic visions of the governance and design of society. Although the two regimes have political discontinuities, we argue that these twin experiments share a common cybernetic vision of designing society from the top down through the practice of 'designing freedom' (Beer, 1974).² This explains how the Allende and Pinochet regimes conceived economic and political freedoms as social engineering tools that can be designed, harnessed and discretionarily granted or withheld to steer society towards specific functions and constrained self-organizing dynamics (Beer, 1971, 1974).

This paper makes a threefold contribution to the literature. First, we highlight the implications of technocratic 'high modernism' and, within that space, the influence of cybernetic theories of freedom and control on the governance techniques applied under socialism and neoliberalism. Second, our paper corrects for the relative silence in the literature regarding the technocratic *continuities* between the two starkly different regimes in their relative attitudes toward designing freedom. As far as we know, this is the first paper highlighting the modernist continuities between cyber-socialism and neoliberalism, explored through their cybernetic and technocratic conceptions of freedom.

Third, this paper makes a novel contribution to analyzing the instrumentalization of freedom by technocratic and cybernetic attitudes. We show how

freedom could become increasingly seen as *an instrumental means* of maintaining and modifying, rather than undermining, top-down social control. Since freedom is typically seen as an antidote to authoritarianism and social control, analyzing the paradoxical ‘cybernetic’ and instrumental role that freedom played in the managerial techniques of Chilean statecraft advances our theoretical sophistication while also providing a cautionary lesson about how ‘designed freedom’ can be used to buttress existing authoritarian rule. In this regard, this paper contributes to the growing scholarly interest in twentieth-century cybernetics that has arisen from recognizing its importance for contemporary models of computation, technological surveillance and artificial intelligence (see Pasquinelli, 2023).

The paper proceeds as follows: Section 2 explores the relationship between cyberneticist Stafford Beer and Allende’s government. Section 3 examines the relationship between the ideas of F. A. Hayek and the development of cybernetics, subsequently linking them with the technocratic ideas advanced during Pinochet’s neoliberal counterrevolution. We argue that this form of top-down neoliberalism is akin, in spirit, to Allende’s cyber-socialist utopia and, thus, prone to similar failures and pitfalls. Section 4 concludes.

2. Stafford Beer, Allende and the allure of cyber-socialism

The relationship between cybernetics and socialism is peculiar (Lavanderos, 2022; Peters, 2017). In the Soviet Union, cautious interest developed in building socialism based on cybernetics (Gerovitch, 2004; Peters, 2017). For dissidents of Stalinism, it played the emancipatory function of facilitating more freedom of thought in science. It also suggested a scientific basis for a subtle critique of the inefficiencies of excessive political and economic centralization (Peters, 2017). By the 1970s, however, it had become an official propaganda tool of the Soviet bureaucracy (Gerovitch, 2004, p. 293). Stripped of its emancipatory content, cybernetics ‘fit specifically well with the Marxist-Leninist ideology of the USSR because of its promise of increasing control over large systems ... cybernetics became a buzzword among Soviet technocrats’ (Clancey, 2017, p. 117). The Soviet case with cyber-socialism foreshadows the essential tension within the socialist (and all technocratic) applications of cybernetics that later became evident with the Chilean case: is cybernetics a tool of dissent and decentralization to expand freedom, or could it become a tool for increasing control over society? The same tension resurfaces in Chile.

It is unlikely that the Allende administration would have ever become as interested in cybernetics had a tradition of cybernetic socialism not existed in the Eastern Bloc (Gerovitch, 2004; Lavanderos, 2022). Long before Allende, the Soviet Union contemplated a nationwide system of computerized cybersocialism (Gerovitch, 2004; Peters, 2017). Still, Chile in 1971 did not turn to the Soviet Union but to the Western world for ideas on conducting their

experiment in cybernetic socialism. They turned to British cyberneticist Stafford Beer (1926–2002), who was the founder of *management cybernetics* (Beer, 1981 [1972], 1974). Although he had socialist inclinations before his experience in Chile, Beer was best known as a Western management guru and owned a consultant firm called SIGMA (Morozov, 2014).

The cybernetic vision of Beer needs to be contextualized in the broader intellectual discussion around cybernetics in the twentieth century (Pickering, 2010). Interestingly, Chile also played a relevant role in developing a branch of cybernetics called *second-order cybernetics*. Chile had important cybernetic theoreticians such as Humberto Maturana and Francisco Varela (1980 [1972]), who were known for creating the term ‘autopoiesis’. There is a tension between first-order cybernetics and second-order cybernetics. First-order cybernetics treats systems as *objects* that scientists can control from the outside. In other words, the ‘designer’ is considered separate from the system, focusing on feedback loops and control to maintain equilibrium (Novikov, 2016). Second-order cybernetics, in contrast, recognizes the observer as *part of the system*, shifting the focus from control to understanding (Maturana & Varela, 1980 [1972]). Coming from a managerial and business background, Beer became a business consultant, and he was more interested in developing a management theory of cybernetics, emphasizing its design, implementation and control aspects (Beer, 1981 [1972], 1971).

In July 1971, Beer was invited by a member of the Allende administration, Fernando Flores, who had a top leadership role in the Chilean State Development Corporation, CORFO (the agency responsible for leading the nationalization effort), to come to Chile to plan and implement cybernetic socialism (Medina, 2014). Flores was influenced by the circulation of early manuscripts of Beer’s book *Brain of the firm* (1981 [1972]), which became the blueprint for Project Cybersyn. Flores asked Beer for advice on applying and implementing cybernetics to the Chilean economy’s overall management, which was quickly changing due to Allende’s wide nationalization policy (Larraín & Meller, 1991). By mid-1972, the Allende administration had nationalized many industries and took *de facto* control of many medium to large companies (Zammit, 1973). Hence, its crucial challenge was to manage them effectively (Medina, 2014). From the get-go, the cybernetic theory was embedded into a pre-existing institutional framework under the direction of Allende, Flores and the CORFO, where it was made to serve the ends of Chilean industrial socialist policy (Medina, 2006).

According to Flores, the Allende administration was ‘now in a position from which it is possible to implement, on a national scale – at which cybernetic thinking becomes a necessity – scientific views on management and organization’ (quoted in Beer, 1981 [1972], p. 247). This passage underlines the high modernist and optimistic tone of the project. Beer eagerly took up the socialist cause by becoming the chief designer of the cyber-socialist experiment under Allende. This project was named ‘Project Cybersyn’, highlighting its ambition to marry cybernetic theory with political and economic management.

Its mission was to offer a vibrant and efficient socialist alternative to both the market economy and the bureaucratic ossification, economic inefficiencies and hyper-concentration of power of existing Communist states, most notably the Soviet Union (Medina, 2006). Nevertheless, Allende (1973), as a committed Marxist, still believed in a serious form of rational and scientific planning: 'We are and always shall be in favour of a centralised economy, and companies will have to conform to the Government's planning' (quoted in Debray, 2023 [1971], p. 111). Cybersyn was then designed as a partially decentralized network with a single point of convergence and arrival (see details below), designed to capture and transform all the information gathered throughout the network into the hands of the central government. However, at the same time, Allende 'wished to be satisfied that [Project Cybersyn] would be decentralizing, worker-participative, and anti-bureaucratic' (Beer, 1981 [1972], p. 257). Both Allende and Beer considered this decentralizing drive 'fundamental to [their] work' (Beer, 1981 [1972], p. 257).

Reconciling these two conflicting goals was challenging given the technocratic and 'command and control' approach under which cybernetic theory and practices developed (Gerovitch, 2004). In addition, since Project Cybersyn was forced to operate in the entrenched technocratic, top-down milieu of Chile, despite his genuine 'loathing for technocracy', in practice, it can be argued that 'Beer failed to definitely separate himself from the technocrats he criticized' (Medina, 2014, p. 200). For instance, the political and economic centralization and tensions inside Allende's socialist project were exemplified by the explosion in the number of state-controlled enterprises under the direction of CORFO and the crucial role played by the central government in attempting to influence the press, the radio, syndicates and other aspects of civil society (Larraín & Meller, 1991; Winn, 1989; Zammit, 1973). These centralizing developments occurred parallel to other democratic socialist efforts to decentralize power to workers and workplaces. If we conceive cybernetics as the science of efficient system control, and if we take seriously Allende's Marxist vision for a rationally planned economy (Allende, 1973), then this raises doubts as to how these two visions could become compatible with a democratic and decentralized system of governance. Nevertheless, this was precisely one of the main objectives of Cybersyn (Medina, 2014). This was also Allende and Beer's vision of using cybernetics to reconcile socialist rational planning with a more democratic organization of the economy.

2.1. *Cybersyn's five systems and its vertical structure of control*

Based on the five layers of Beer's (1981 [1972]) viable system model (VSM), Cybersyn consisted of five layered 'sistemas' (systems), organized in a vertical form of decision-making and divided into four sub-projects: (1) the telex-network (Cybernet), (2) the statistical software (Cyberstride), (3) the economic simulator (CHECO) and a fourth component, (4) the Operations Room

(Opsroom); all of them under the final control of the fifth level (5) the 'Presidencia' (the Presidency of Chile). Cybersyn was developed inside CORFO as the scientific and planning part of an extensive nationalization process of the Chilean industry (Ganon, 2022). The project was designed to guide and 'regulate the growing social property area and manage the transition of Chile's economy from capitalism to socialism' (Medina, 2006, p. 571). In Beer's vision, Cybersyn's mission was to become a technologically advanced and institutionally integrated VSM model at the intersection between politics, economics and technology: a cybernetic communication and control system with five levels of governance, under which all (state-managed or state-controlled) Chilean businesses were to be integrated into a single, high-speed telex-based information network.

The first part of the system ('system 1'), which acted as its informational (epistemic) base, was a country-wide network called Cybernet, which was supposed to carry data to the central government in Santiago to aid in the management of the economy. All the information gathered throughout the network daily was later concentrated, depurated and processed in Santiago and later communicated to the President and his administrative staff for them to act upon (Medina, 2014). The goal of Cybersyn was to 'network every firm in the expanding nationalized sector of the economy to a central computer in Santiago, enabling the government to grasp the status of production quickly and respond' (Medina, 2006, p. 572). Indeed, based on the hierarchical structure of Cybersyn (see Figure 1), one could argue that this system was more a structure for *industrial surveillance* and productive top-down control rather than a dynamic network of decentralized coordination and democratic adjustments. In essence, Allende's attempt to monitor and manage the Chilean economy to improve its production capacity and stimulate growth was a crucial aspect of his overall socio-economic project, which sought to implement all-encompassing and radical alterations to its structure (Allende, 1973). Cybersyn was conceived to gain fast control and management of the growing nationalized industrial sector of the Chilean economy, hoping to promote economic growth and efficiency that would later translate into political support for Allende.

The second part of the system was a computer software called Cyberstride ('system 2'). In real-time (or something approximating it), it was designed to collect and process the statistical data collected via the Cybernet to monitor, chart and control the economy down to the level of individual businesses' fluctuating inputs and outputs. To the extent that firms and workers operate *within* average default values (within the parameters defined by the Cybernetic 'homeostasis' or equilibrium state), the system mostly managed itself without the need for the upper levels of management to intervene. However, as soon as 'a particular variable fell outside the default values set by the computers [and the technocrats], the Cyberstride system sent a warning signal, which Beer called an 'algedonic signal', to the higher levels of government to act upon it (Medina, 2006, p. 588).

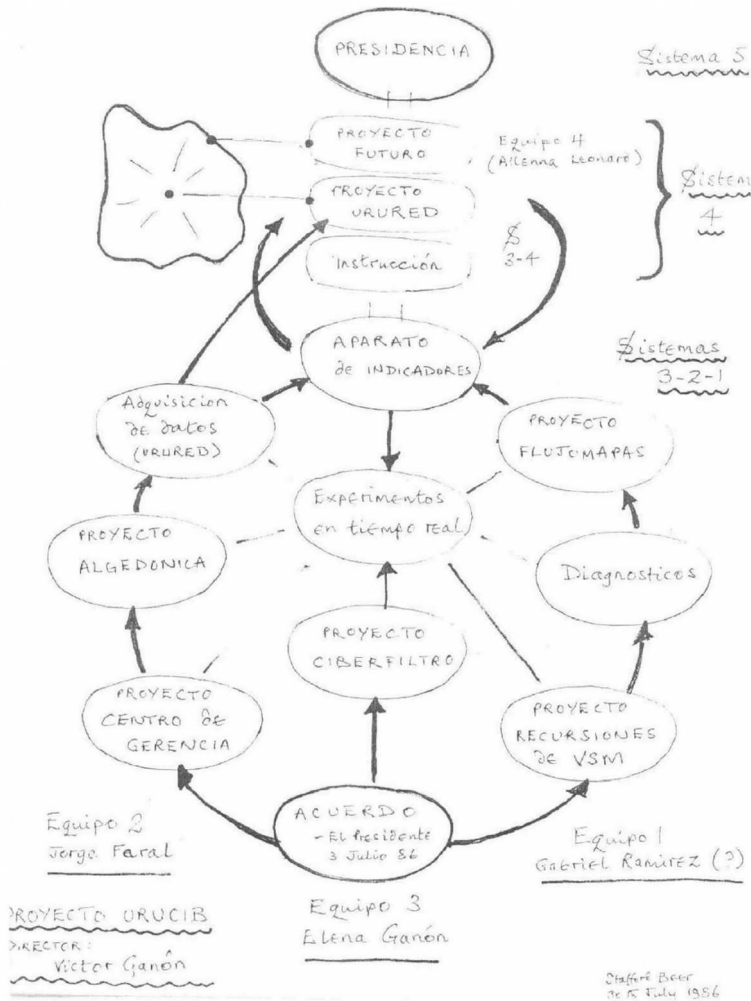


Figure 1 Diagram of cybernetic governance drawn by Stafford Beer
Source: Ganon (2022)

One key function of this signal was to allow the upper levels of government to intervene in a critical or anomalous situation, guiding the system toward the established goals defined by the engineers (Espejo, 2014).³ Such an adaptive mix of multi-level control, combining a decentralized decision-making process with the steering of complex information flows from the top, matched the vision of an optimal system in Beer's cybernetic models and underscored its central tension between freedom and top-down planning (Medina, 2006).

The third level, CHECO ('system 3'), was a computer programme that projected the econometric data collected into the future to simulate, forecast and predict various economic scenarios and trends. The fourth level, the Ops-room (Operations room) ('system 4'), was the actual decision-making room or headquarters of the entire project in Santiago, a futuristic room that, at least in the prototype sketches, looked a lot like the deck of Star Trek Enterprise (Morozov, 2014). System 4, which laid on top of the entire network, was crucial in Beer's model since it 'provided the vital link ... between centralised or decentralised regulation. ... Securing this balance between individual freedom and centralised control proved vital when attempting to align the Cybersyn project with the political ideals promoted by the UP [Allende's] coalition' (Medina, 2006, p. 585).

A prototype of the Ops-room was built in 1972, but given its hierarchical design, 'the Operations Room failed to engage the right stakeholders. It was an instance of a technology-dominated agenda at the expense of enhancing the autonomy of enterprises' (Espejo, 2014, p. 89). Although the Cybersyn system was allegedly based on decentralized and democratic governance, ultimately, the decision-making power and the guidance of the whole system ('system 5') belonged to and resided with the President of the country. The 'correct' parameters defined in the VSM model to establish the system's 'homeostasis' or equilibrium state were defined and enforced by the President and the technocrats in charge of the programming (Morozov, 2014).⁴ Hence, given its hierarchical structure and tension between self-organization and control, 'Beer's design, as he claims, could serve both a socialist vision and a fascist command' (Lavanderos, 2022, p. 1279).

2.2. *Planning liberty through a cyber-socialist technocracy*

The hierarchical nature of Cybersyn can be encapsulated with the following anecdote: In one of the meetings with Allende, Beer designed a sketch of Cybersyn for the President to explain the five levels of decision-making. Beer started drawing the system from the lowest decision-making levels (systems 1, 2, 3) up until 'system 5', which resided within the 'Presidencia' (i.e. the President), as represented in Figure 1. 'Ah, at last, *el pueblo!*' exclaimed Salvador Allende when Beer showed him the design of the planned five-tiered Cybersyn system and its highest level of command: the President's Office (Medina, 2006, p. 573).

Did Allende confuse himself with the people? Allende's observation, far from being a simple indication of his megalomania, was an ideologically consistent interpretation of the role of the President within the cyber-socialist scheme. Indeed, Allende saw himself as a modernist and vanguardist Marxist (Allende, 1973; Clancey, 2017), acting as the chief representative and embodiment of the people's will (Medina, 2006, p. 573). Centralized political power and the 'command and control' of the economy in the hands of a socialist President,

insofar as this power emanated from the people, was (in his view) in the service of the popular power and the expression of the voice of the people (Allende, 1973). This allows for the interpretation by which Presidential power concentration simultaneously indicates a dispersal of the power (back) to the people, underscoring the tensions between liberty and central planning (Debray, 2023 [1971]).

This vision, in which the administrator of the socialist revolution takes the lead and allegedly encapsulates the will of the people by guiding them towards a socially desirable and unitary objective, is analogous to the philosophical vision under which cybernetics was founded: as ‘the art of steersmanship’ (Ashby, 1956); in which it is believed that we can design a cybernetic-human interface that receives and processes information to control and steer society – as a good helmsperson steers a ship. Tomás Kohn, one of the engineers of Project Cybersyn, described the modelling process as ‘fairly technocratic’ and ‘top-down’, as it did not include ‘speaking to the guy who was actually working on the mill or the spinning machine’ (quoted by Medina, 2014, p. 134).

In essence, Project Cybersyn had a technocratic flair that sidestepped *de facto* workers’ participation and economic freedom from below, generating a conflict between the project’s engineers and factory workers (Espejo, 2014). Beer acknowledged that the information-gathering and technocratic elements of Cybersyn could potentially become instruments of oppression. In his words, cyber-socialism could ‘result in an old system of government with some new tools ... For if the invention is dismantled, and the tools used are not the tools we made, they could become instruments of oppression’ (Beer, 1973).

Paradoxically then, Allende’s utopia sought to combine two conflictive ends: a strong central government based on the nationalization and state control of a significant portion of the economic system, alongside social freedom for the working classes and a dispersed governance based on the popular will (Winn, 2021). Nevertheless, Allende never unravelled the vital internal paradox inside his ‘democratic road to socialism’ (Medina, 2006): on the one hand, the socialist revolution was supposed to be attained through democratic and non-violent means (Allende, 1973) – thus respecting the rule of law – and, on the other hand, the confiscation of private property and the radical transformation of economic liberties were undertaken *ad hoc* by a strong central government, to bring a revolution from above using a ‘firm guiding hand’ against opposition and without much power-sharing or information-sharing with businesspeople or lower-level workers (Winn, 1989, p. 185). Ultimately, this contradiction never really resolved itself and became a crucial aspect in the demise of Project Cybersyn and the Chilean socialist project, as such tensions alienated fractions of the Chilean middle class and the Armed Forces (Zammit, 1973).

Although Cybersyn was only a part of Allende’s grand socialist project, it exemplifies ‘the struggle between centralisation and decentralisation that plagued Allende’s dream of democratic socialism’ (Medina, 2006, p. 575).

Indeed, ‘Cybersyn was intentionally designed to provide an instrumental embodiment of Chile’s socialist politics’, although it also highlighted its irresolvable tensions (Medina, 2006, p. 596). Relatedly, Peter Winn (2021, p. 17) argues that the demise of Allende’s socialist project can be partly explained by a deep tension between top-down planning and bottom-up autonomy; at the core, there ‘were tensions between two revolutions: the revolution from above of President Allende and the politicians; and the revolution from below of the residents, the peasants, and the workers’ (Winn, 2021, p. 17).

In section 3, we will show that Allende regime’s ‘command and control’ approach to ‘designing freedom’ (Beer, 1974), constrained by the boundaries and optimality parameters established by technocrats (Espejo, 2014), shares surprising similarities with the modernist attitudes that the Pinochet dictatorship held about the capacity of a top-down technocracy to expand economic liberty within tightly drawn political constraints and in the service of performance goals established by neoliberal technocrats (Rumie, 2019).

2.3. *Designing freedom under Allende’s project*

Before turning to the Pinochet regime, let us recapitulate the purpose of our analysis: we aim to show how, in both the Allende and Pinochet experiments, the very conceptions of freedom that cybernetic theory preached were liable to be hijacked, instrumentalized and implemented for the scope of social engineering and the ‘steersmanship’ of society towards some desired goals defined by technocrats. This is what we mean by the *instrumentalization of liberty* under cybernetic principles: reducing freedom to an operational or engineering feature of complex systems, which constrains and legitimizes freedom for technocratically organized societies but also subjects it to top-down control, circumscribing it under programming parameters defined by scientists. This flattens out its emancipatory depth.

Allende’s cyber-socialist utopia underscores a crucial tension in the conception of freedom as conceived by Beer and hinted at by the Soviet engagement with cybernetics (Peters, 2017). For Beer (1971, 1974), cybernetic freedom entailed a controlled form of freedom or emancipation within optimization constraints. Thus, ‘designing freedom’ under cyber-socialism was not about absolute freedom or human spontaneity left to its whim, but rather, it was about giving power to cyberneticists to create systems and feedback rules that would later allow for bounded autonomy and self-regulation within defined constraints. In *Designing freedom*, Beer (1974) argues that cybernetics can be used to design systems that are both efficient and allow for some forms of autonomy since he wanted to guide freedom and self-organization to promote informational and economic efficiency. To Beer (1974, p. 44): ‘The freedom we embrace must yet be ‘in control’. That means that people must endorse the regulatory model at the heart of the viable system in which they partake’.

As suggested by Cybersyn and with Allende's anecdote (see previous sections), we can recognize that Salvador Allende also shared similar tensions in his thoughts about democratic socialism, freedom and economic planning. On the one hand, Allende (1973) wanted to promote democratic socialism and decentralization by expanding the economic and political participation of workers in industrial production and in transitioning towards socialism via democratic means; but, on the other hand, he also promoted a 'revolution from above' (Winn, 2021) under which he intensified the centralization of the economic order through state control, the nationalization of the economy, and by an industrialization plan implemented by the technocrats at CORFO (Larraín & Meller, 1991; Zammit, 1973).

Akin to Beer (1974), Allende's project also wanted to 'design freedom' through a planning and development programme from above by using the central government and CORFO to give a new form of freedom and participation for the Chilean workers in which their economic and political freedoms must have to be aligned with Allende's transformative industrial programme. According to Peter Winn (2021), Allende's socialist revolution

was a complex and choreographed strategy to be implemented by a revolution from above ... If we consider [the] ... major structural changes as a whole, we see that they were all promoted by the State. The *via chilena* was, in short, a revolution from above. (Winn, 2021, pp. 19, 21)

Under Allende's project, the five-system model justified the usefulness of circumscribed forms of decentralization (under state-control companies) and a hierarchical, multi-level system of authority and surveillance. Although the system was intended to facilitate self-management and the democratic participation of all levels of decision-making – including workers in factories – the relative ineffectiveness of the bottom-up communication pathways ensured that most decision-making power flowed from the top to the bottom. Under this project, workers, syndicates and local factories had some freedom to act independently and participate in the new economic order through production committees and worker assemblies (see Winn, 1989), but only insofar as they also moved and acted within the optimizing parameters (see the roles of the Operations Room and *La Presidencia*).

The free decisions made by local actors were treated *as inputs* in an environment that computes efficient solutions to diverse public management problems. In other words, Project Cybersyn constituted 'a technocratic approach to organization, inasmuch as it was an invention of technical experts' who barely talked to 'Chilean workers' (Pickering, 2010, p. 265). The amount of feedback from lower to higher levels was too limited to constitute actual worker participation, and critics rightly worried that 'such signals could also constitute a surveillance system' that strengthened the power of upper-level management (Pickering, 2010, p. 266).

Hence, the problem runs deeper: even if the integration of the industrial workers into Project Cybersyn had been fully implemented, this would have likely required a vast system of monitoring and discipline, contrary to the democratic and liberalizing ideals under which the project was founded. In the name of designing freedom, Beer inadvertently devised a system that increased visibility from the centre (top) to the periphery (bottom) but not the other way around (Espejo, 2014). There was negligible accountability, scant democratic contestation and limited feedback between the higher and lower levels. Project Cybersyn, whatever its utopian promise, contributed more to narrowing the horizon of emancipation for workers (Lavanderos, 2022) and enhanced the ‘top downing’ and ‘surveillance’ aspects of Allende’s utopia.

To conclude, the freedom to act and to participate in economic decision-making of the workers was circumscribed by cybernetic functions: the freedom to feed industrial data (informational inputs) to the computer network, read its signals and adapt to them, the liberty to correct one’s productive misbehaviour, and, in times of crisis, alert and gradually yield power to the higher levels. This kind of worker participation flattened the emancipatory aims of democratic socialism to something suspiciously similar to the disciplinary models and monitoring techniques of surveillance capitalism.

3. Hayek, Pinochet and the allure of undemocratic neoliberalism

The modernist dream of cyber-socialism in Chile ended in September 1973 when Allende was overthrown by Pinochet’s military *coup d’état*. Allende’s utopia was then replaced by a new, very different but equally ambitious modernist experiment: authoritarian neoliberalism, another large-scale form of ‘global planning’ (Góngora, 1981). Pinochet did not need socialist centralized planning, as the free market was to replace it – another modernist dream akin to the cybernetic one for ‘designing freedom’ (Beer, 1974). The Pinochet dictatorship (1973–1990) would implement numerous economic ‘market-based’ reforms under the leadership of the Chicago Boys. Consequently, Chile became one of the world’s first leading neoliberal experiments (Edwards, 2023).

Let us show how the Chicago Boys’ programme, without relying on explicit cybernetic language, offered a partly decentralized economic model suitable for technocratic appropriation. The Chicago Boys’ influential pamphlet, *El Ladrillo* (de Castro, 1992 [1973]), contained numerous market-friendly prescriptions inspired by the ideas of self-organization, feedback loops and spontaneous order. Its core message was encapsulated in its recommendation to

carry out an effective decentralization of the economic system ... , making the enormous, existing control systems unnecessary, and allowing the transfer of an important part of the responsibility in the production of goods and services

to independent and non-state units, which will boost the economy. (de Castro, 1992 [1973], p. 56)

Against inefficient, top-down ‘control systems’, the Chicago Boys insisted on decentralized market prices as a more efficient guiding system for the economy.

According to the Chicago Boys, the superiority of the market was measured against its capacity to meet key performance indicators: ‘In countries with a market economy, it has been possible to obtain high rates of growth while substantially increasing the community’s standard of living because there is a better use of productive resources’ (de Castro, 1992 [1973], p. 67). This promise made the free-market system attractive to pragmatic technocrats and planners looking for efficient means of running the economy on scientific grounds after the demise of Allende’s economic project (Paniagua, 2021, 2023a; Rumie, 2019). However, the goal of the neoliberal project was not to abolish planning and top-down guidance of the economy, nor to get rid of mechanisms of control (especially political ones), but to swap inefficient planning and control tools for more efficient ones (de Castro, 1992 [1973], p. 31). Thus, this second Chilean modernist dream was built on a close intellectual bridge between Chicago and Santiago (Edwards, 2023). Nonetheless, one cannot fully grasp Chile’s neoliberal project without understanding the ideas of one key Austrian economist: F.A. Hayek.

The connection between Hayek and Chile’s neoliberal experiment has three dimensions, showing how his cybernetic market conception can help us make sense of the regime (Cooper, 2008). First, Hayek exercised considerable, albeit indirect, influence on the regime. Hayek met with Pinochet in 1977 and advised him on the virtues of economic liberalism and the dangers of unlimited democracy (Caldwell & Montes, 2015). Beyond this meeting – and through both the Mont Pèlerin Society and other intellectuals in Chicago such as Milton Friedman – Hayek’s (1945, 2011 [1960]) cybernetic-like ideas about prices as mechanisms for knowledge exploitation, self-organizing markets and spontaneous orders influenced the way the Chilean neoliberal project unfolded (Caldwell, 2011; Van Horn & Mirowski, 2015). Hayek’s ideas concerning the nature of price signals and self-organizing orders influenced Milton Friedman, Aaron Director and the neoliberal thought collective (Slobodian, 2018). Thus, the ‘complex models of self-organization proposed by Friedrich Hayek’ that explicitly employed cybernetic language ‘have exercised the greatest influence on the political and social forms of neoliberalism’ (Cooper, 2008, p. 9).

Second, Hayek’s apologetics for the Pinochet regime (see section 3.2) offer a cybernetic justification for the expansion of economic freedom while also restricting democratic and political freedoms under a ‘liberal dictator’ that can impose a new order according to the principles of control and economic self-organization. Relatedly, two members of Pinochet’s Council of State – a body that revised and amended the Chilean Constitution from 1978 to 1980 – Carlos Cáceres and Pedro Ibáñez, both hosted Hayek during his visit in

1977 and were enthusiasts of Hayek's work (Caldwell & Montes, 2015). Both Cáceres and Ibáñez were members of the Mont Pèlerin Society, and they explicitly acknowledged the influence of Hayek's *The constitution of liberty* in their work during the constitutional drafting (Caldwell & Montes, 2015). These ideas and events parallel Beer's (1971, 1974) justifications for cybernetic freedom by crafting a rational balance between control and *selective* self-organization (see section 3.3).

Third, Hayek inspired and contributed to a network of think tanks and classical liberal groups, including the Mont Pèlerin Society and others, which had a durable influence in spreading the neoliberal movement among academics and businesspeople, especially in Chicago and Chile (Caldwell & Montes, 2015; Edwards, 2023). Hence, Hayek's vision of the market inspired many intellectuals such as Milton Friedman and other key economists in Chicago, such as George Stigler, which later influenced and even taught economics to the Chicago Boys (Caldwell, 2011; Edwards, 2023). For instance, Friedman (2002 [1962], p. 39), who visited Chile twice under Pinochet, fully shared Hayek's vision concerning 'the need to adapt to unforeseen circumstances', which was a crucial economic problem that was best solvable through a 'dispersal of [economic] power'. In other words, Beer's (1974) cybernetic adaptation problem had a surprising (alternative) market-based solution.

Finally, for the Chicago Boys, one of the key justifications of the market order was its ability to process complex information efficiently through 'the existence of freely determined prices due to competition', which register and transmit information about 'the relative scarcity of goods' (de Castro, 1992 [1973], p. 67). Although the Chicago Boys' argument makes no explicit mention of cybernetics, its language and vision are very close to Hayek's (1945, p. 524) cybernetic argument that the decentralized price system transmits dispersed information of 'circumstances of time and place' in a manner conducive to 'rapid adaptation' (Hayek, 1945, p. 524). In essence, the technocratic project of the Chicago Boys became just another facet of the broader modernist dream of attempting to design – from the top-down – a vibrant and modern society, but this time driven by the cybernetic-like properties of the free market while constraining other fundamental political and social liberties (Rumie, 2019).

3.1. *Hayek's cybernetic view of the market*

The story between Hayek and cybernetics is fascinating yet understudied (Lewis, 2016; Oliva, 2015). Oddly enough, Stafford Beer and F.A. Hayek knew each other, as they met during a cybernetic conference in 1960 (Morozov, 2014). Hayek then not only drew explicitly on cybernetic models and concepts (Oliva, 2015) but was also actively involved in the cybernetic community, attended its conferences and interacted with many of the key figures in the field, including Beer (Lewis, 2016). Another point of connection is that

Beer (1981 [1972], 1974) explicitly modelled his VSM, which was the basis for Project Cybersyn, on the human brain, which was also a key focus of Hayek's (1999 [1952]) book *The sensory order*.

Hayek saw parallels between how the brain adapts to (changes in) the environment and how the market system adapts to (changes in) the economy. In less than 10 years, Hayek published two books – one on political economy (*The road to serfdom*) and one on theoretical psychology (*The sensory order*). Both books have deep connections to cybernetics. Hayek's theory of the mind and the market resembles the cybernetic theory of the organization of systems reviewed in the previous sections, and this is not a coincidence since Hayek deliberately used the work of cybernetician Kenneth Craik and others such as Norbert Wiener, Warren McCulloch (who was Stafford Beer's mentor) and Ross Ashby, in addition to appropriating from cybernetics the notion of 'negative feedback' (Lewis, 2016).

Hayek often referred to cybernetics and its cognate sciences in his essays, especially from the 1960s onwards. In 1978, Hayek acknowledged that 'in the language of contemporary cybernetics, [the market's] feedback mechanism enables a self-regulating system to function. This is the same thing that Adam Smith noticed and called the "invisible hand"' (quoted in Oliva, 2015, p. 28). Like Beer (1974), the cybernetic notion of *negative feedback* was instrumental in Hayek developing his early theory of the mind and his idea of the market order (Lewis, 2016). A few similarities between Beer's Cybersyn model and Hayek's (2014) theory of the market are worth emphasizing. Three core concepts of cybernetics are *communication of information*, *negative feedback*, and *multiple levels of governance* (Wiener, 1948; Beer, 1981 [1972]; Ashby, 1956). We will briefly explore how these cybernetic features relate to Hayek's view of the market (Hayek, 2011 [1960]).

First, for Hayek (1945), money and prices are communication mechanisms for mobilizing information within the network (see also Paniagua, 2018). Money 'provides a communication mechanism through which we can translate our fragmentary and uncertain knowledge of people's preferences and abilities into a form that is socially useful' (Horwitz, 1992, p. 212). Hayek (1945) also describes the price system as 'a system of telecommunications' (p. 527) that tells market participants about scarcity. Price signals are instruments of communication and sources of rational control (Hayek, 2014; Paniagua, 2018). This communicational role of markets is analogous to what Beer envisioned for *Cybernet* reviewed earlier.

Second, price changes (i.e. economic loss and profits) allow *cybernetic feedback* to influence and guide human behaviour and the use of scarce resources through positive or negative feedback between the system and the parts (Hayek, 2014). The diminishing effect of high prices on market behaviour entails (marginal) reductions in the use of scarce resources in economically wasteful or costly behaviour. Hence, 'when a variable (market price or species' trait) deviates from its norm (natural price and fittest trait) in one direction, counteracting forces push this variable in the opposing direction, generating

a tendency of gravitation towards the norm. ... Smith's "invisible hand" was actually a "cybernetic hand" (Oliva, 2015, p. 26). This 'negative feedback' role of markets is like what Beer envisioned for *Cyberstride*, in which the data processing software would alert workers and managers about potential deviations in their performance and outputs.

Hence, Hayek's market order, like Allende's Cybersyn, is constantly monitoring, gathering and mobilizing the local data of the economy, albeit *without* a central planner or a unifying control room into which the information is collected (Hayek, 1945, 2014). The market's signals and feedback enable consumers and firms to adjust and exploit a wide range of local and distributed information to use resources, akin to what Beer (1981 [1972], 1974) envisioned for the interaction between the lower-level systems (systems 1–3) and the decision-making rooms (systems 4 and 5) in his cybernetic model (see Figure 1). Yet, the social coordination function of the price mechanism produces system-level control *without* a rational controller or Ops-room (Hayek, 2014). Consequently, 'one of the central institutions that allows social coordination – the price mechanism – would be described by Hayek as a cybernetic system' (Oliva, 2015, p. 36).

Importantly, Hayek (1945, 2014) states that the market produces system-level control and coordination of the economy without an explicit or tangible controller. In other words, the 'invisible hand' of the market was a 'cybernetic hand' based on decentralized feedback loops between agents, firms, capital and prices (Oliva, 2015). Unlike Beer's (1981 [1972]) cybernetics, Hayek's (2014) model does not possess a 'bureaucratic brain' or a political entity in charge of the daily tasks of monitoring activities and overseeing the informational loops of the system. Hence, despite their commonalities, there is also a difference between both projects' conceptualization of the market *vis-à-vis* the state's role and the types of feedback loops encouraged. In Cybersyn, cybernetic ideas were used to implement state-centred feedback loops in the form of 'state-bureaucracies-companies' informational channels, whereas, in the neo-liberal project, they were not directed at the state but at the market level through 'consumers-firms-capital' feedback loops insulated from politics (Paniagua, 2021, 2023a).

Third, on the level of the governance of the entire system, as Quinn Slobodian (2018, p. 224) argues, market liberals, including Hayek and Friedman, advocated a kind of 'cybernetic legalism, which saw individual humans as units within a self-regulating system for which the lawmaker had the primary responsibility of transforming the system's rules into binding legislation', designed to facilitate 'a world economy of signals – a vast space of information transmitted in prices and laws' (Slobodian, 2018, p. 224). Thus, the goal of the neoliberal technocrats, such as the Chicago Boys, was similar to Beer's (1971) vision of cybernetic control by promoting certain types of self-organization and feedback dynamics. They aimed to establish a legal framework and a governance system that would encourage the self-organizing properties of the market but safeguarded from political and democratic contestation (Rumie,

2019; de Castro, 1992 [1973]). This point about the control and design of the social system based on its governance structure is relevant to understanding the commonalities between Beer's and Hayek's utopias and how they could be appropriated by different ideological projects (see section 3.3).

In sum, Hayek's vision parallels that of Stafford Beer, despite the difference that one advocated socialism and the other advocated capitalism. Hayek's view of markets influenced the views of Milton Friedman and the Chicago School in conceptualizing the feedback role of markets (Caldwell, 2011; Van Horn & Mirowski, 2015), which later inspired the neoliberal Chilean project (de Castro, 1992 [1973]; Paniagua, 2021, 2023a).

3.2. *The technocratic allure of the 'liberal dictator'*

Hayek's relationship with Chile and Pinochet is as controversial as that of Friedman's (Caldwell & Montes, 2015). Hayek visited Chile twice: the first visit was in 1977 and the second in 1981. On his first trip, Hayek met with General Pinochet. During his second 1981 visit, he gave interviews published in *El Mercurio*, in which he discussed authoritarian regimes and the dangers of unlimited democracy:

a dictatorship may be a necessary system during a transitional period. Sometimes it is necessary for a country to have, for a time, some form of dictatorial power. ... I personally prefer a liberal dictator to a democratic government lacking liberalism. ... I refer to this dictatorial power ... [a]s a means for establishing a stable democracy and liberty, free of impurities. (quoted in Caldwell and Montes, 2015, pp. 298–299)

From the historical and archival evidence (see Farrant *et al.*, 2012; Farrant & McPhail, 2014), it is reasonable to conclude that Hayek considered the Pinochet regime as consistent with his view of the transitional 'liberal dictator' that could design freedom and be justified insofar as it leads to a liberal market-based society. Hayek claims: 'As you will understand, it is possible for a dictator to govern in a liberal way' (quoted in Farrant & McPhail, 2014, p. 341).

The Chilean affair illustrates, for the Chicago Boys and Hayek, the allure and dangers behind the 'Faustian bargain' between liberty and a 'liberal dictator' that can design a constrained form of freedom via the imposition of neoliberalism. As revealed from his interviews (see Caldwell & Montes, 2015), Hayek suggested that – at least instrumentally – both economic freedom and the market order were more important (to him) than civil liberties and human rights (Farrant & McPhail, 2014). As Hayek claimed while in Chile: 'I have not been able to find a single person even in much maligned Chile who did not agree that personal freedom was much greater under Pinochet than it had been under Allende' (quoted in Caldwell & Montes, 2015, p. 283). Thus, 'Hayek was willing to turn a blind eye to human rights abuses if those

abuses were committed in order to facilitate a long-term transition to a more liberal order' (Meadowcroft & Ruger, 2014, p. 359). A similar strategy was followed by the Chilean technocrats trained in Chicago, which gave birth to neo-liberalism in Chile (Edwards, 2023; Frank, 1976).

Analogous to Beer's cybernetic experiment, the Chilean neoliberal project would be born out of a Faustian bargain between a new (Chicago-trained) technocracy and a 'liberal dictator', under which Chile would embark on a second grand attempt at designing freedom from above (Góngora, 1981). In other words, 'the new policies were implemented by Pinochet as [optimal] equilibrium on the point of a bayonet' (Frank, 1976). For the Chicago Boys then, akin to Hayek, what was important was to use technocratic knowledge to advise the 'liberal dictator' as a means for establishing a stable and prosperous society based on economic liberty, even at the expense of other political liberties, and oblivious to the human rights abuses committed in the process (Edwards, 2023). For them, just like the engineers from Cybersyn, the legitimacy of decision-making came from expert knowledge rather than freedom of expression, contestation and democratic politics (Rumie, 2019).

Following Hayek's claims on the allure of a 'liberal dictator', the Chicago Boys

contributed to the justification of the antinomial relationship between economic freedom and the cancellation of political freedom during the military regime. In this sense, the [Pinochet] economic team justified the authoritarianism that allowed it to have freedom of action inspired by the neoliberal theoretical framework. (Rumie, 2019, p. 151)

In so doing, they demonstrated an authoritarian and technocratic attitude toward society. Consequently, both the cyber-socialist and the neoliberal utopias were experiments that saw liberty *as instrumental* to their own preferred technocratic-laden dreams. Both ascribed to a 'high modernist' vision of society under which a unitary plan (or utopia) is imposed upon society, disregarding 'the cries of the electorate or the laments of society's victims' (Scott, 1998, p. 112). Consequently, the post-Pinochet Chilean 'miracle ... had an original sin: it was put in place by a dictatorship, a regime that violated human rights and systematically persecuted, imprisoned, tortured, and assassinated its opponents' (Edwards, 2023, p. 2).

3.3. *Beer, Hayek and designing freedom under Pinochet*

Despite their many differences, Hayek and Beer conceived of governance in terms of 'variety engineering' (see Ashby, 1956), which is a form of designing freedom to guide self-organization at the lower levels to generate information that will later be useful to the system. The crucial tenet of this perspective is that the effective regulation and design of a complex system

(including a national economy) requires the partial and selective decentralization of decision-making power to lower-level units (individuals and organizations). Variety engineering seeks to devise a regulatory and governance system that can transform anarchic freedom into a guided and purposeful one (Beer, 1974). This is related to Hayek's (2011 [1960], 2014) idea of establishing a constitution of liberty or a system of meta-rules that will guide self-organization and the spontaneous forces of individuals toward something economically beneficial for society. In other words, like Ashby (1956), Beer and Hayek shared a vision of designing freedom through gathering knowledge via monitoring and control mechanisms and establishing rules for promoting certain types of self-organization and feedback loops to deal with complexity.

Beer's (1971) concept of 'the liberty machine' is relevant here since it shows the close relationship between Beer's conception of constrained freedom and Hayek's (1978, 2011 [1960]) plea – later implemented by the Chicago Boys – for creating a constitution of liberty through a 'liberal dictator'. This meant for Chile, in practice, the imposition of a *restricted liberal system* to steer society towards a narrow and constrained form of liberty, which expanded economic freedom and promoted a market-based social order while restricting democratic and political freedoms (Farrant *et al.*, 2012). Similarly, for Beer (1971, 1974), 'the liberty machine' is a framework for designing social orders that promote individual liberty but within the constraints of certain desired rules. This machine cultivates agents' freedom under the direction of rules to manage and mitigate the impact of variety at the lower levels (Beer, 1971). The free choices of rule-following agents generate adaptive pathways of information flows, feedback, behavioural adjustment and multi-level control mechanisms. This enables efficient information management in an economy conceived as a complex system – a vision shared by both Beer and Hayek (see also Paniagua, 2023b).

Like Hayek (1978) when he visited Chile, Beer (1974) advocated for decentralized control by empowering lower levels to make economic decisions and adapt to local conditions. Yet, his view was still based on 'freedom under control': he believed that true freedom comes from having a well-designed system that provides constraints and monitoring and informational mechanisms for individuals to operate effectively. Beer's (1981 [1972]) VSM model was his framework for balancing freedom and control; for Hayek (2011 [1960]), it was a 'safeguarded' constitution of liberty that will control a 'stable democracy ... free of impurities' (quoted in Caldwell & Montes, 2015, p. 299). Both visions harness freedom in the service of control and system-level coordination. Whether in the service of capitalism or socialism, they facilitated the use of knowledge to increase efficiency.

Hayek's and Beer's cybernetic-laden ideas of liberty highlight a deep ambiguity between freedom and control or decentralization and centralization. Since variety engineering requires both *variety-amplifiers* (freedom-enhancers) and *variety-attenuators* (freedom-restrictors), such a 'liberty machine'

is precariously poised between the double threats of constrained freedom and excessive authority. The justification of freedom as a tool of control for knowledge utilization and efficiency made the cybernetic ideas of Beer and Hayek resonate with and become suitable for abuse and manipulation by the projects of Allende and Pinochet. In a technocratic regime, the liberty machine is implemented from the top down by a strong authority for whom the threat of excessive freedom from the lower levels (i.e. increased variety) becomes very important, whereas the danger of excessive authority becomes, at best, secondary. Both Beer and Hayek, in different ways, contributed to the twin experiments in technocracy since their overlapping conceptions of freedom lacked immunity to certain levels of authoritarian or technocratic manipulation.

Under Pinochet's neoliberal project, designing freedom meant a radical desire to use the state's coercive power to promote an economic counterrevolution from above by expanding economic freedoms alone. Echoing Beer (1971), the goal for the Chicago Boys was to design and impose a new social machinery that would promote the criteria of economic efficiency across society through better use of knowledge by expanding the free market and by ensuring that it will be isolated from politics (de Castro, 1992 [1973]). Individual freedom and decentralization were promoted only within the realms of economic decision-making, disregarding – and even deliberately eliminating – other freedoms (Rumie, 2019). The neoliberal project circumscribed citizens' freedom mostly to the marketplace while reducing other liberties such as political freedom, democratic participation, freedom of expressing dissent and the reduction of the public sphere through strict limits on civil society (Farrant & McPhail, 2014).

Within this context, Hayek (1978) also saw political participation and democracy as secondary to the more urgent task of instilling in people a faithful adherence to the abstract rules of the market economy. This left Hayek in the 'uncomfortable position that individual freedom is only to be enforced, and individuals are only to be allowed to participate in collective decision-making if it can be demonstrated that socially beneficial outcomes follow' (Meadowcroft & Ruger, 2014, p. 361). This entails a narrowing of liberty, stripped of its link to democratic self-governance, political pluralism and civil liberties.

To summarize, we have seen how the cybernetic vision of society oscillates between emancipation and social engineering. Both projects had contrasting ideological goals and differences in what they meant by designing freedom. Yet, they both shared the modernist and cyberneticist attitudes of steering society by imposing a global plan. The grand vision of cybernetics, stripped of its utopian promise, became instrumentally co-opted by national planning goals. The discourse of freedom became enmeshed with justifications of power. In both cases, cybernetic ideals became the Trojan horse through which hierarchical forms of technocracies could reassert themselves.

4. Concluding remarks

Chile has commemorated 50 years since Pinochet's *coup d'état* and how his neo-liberal project violently replaced Allende's socialist and cybernetic utopia. Rivers of ink from left and right have been poured into assessing and criticizing both projects. However, few intellectuals have reflected on the underlying modernist principles and economic attitudes that paradoxically bind these two projects. This has been the novel focus of this paper. We have shown how the regimes of Allende and Pinochet were attracted by new scientific and technocratic visions of management that challenged the vision of rigid central planning in favour of a more decentralized and cybernetic vision of 'designed freedom'. Their technocratic hired hands – including the Chicago Boys and Beer – recommended functionally similar (although ideologically different) forms of controlled decentralization and top-down guidance to improve performance and economic efficiency.

Our analysis provides evidence and a novel framework for studying both projects' counter-intuitive commonalities, also supporting Mario Góngora's (1981, p. 136) conjecture that both experiments could be seen as twin forms of top-down design and 'global planning'. As far as we know, this is the first paper providing evidence supporting this conjecture by exploring their cybernetic commonalities. Both Allende's road to socialism and the Pinochet regime wanted to strategically decentralize some limited facets of power and autonomy down to lower-level actors, but only to the extent that this was deemed advisable based on their ideologies. This reveals paradoxical continuities in the political economy of statecraft in Chile, centring on freedom as an increasingly important yet strategically restricted operative social concept.

Cybernetics made liberty respectable for technocratic managers attracted to its promise as an efficient tool of decentralized control, but this in turn made liberty subservient to power. Our paper thus contributes to the broader literature exploring the tension between the emancipatory promise and disciplinary reality of cybernetic management and AI (Gerovitch, 2004; Pasquinelli, 2023; Wiener, 1950). The Chilean case also underscores a longstanding temptation in technocracies to instrumentalize human freedom and agency in the service of economic efficiency and national planning goals. The warnings highlighted in this paper should inform debates about the future of liberal democracy in the era of Big Data, AI and surveillance capitalism.

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raised relevant concerns that significantly improved the quality and argumentation of this paper.

Notes

1 There are important ethical and ideological discontinuities between the two regimes, as well. For instance, whereas there were instances of suppression of dissent and economic coercion under Allende (Zammit, 1973), these paled in comparison to the human atrocities committed by the dictatorship. The Pinochet regime systematically tortured and murdered thousands of citizens. These two experiments are different under moral, ethical and human rights considerations, presenting clear discontinuities (Winn, 2021).

2 'Designing freedom' means that scientists should be free to design and impose specific parameters and feedback mechanisms upon society to steer it towards specific functions (Beer, 1971, 1974). For Beer (1974) – and Hayek ([1960] 2011), the goal was not to eliminate constraints but to *design efficient constraints strategically* to facilitate spheres of freedom that are conducive to adaptive behaviour that is congruent with the system's purpose crafted by the designers.

3 The parameters that guided the 'homeostasis' process were unilaterally decided by the technocrats involved: 'The chosen variables to monitor in real-time were less the outcome of autonomous conversations of operational units at different levels of recursion and more the outcome of global policies' (Espejo, 2014, p. 90).

4 As acknowledged by the operational director of the project Raul Espejo (2014, p. 87): 'Cybersyn ... used hierarchies emerging from political processes. These were power hierarchies and relationships between levels driven by politics. ... the natural orientation of communication is vertical, that is, hierarchical'.

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