Diego Gómez-Venegas
Frictional Computing

Özgün Eylül İşcen: Given your work that historically and critically reflects on cybernetic thinking at its edges, or better put, in frictions through either media archaeological inquiries or epistemological shifts beyond North America and Western Europe-centered frameworks, how would you describe frictional computing?

Diego Gómez-Venegas: I would like to begin by stressing that by computing here I mean an open and collective technological practice for data processing that involves the operational participation of multiple times, scales, layers, individuals, and agencies. That is, an understanding of computing that goes beyond the purely technical notion of digital data processing performed with and by hardware. I am sure that the readers of the Counter-N project are already familiar with this broader understanding, but I think that it is important to reiterate it as a conceptual starting point for this conversation. In this sense, frictional computing refers to, say, the *tractions* between two or more actors involved in this computational process. I use the term tractions here (it could also be abrasions, or others) to emphasize the positive, or at least not necessarily negative, meaning of frictions, as opposed to the more contentious connotations of the word, such as in collisions, disputes, discords, and so on. This is not to avoid the conflict. On the contrary, it is a conceptual strategy to emphasize the fact that the very nature of frictions does not lead to destruction, but to the emergence of something new that has been generated as a product of the traction between two or more forces.

This may seem a bit contradictory, but I also argue that the best way to start recognizing the frictional nature of computing is to go back to the operational relations between hardware and software in actual computing machines. This is a lesson learned from German media archaeology and Wolfgang Ernst's approach to it, the more recent version of which has been presented through his notion of *technológos*.[1] This move will show that the question of frictions is not just a figure of speech or a hermeneutic reading of the scope of computing, but an inherent component of its operational structure. On the one hand, the mathematical formulations on which the functions and instructions of a program are based must be transformed into binary code in order to be compatible with the realm of hardware. On the other hand, this binary code must be transformed into electrical signals in order to activate the transfer of data and the actual calculation that takes place on the deep materiality of memory modules and processors. Each of these

transformations entails frictions. On the side of software, it involves the symbolic friction between the formal structure of decimal and binary mathematics. On the side of hardware, it implies the natural physical resistance between electric waves and conducting and non-conducting materials. These series of frictions, operating at the millisecond level, have been brought together to produce an output; to create from the frictions.

Moving the analysis up a few layers, it is possible to see how this frictional computing also takes place in the ways we human individuals relate to contemporary technologies. The data required for the computational process outlined above is nothing more than the transformation of our bodily actions into weighted values; an instance of frictions between applied human energy and techniques of quantification. In an attempt to develop a media archaeology and genealogy of this later order of frictions, I've studied how the transformation of labor into data was unfolded in the factories of 1970s Chile. This is relevant because, in contrast to the common understanding of data economies, which operate in most contemporary societies as a central component of the automation of capitalism, this frictional computing was deployed in 1970s Chile as a way to promote a cybernetic type of socialism.

In other words, frictional computing describes the technological operations that can unleash the potential that lies between seemingly opposing forces or agencies. Of course, such a potential can be used to further very different ends, as in the case of capitalism and socialism. That's why, I think, an experimental approach to frictional computing is so important. We really need to understand the minute operations of these technological frictions in order to be able to redirect their potential.

But perhaps in a still metaphorical sense, frictional computing could also describe an approach to research that goes against the grain of normative narratives and their boundaries; namely, that technological progress is a West-driven enterprise, and that the territories beyond this circle have only been subject to such a trajectory. Without disregarding the importance and impact of these historical vectors, this frictional computing could (re)activate overlooked technological trajectories whose point of departure lies beyond the West, and not necessarily in the equally hegemonic notion of the East (the former USSR and today's China). Accordingly, these alternative trajectories would encounter West-driven (or rather East-driven) technological progress, describing new instances of frictions; instances that could also be thought of as feedback loops, insofar as they lead to new improved outputs.

Özgün Eylül İşcen: Thank you, Diego, for this expansive overview of the concept of friction. It is a concept that has been very productive for me while theorizing the geopolitical aesthetic of computation in the context of the Middle East. So, it excites me to hear about your historically and conceptually elaborated take on it. I share your commitment to opening up alternative trajectories of computation by reflecting on its historicity, which is to say, its situatedness, like your reflections on its socialist possibilities as actualized in the case of Chile in the 1970s. And I know that you also dive into the nuances of this historical case that many often reduce to an anecdote in the dominant narratives of media history.

I will continue with a follow-up question about how you conceive of cybernetic thinking through these conceptual and historical interventions, which I imagine have implications for assessing today's media landscapes and their possible futures. For instance, your recent edited volume with an intriguing title *Frictions: Inquiries into Cybernetic Thinking and Its Attempts towards Mate[real]ization* (2023) addresses these different scales and temporalities underlying cybernetic thinking (its verb rather than noun form has caught my attention, as we also prioritize via Counter-N), thereby contesting the inevitability of the dominant framings of technical rationality and motivating alternative narratives/models for that.

Thus, the idea of friction is not only a matter of technical failures of the machine (which could be associated more with the term glitch) that expose/reveal its underlying structures, but more about reconfiguring frictions as operative to the machinic functions that can only operate transindividually – which is to say, constituting their systemic as well as contingent qualities in their entanglements across material and epistemological worlds. From this perspective, I am curious to hear how your approach to this edited volume intervenes into some existing research fields, such as media archaeology (and Wolfgang Ernst, one of the pioneers of this field, writing in the book about its radical model/implementation), or research methods, like bringing the past/archive into the picture while reflecting on their very legacy, such as in the case of Cybersyn, the historical example from Chile that you discuss.

Diego Gómez-Venegas: I have come to the conclusion that we should understand cybernetic thinking as an epochal rationale. That's why I insist on using the term cybernetic thinking instead of cybernetics alone. This conclusion is inspired by aspects of Gilbert Simondon's philosophy of technology. For example, he spoke of "encyclopedism" to describe the rationale behind a period of technical development in Europe that runs roughly from the late Renaissance to the early 19th century. Simondon argues that the appearance of Diderot and D'Alembert's *Encyclopédie* in the middle of this period is the clearest

and most concrete manifestation of such a rationale, but that its effects can be seen before and after the appearance of this treatise.[2] I argue that something similar applies to cybernetic thinking, but on a transcontinental scale. You have the emergence and development of cybernetics between the 1930s and 1970s as the most concrete manifestation of a rationale (an episteme, if you prefer), but its effects can be found as far back as in the second half of the 19th century and certainly in our own time (with automation and generative AI, for example).

In my view, our book *Frictions* is instrumental in advancing this conclusion. The book was triggered by a lecture series I organized in late 2019 and early 2020, just before the pandemic. Called Applied Cybernetics, this event sought to discuss why the application of cybernetic principles tended to fail in the 20th century. This question arose in conversations with Wolfgang Ernst, who suggests that technology was simply not ready to implement the formulations of cybernetics at the time. Some of these failures are discussed in our book Frictions. Projects whose implementation was thwarted by the tensions between their original theoretical goals, the infrastructure and technology available at the time (e.g., computing power), and the socio-political reality. But I was also interested in discussing the possibility that cybernetics was the effect of an underlying episteme, in Foucault's sense. I then thought that a collective discussion of all these questions might lead to a recognition of whether the advent of this episteme was in a process of collision, or negotiation, if you will, with the material conditions of possibility of the time. This is how the notion of frictions emerged in this context.

Here I would like to acknowledge Anna Tsing's work on this particular topic. It's a bit embarrassing, but I only learned about it recently. My friend Dusan Cotoras took me to a social sciences conference here in Berlin last February, where Anna Tsing's book *Friction* was mentioned a couple of times.[3] I guess I was a victim of my own field's biases, although I of course was familiar with Tsing's book *The Mushroom at the End of the World*.[4] The conceptual description of frictional computing that I attempt to develop in this conversation certainly echoes Tsing's work, especially when she says that "cultural diversity brings a creative friction to global connections."[5] But while her approach remains discursive and ethnographic, I propose to extend it decisively into the realm of non-discursive practices, and even into what underlies it all; into the domain of the episteme, where the epochal rationale I mentioned earlier is generated. That's why it is so important to assess the validity of this frictional computing through actual and material case studies. Only then is it possible to witness the diversity of individualities (not only cultural and discursive diversity) that have shaped and continue to shape these frictions, in the plural. Our book *Frictions* wants to be part of this kind of

endeavor, understanding the age of cybernetics as a particularly rich field for finding such case studies.[6]

In this sense, I don't think that the approach our book seeks to outline, or my work in particular, contests the frameworks of West-driven technical rationality in a directly antagonistic way, that is, by reclaiming the centrality of the human subject, and thus the plane of discourse and the social. It seeks to contest it, of course, but in a lateral, if not circular way; as a judo throw, if you will. On the one hand, this implies that the idea of frictional computing we are discussing here entails a transindividuation, a notion also taken from Simondon's philosophy.[7] This means that a number of individuals, organic and inorganic, become bound together in this process of frictional computing; that they and their often conflicting agencies produce a collective whole.

Without having the time and space to discuss it in detail here, this is how you can understand Project Cybersyn through the prism of frictional computing; as a transindividual collective whole. For those unfamiliar with the case, it was a telecommunications and computing system designed to manage the industrial economy of Chile according to the principles of cybernetics. It was commissioned by the socialist government of Salvador Allende in 1971 as part of his reformist program and ran until September 1973, when a military coup overthrew Allende's government and ended the Chilean experiment with socialism. What is interesting about this project is that a series of human-machine couplings signal a synergy that, as it reshaped the organization of the factories and their administrative apparatus, gave way to the becoming of a technological whole. You can see this by studying how the data for these processes were produced, circulated, and processed. Considering that Simondon spoke of technical individuals and Ernst proposes the notion of the agency of the machine, the possibility of this technological transindividual whole in 1970s Chile becomes even more interesting.

In this context, one can imagine the frictions between the agency of the machine operators in the factories, the historical agency of industrial capitalism embedded in the electromechanical machines and in the factories in general, but also the theoretical premises of cybernetics deployed through techniques that sought to quantify the relations between operators, machines, the factories, and groups of factories. Even more, we have the political discourse of Chilean socialism in the 1970s (which was Marxist and Leninist, but also deeply democratic) colliding with cybernetic thinking. All these frictions computed something that it is necessary to identify, characterize, and problematize. When I say computed here, I mean that it is this frictional computation that creates this collective whole. And if we accept this hybrid collectivity as a new kind of technological being,

we must also accept that we are only in the very early stages of understanding this phase of our history. There is a lot of work to be done to see where it all goes.

Methodologically, this means tracing the technological formation of knowledge (the production and transmission of data), the circulation of power (the reconfiguration of labor and its value), and ontological transformations (the becoming of a new collective whole). That is why my work draws on media archaeology, media genealogy, and media philosophy. But certainly, this also requires an investigation that challenges the historical narratives surrounding these traces. As I said earlier, the age of cybernetics is a rich field for finding cases to further assess the validity of the notion of frictional computing (and perhaps also other notions discussed in the Counter-N project), but at the same time this techno-scientific period is also narrow in comparison to the scope of cybernetic thinking. That is why a broad and critical process of historicization is necessary. The methods developed by media and cultural history offer an important starting point. Our book *Frictions* and some of the contributions to this volume are good examples of this approach. At the same time, however, the frictional approach invites us to counter classical processes of historicization. I think that a lot of experimental playfulness or tinkering is needed here. The inherent materiality of this frictional context demands it. In my case, this comes naturally to my practice because of my background in media arts – I really believe that the media arts are a mode of inquiry into media cultures. Shintaro Miyazaki calls for it as a way of playful collectivism or commonism.[8] Ernst understands it as a search for the agency of the machine.[9] All this contributes, even if it seems contradictory at first.

Özgün Eylül İşcen: I strongly agree that media arts become a mode of inquiry into media cultures by partaking in an unfolding milieu in ways that enact alternative transindividuations. I had a period in which I sought to overcome technodeterministic conceptions of technology through Simondon (and the growing literature on his work). Then, I ended up with Fredric Jameson’s geopolitical aesthetic (probably because I was at Duke University, where you could closely encounter both canons) that also addresses the inherent contradictions of computational capital (as Jonathan Beller coins the term) or any totalizing system, including cultural critique itself, that underlie what we call frictions here. The geopolitical aesthetic helps me to tackle “frictions” as they cut across local and global scales, economic and cultural realms, or psychic and social levels – which ultimately make technology/culture a problem of mediation.

Moreover, your reflection on transindividuation resonates with Katherine Hayles’ latest works on human-technical (cognitive) assemblages that highlight the contingent and performative nature of

networked and automated systems cutting across biological and technical cognizers. They build up milieux in Simondon's sense. Hayles incorporates affects and nonconscious, or what you would call nondiscursive, processes into the registers of cognition/computation without establishing them as the ultimate end for politics or the optimum site of emancipation itself. The question has ultimately become how power is exercised, transformed, and distributed, and yet, it never operates without frictions.

I like Hayles' response (among many others) that questions the overemphasis on the agency of technical or material forces, celebrated by some scholarly endeavors such as new materialism, and which sometimes overlooks political responsibility/accountability. I can see how machine agency or playfulness may play a crucial role in utilizing the inherent frictions of these techno-social systems. Nonetheless, don't we need organized collective efforts to intervene in these socio-economic systems that are political as much as they are technical? Where do you locate your framework within these inherent tensions?

Diego Gómez-Venegas: If you allow me, Eylül, I would like to answer this question by referring to a small collaborative process I developed with my friends and long-time collaborators Joaquín Zerené and Dusan Cotoras. Like many people, we used this long quarantine and home office period from 2020 to 2022 to work on a series of ideas that had been going on for a while in our conversations. At the heart of these conversations were precisely the tensions between overlooking political accountability, as the critique of new materialism has it, and giving agency to technological systems and other non-human individuals. I am well aware that this critique also applies to Wolfgang Ernst's agency of the machine and, by extension, to the Berlin School of Media Studies of which I somehow feel a part.

Joaquín, Dusan, and I were wondering about the recent political process in Chile and the role of human and non-human agencies in this context. In October 2019, Chile experienced a social uprising that peaked on a night when dozens of subway stations, buses, and private buildings were set on fire. Hordes of people had been protesting increasingly for days, but that night things really got chaotic on the streets of Santiago. The political class was not only confused, but shocked. The scenario seemed so anomalous to them that the Chilean congress, after decades of blockade by conservative parliamentarians, decided to open a process to change the neoliberal constitution imposed by the dictatorship in the early 1980s, since the ever-increasing protests had put this at the center of their demands. In other words, a sudden, extreme level of chaos turned the political status quo on its head. This was November 2019.

In the months that followed, the political class also decided to find out who had set Santiago on fire. The most ridiculous theories were floated: insurgent Indigenous groups from the south of the country, paramilitary factions from Colombia, and infiltrated intelligence agents from Venezuela and Cuba. Perhaps the most reasonable: local anarchist groups. However, the news reports from the night of the uprising showed that among those surrounding the fires were lay people: housewives, teenagers, children, and elderly people. The authorities tried everything. They even hired a self-proclaimed expert in electronic warfare, whose report, later leaked to the press, named stand-up comedians and K-pop groups among the suspects. It sounds like a joke, but it is not (or maybe it is). In short, they had no idea, and after all these years, they still don’t know who to blame.

Then, Joaquín, Dusan, and I came up with a hypothesis: these events seemed, and to some extent were, organic in the way they unfolded, but technological in the way they worked; a hybrid. It was a kind of spontaneous collective whole in which telecommunications infrastructure, mobile phones, as well as messenger and social network apps seemed to play a very relevant role in modulating and setting in motion a great deal of accumulated energy. A sudden episode of consciousness-raising, if you will, agglutinated and concretized by technological platforms.

Based on this hypothesis, we developed a series of small projects. First, we speculated on the existence of an oscillating flow of energy that drove the last 50 years of Chilean political history. A wave with ups and downs that connected experiences like Project Cybersyn with the social uprising of 2019, with the dictatorship in the middle. We wrote an experimental essay and even coded a micro piece of software to visualize this wave. We called it Chile’s M_Machine.[10] Similarly, we then wrote a theory-fiction essay for an exhibition organized by people at Goldsmiths,[11] and finally we published a more scholarly article in the journal *APRJA*.[12]

In all of these projects, the premise was that the process of consciousness-raising is both the driving force and the product of a technological collective whole. So, to your question, don’t we need organized collective efforts to intervene in these socio-economic systems that are political as much as they are technical? Absolutely. That’s exactly what I’m trying to say here. But I take this “as much as” to heart. That is, I argue that we cannot, on the one hand, call for the embrace of the cyborg and, on the other hand, reclaim the old sovereignty of the subject. And I think that much of the criticism of posthumanist perspectives has to do with this reclamation. It is true that we urgently need to expand the spaces of subjectification. But with the humanist scope of the word subjectification in mind, I also think that we urgently need a better framework and vocabulary for

thinking about processes like subjectification, but for collective and hybrid contexts. In other words, I am convinced that our present and future require techno-political strategies of emancipation that transcend the polarity drawn between technology (or machines) and human subjects. The general intention behind my work, behind the speculative process above and the book *Frictions*, is to contribute to such strategies.

Özgün Eylül İşcen: Your position resonates with mine, as I share a similar background in media theory while working on the geopolitical context located beyond (but always historically entangled with) that of North America and West Europe. We are also currently based in Berlin, where one can strongly feel the legacy of the German media theory. I wonder about the development of theoretical work on resonating themes while situated across different histories and localities. What about some encounters, resources, and research journeys that impacted the trajectory of work?

Diego Gómez-Venegas: Thank you for mentioning this resonance, Eylül. In fact, just before I finished my MFA in California, I was accepted into a PhD program in North Carolina, at NCSU. I mention that because I know you were in that area, and so this kind of geographical coincidence helps me to sort of wave a network of relations out of this resonance. A latent network in this case, because in the end I decided not to go to North Carolina. I didn't think I was ready to do a PhD right after my master's, and perhaps more importantly, I felt that something was missing in the formulation of my research interests then. During my time in California, all my work was inspired by Project Cybersyn (it was a kind of obsession), and both my background and part of the community there pushed me to approach these interests from an aesthetic and discursive space where the subject was always the sovereign. However, the work of some members of that community seemed somewhat alien to that narrative, and that played an important role in implanting this sense of something missing in me. I'm thinking in particular of the work of the artist Casey Reas, whose work in generative art (like cellular automata) and more recently in generative AI (such as GANs) I find deeply machinic, even if he doesn't put it that way.[13] So I returned to Chile to try to understand this feeling better.

It took a few years. Marxist theory has a prominent place in the arts and humanities in Chile, and this tends to place most readings of our past and present from a point of view where the subject, again, is the absolute sovereign. That didn't help me in my search at the beginning, but it was certainly inspiring, and I found my way through. It's funny, because it was in this context that I returned to Friedrich Kittler, whose work was introduced to me in California by Erkki Huhtamo (I didn't know anything about German media theory before that). I remember

that we all found Kittler annoying and pretentious when Erkki made us read *Optical Media*.[14] Probably because we had just read Benjamin's *Illuminations* and thought that this was the only kind of theoretical thinking that you should get involved with in grad school. But in Chile I was able to break out of that stereotypical position, I guess, and my reencounter with Kittler was really fruitful. I broadened this search and eventually arrived at Ernst's, which allowed me to connect with Foucault's philosophy from his archaeological phase, and not just from the disciplinary and punitive perspective that, consistent with a certain Marxist view, is the dominant positioning of the philosopher's theoretical horizon in Chile.

At this point I must mention the work of Antoinette Rouvroy around the notion of algorithmic governmentality.[15] I think it was in 2016 when my friend Joaquín Zerené sent me the video of her talk at transmediale 2015, and around the same time the Chilean philosopher Zeto Bórquez introduced me to the Spanish translation of Rouvroy's seminal article with Thomas Berns on this subject, which Zeto published in his short-lived journal *Adenda Filosófica*. Rouvroy's approach blew me away. Her strategy of updating Foucault's governmentality – by pairing it with Deleuze and Guattari's notion of the rhizome and Simondon's disparateness to show that, at least in theory, computer technology and big data posed both a danger and an opportunity for political emancipation – began to put the pieces in place for me. This implied that there was an epistemological and axiological zone that was intrinsic to technology, and that its fate and scope didn't obey only the moral standards of those who implemented it.

The pandemic also had an important impact on pushing this repositioning forward. In my case, Donna Haraway's work was a great companion during this time. The *Manifesto for Cyborgs*, of course, but perhaps more importantly, her book *When Species Meet*.[16] Haraway's clear argument that in order to comprehensively assess the world we live in, we must overcome the centrality of the human and openly embrace our collective becoming with other species, also makes room for the agency of non-organic entities when reconnected to the *Manifesto for Cyborgs*.

Until then, Project Cybersyn had been studied and explained mostly from a socio-technical perspective. But this network I'm outlining here suggested that there might be aspects of this case that had been overlooked. More generally, it also implied that the theoretical notions of the machine and of the machinic deserved further assessment. That's why I finally decided to come to Berlin and study Project Cybersyn using the methods of German media theory. But since I remained connected to members of the arts and humanities community in Chile, and given the historical nature of the case I was studying, I also sought to link my work to alternative readings of Marxist ideas. Thus, together with my friends Joaquín and Dusan, I did, as mentioned above,

some projects around the work of Mark Fisher. Here in Berlin, I met Max Grünberg, and since then his developments in the field of historical materialism have become very important for my own work, especially his notion of algorithmic realism.[17] Similarly, Matteo Pasquinelli's discussion of Italian operaismo has been illuminating,[18] and more recently, his historical epistemology around the notions of the algorithmic and the division of labor has been simply fascinating.[19]

In sum, it is this drift that allows me to say now that we can understand Project Cybersyn as a concrete historical example of a potentially emancipatory, technological transindividual whole. Moreover, this also means that the question of the machine is in fact a field of existence that can be reorganized from an inside that includes us; a reorganization whose strategies can certainly be thought and implemented from the Global South. I'm convinced that this seemingly theoretical formulation has very concrete and hopeful correlations in our lives. Especially now, when everything seems so hopelessly oppressive.

Özgün Eylül İşcen: Could you please suggest further Counter-Ns (e.g., N-computing[s], N-futuring[s]) and share your thoughts on them?

Diego Gómez-Venegas: Transindividual computing and transindividual futuring. As I understand them, they are the two successive phases that follow frictional computing once a general stage of conscious technological collectivism has been reached.

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Diego Gómez-Venegas is a media researcher and media artist based in Berlin. He studies the history of cybernetics and its epistemology, with a focus on the techno-epistemological and techno-political conditions of such a period. Diego is also a PhD candidate (soon to be defended) in Media Studies at Humboldt-Universität zu Berlin. Under the supervision of Wolfgang Ernst and Hans-Christian von Herrmann, he developed a media-archaeo-genealogical study of Chile's Project Cybersyn, which is essentially archival research with aspects of art research understood as experimental epistemology. Diego is the editor of the book *Frictions: Inquiries into Cybernetic Thinking and Its Attempts towards Mate[real]ization*, published in 2023 by meson press (Lüneburg), author of the article "Forgetting / Cybernetics" for the journal *History of Media Studies*, co-author – with Cotoras and Zerené – of the theory-fiction essay "Towards the Operative Objects of Post-Capitalism," published in 2021 by the journal APRJA (Aarhus), among others.

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