

## **Critical Constructal Theory**

*Class as a Material Flow System Optimized for Capital Accumulation*

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Plowing through cold ocean waters on a spring evening in 1912, the RMS Titanic was a microcosm of Western Civilization. While the lower decks were cramped, dank and full of people who could barely afford passage, the upper decks were replete with all the opulent luxury money could buy. The separation of the classes was gatekept, literally, with steel grates confining poorer passengers to steerage. But, walking the upper decks and taking tea with the finest society ladies was a woman who herself had been born to a poor laborer family.

The woman who would become known to history as “The Unsinkable Molly Brown” was not raised with the etiquette, mannerisms, tastes and habits, or the social connections, which set the elite apart. And as people in her position often were, she was probably derided in whispers behind white-gloved hands as “New Money.” But for all the pearl-clutching, and despite her modest beginnings, Molly Brown had a First Class ticket and was among the upper deck passengers, for one reason – she could afford it. According to a discussion of the dining arrangements aboard the Titanic, “New money had to an extent created a democracy where if you could afford to travel in 1st, despite your humble origins, you could dine next to a duke” (Louden-Brown n.d.).

Molly’s example illustrates the shortcomings of current critical theory about how culture maintains class divisions. According to class theorists like Gramsci, Althusser, and Bourdieu, class is being reproduced culturally, through shared beliefs, social institutions, or embodied mannerisms, tastes, and attitudes. But as we can see in Molly’s case, the simple fact that she had money made all that irrelevant – with enough money, access to elite power structures was granted. So, rather than assuming that class is produced culturally, it would be more accurate to say that the power structures, the ideology, the mannerisms and the culture all emerge from the same underlying process.

In this paper I will be demonstrating that process. It's clear that people's ideologies and habits, while they support the status quo, are not what is creating class in the first place. I will argue that instead, class is a flow architecture: an arrangement of people, land and institutions self-organizing for extractive efficiency. The rapid way that ideology, systems, culture, habits and mannerisms all adapt to serve the changing needs of capital are showing a deeper mechanism at work, a process of selection for efficient flow.

In this sense, class is not primarily ideological or cultural, or even a static relationship of ownership of the means of production. Instead ideology, and all of society, adapt to the flow in a universal process of selection. This is demonstrated by the way the system selects for practices that keep capital flowing. Class is best understood as a self-organizing flow architecture, optimized for capital accumulation, with class culture and ideology emerging from this process.

### **The Ideology Problem: Limits of Cultural Determinism**

A great question which concerns class theorists is how the class structure keeps working, generation after generation. The existing class structure is oppressive, exploitive and unfair to the lower class, and yet every day people enact their cooperation and acceptance of a system that exploits them. Certainly some of this order is imposed from above by the coercive use of force. But most compliance seems to be consenting, coming from a place deeply embedded in culture and psychology, where people conform to a sense of what their expectations are for life and their place in it, even to the extent of accepting a lower station. It seems nonsensical, but there are numerous theories to explain it.

One theorist who focused on how this happens is Antonio Gramsci. He used the term *hegemony* to describe a dynamic cultural force that eases people into accepting ruling class dominance, by shaping institutions, worldview, and what is regarded as “common sense.” Says Gramsci in *The Prison Notebooks*, “The ‘spontaneous’ consent given by the great masses of the population to the general direction imposed on social life by the dominant fundamental group; this consent is ‘historically’ caused by the prestige (and consequent confidence) which the dominant group enjoys because of its position and function in the world of production” (Gramsci 1971, 145). Gramsci described in particular detail the role of public intellectuals and schools in shaping class attitudes. Of intellectuals, he said that they arise within the classes to direct their sentiments, and that dominant-class intellectuals act as “deputies” to convey the wishes of elites to the masses (1971, 146). They do this by creating ideas and narratives that make the existing social order seem normal, inevitable, or even desirable.

Gramsci also noted the great extent to which schools funnel the next generation into classes, by shuffling some into trade schools and others into advanced education. “The fundamental division into classical and vocational (professional) schools was a rational formula: the vocational school for the instrumental classes, the classical school for the dominant classes and the intellectuals” (1971, 166). Gramsci regarded this as a class sorting device “in which the pupil’s destiny and future activity are determined in advance” (1971, 166). These processes unquestionably are sorting people and making them fit into their classes, but left unexplained is why the education system aligns so precisely with the needs of capital to begin with.

Another theorist takes these observations even further. Louis Althusser wanted to peer even more deeply into what made people freely enact their own subjection, and he named the force at work – ideology. Like Gramsci, Althusser acknowledges the role of coercion in

maintaining class order, referring to Repressive State Apparatuses (RSAs) like the police force and the military which act on directives by the state (Althusser 1971). But Althusser also discusses the role of ISAs, or Ideological State Apparatuses (1971). These are institutions, like churches, schools and civic organizations, which prompt people to act appropriately for their class role. As he explains, the school “teaches ‘know-how’, but in forms which ensure *subjection to the ruling ideology*” (Althusser 1971, 5). The laboring class needs to be taught both competence and compliance.

Althusser points out that many of the institutions that perform this function are private, like political parties, newspapers, “cultural ventures” and even families (1971, 12), but they are all working in tandem to create the same, unified message, one that aligns with the interests of the ruling class. Says he, “All Ideological State Apparatuses, whatever they are, contribute to the same result: the reproduction of the relations of production, i.e. of capitalist relations of exploitation,” and “each of them contributes towards this single result in the way proper to it” (1971, 18). He notes for example that most teachers unknowingly perpetuate the ruling ideology through the school, stating that most, “...do not even begin to suspect the ‘work’ the system (which is bigger than they are and crushes them) forces them to do,” and are unaware that “their own devotion contributes to the maintenance and nourishment of this ideological representation” (1971, 19).

According to Althusser, one’s class role is not merely assigned by society; instead he describes “interpellation,” an interactive process in which individuals are continually “hailed” by institutions and invited to act out their roles, like a crossing guard who calls to a pedestrian so he can tell them exactly where to walk (Althusser 1971). Through this process, people internalize and enact social rules voluntarily, without the need for constant external coercion. Althusser

describes how this makes individuals “work by themselves,” (Althusser 1971, 35) conforming to class roles and expectations without requiring constant external coercion.

Pierre Bourdieu pushed this line of thinking even farther. He placed the nexus of class behavior internally, operating below conscious awareness. Bourdieu thought that class was a lived, embodied reality that shapes how people see and react to the world, which he called “habitus” (Bourdieu, 1977). This set of internalized attitudes and outlooks are learned through continuous, everyday immersion in social, familial and institutional contexts, and become deeply ingrained into the personality. According to Bourdieu, it is this socialization process which produces taste, manners, posture, speech patterns, and even emotional responses that align with one’s class position, all without any overt instructions. He believes this “habitus” serves to retain people in their class positions by defining the scope of what is possible for “someone like them” to achieve. As he states, “When habitus encounters a social world of which it is the product, it is like a ‘fish in water’: it does not feel the weight of the water ... it takes the world about itself for granted ... because this world has produced me ... it appears to me as self-evident” (Bourdieu & Wacquant 1992). Habitus makes the social world appear as place where people naturally and inevitably take up the positions in which they are situated.

These fine gentlemen have made many worthy observations about what class reproduction in society looks like, but they are not explaining at all how class started or why we are doing it in the first place. Most notably, these explanations - of deeply ingrained cultural anchors to our class position, inculcated psychologically through a lifetime of interpellations - are not reckoning with two important questions: one, if it’s so deeply, subconsciously and systemically ingrained, then how is it so incredibly easy to change? And two, since these systems are not coercive, what is driving the homogeneity? Why does every organization and

school and church and family step right up to sing the company tune - especially when it hurts many of them in the long run? How is the tune sung in such perfect harmony, without deliberate coordination?

This is where the view of class as a flow system begins to shed some light. Both questions can be answered if we understand a principle of thermodynamics, that flow systems are self-organizing. Our entire society and all of our systems are self-organizing around the flow of capital, in the same way that constructal systems in nature adapt to facilitate the movement of their vital currents.

### **Questions: The Mystery Deepens**

Let's address our first question, by explaining how easy it can be for an individual to change their social class, and even for the classes themselves to change. To be clear, I must emphasize that actually raising one's social class, historically and contemporarily, is quite difficult and rare. However, this is not because, as the theorists would suggest, that our social class becomes so ingrained in our personality, speech patterns, and mannerisms that these confine us to the class of our birth. It is simply because it is incredibly hard to change how much money we have reliable access to. It's true that an actual poor person, trying to intrude on upper class spaces, could be readily identified by speech patterns and style of dress, and would likely be shown the door. In this way, class markers are very effective at maintaining separation. However if that same person somehow came into very large amounts of money, they could pay the purchase price for entry to the seven-star hotels and restaurants of the world without issue, regardless of their speech patterns, mannerisms or internalized sense of place in the social order.

Without money, those things are insurmountable barriers to elite access. But with enough money, the barriers just melt away.

Like Molly Brown, occasionally a person of modest birth will come into money and be able to vault the classes. When this happens, rather than being excluded for their lower-class habitus, they may simply change their habitus to suit their new culture and status. For example, famous rapper Snoop Dogg came from a poor, single-parent home in a rough neighborhood (Snoop Dogg and Barlett 1999). But, after many years of fame and success, a few years ago he was paired with lifestyle matron Martha Stewart on a game show. Snoop Dogg easily guessed the names of luxury home décor items Martha described, like "sconce," "wainscoting," "duvet," and "credenza" (ABC 2016, 1:45), and the two went on to star in a TV lifestyle show together. Clearly, whatever Snoop Dogg's upbringing, he has expensive and sophisticated taste today.

Even upper-class attitudes can be internalized and enacted if money allows. An example is actor Kevin Hart. He, too, grew up in a poor home with a single mom in a rough neighborhood (Hart, K., & Strauss, N. 2017). Today he is quite wealthy from a string of hit films. In a comedy special from 2020, he described how, when he takes his kids to Disneyland, they are met by a concierge and escorted to the head of the line for every ride. Hart emphasizes to his kids that this was earned, not given, and instructs them that, "Rule Number One, as we are walking to the front of the line...you do not make eye contact with none of these f\*ing people in this line." (Hart 2020). His speech patterns may be vulgar and employ double negatives, but he has certainly learned upper-class entitlement, absorbed it as a new value, and is teaching it to his kids.

Class is clearly more defined by what you can do and what you have access to than by habitus. To be sure, lower-class habitus might very well prevent you from getting money;

however it won't prevent you from joining the upper class in the unlikely event that you do find a source of money, which does - occasionally - happen.

In fact, if you want a real illustration of how little habitus matters to gatekeeping elite access and power, look no further than the Silicon Valley tech bros, who vaulted the old guard in hoodies and khaki shorts to place their hands on the levers of society, making decisions that affect millions. They are literally redefining the meaning of upper class, and not by pretending to be acculturated in operatics. Joining the new elite is a matter of almost nothing but wealth.

So, despite the socializing forces of culture and every institution, an individual's class is only cash-deep. And the societal structures of class can change just as easily. This is highly evident in the creation of the post-war American "middle class." Even though such a thing had hardly existed before in history, the middle class was conjured practically out of thin air in the 1950s. Suburban home ownership and consumer culture had no real precedent, but they were turned into a class identity almost overnight, because that served the needs of capital at the time (Cohen 2003). Class positions and even the class structures of society are far from so deeply ingrained into our personalities and culture that we must continue to act them out, regardless of the circumstances. Instead, they rapidly change to fit the circumstances.

I think this cuts deeply against the widely held view that class relations continue because the culture is reproducing them. Culture is a lagging indicator, not a leading cause of class behavior. While Gramsci, Althusser and Bourdieu are not wrong in their careful observations, I do not think they have explained the mechanism of the system, because they have not provided an answer to our second question: why, oh why, is everything in society conspiring to create this form of divided social organization? Teachers, for example, are not even in the upper class, so why are they teaching what benefits elites? Why does what they are teaching so perfectly

reproduce the conditions that support capital? That brings us to the self-organizing principles at work in a constructal flow system, which show us the mechanism at work here.

### **Introducing Constructal Law as Social Theory**

It's rare for a theoretical principle from recent decades to be proposed as a new physical law, but Adrian Bejan's Constructal Law is established, foundational and significant enough to warrant the honor. Observing the branching shapes of almost everything that moves energy in nature, from trees to river deltas to neural networks, Bejan noted that all flows share similar characteristics and dynamics, evolving their design over time to move "vital fluids" more easily. Constructal Law states: "*For a finite-size flow system to persist in time, its configuration must evolve to provide easier access to the currents that flow through it*" (Bejan 1996). This observation has been just as readily applied to human-made flow systems, such as traffic, information networks and economic relations, as described by Bejan and others in *Constructal Theory of Social Dynamics* (2007). Humans are seekers of efficiency by nature and behave constructally in many ways.

One important aspect of all natural flow systems is that they self-configure via a process of selection: efficient channels grow, inefficient ones fade, and obstacles get routed around or worn smooth (Bejan & Lorente 2012).

Applied to our society, we begin to see that under capitalism, capital is the "vital fluid" our society is configuring to enable the flow of. And enable it we do. At every level – from elite control, to the state, to business, to the school, to the shop, to the family and even embedded into our customs and our very psychology – human words and deeds and institutions are being

shaped by a self-organizing process of selection. People have all kinds of needs and drives and desires, even people who start schools and businesses and act as civil servants for government, etc. Not every venture or deed starts out lining up with the needs of capital. Many do not. But in a manner similar to biological evolution, institutions and even ideas in society are subjected to selection. Just as in physical flows, branches that support the main flow are widened and deepened, while paths that dissipate or even just divert some flow away are compromised, co-opted or eliminated. As Bejan states, in constructal systems, “Inefficient paths are abandoned; efficient ones are reinforced” (Bejan & Lorente 2012). This ensures that the system as a whole evolves toward greater efficiency in moving what matters most: in this case, capital.

A powerful example of this is the trajectory of raving...yes, the electronic dance music parties that began as underground warehouse break-ins. Raving arose in the 1990s when enterprising partiers began to utilize abandoned industrial spaces to throw renegade psychedelic dance parties. The phenomenon spurred the development of new music and dance genres along with a strong counterculture (Martin 1999). Almost as soon as the establishment became aware of raving, efforts began to make it illegal (ACLU 2001), even though raving had very few problems associated with it – gatherings were almost uniformly peaceful, uplifting experiences, with statistically insignificant instances of harm (Weir 2000). But, time, attention, culture and money were being diverted away from the capitalist mainstream. Even as laws like the U.S. RAVE Act were being pushed to criminalize small promoters, larger event production companies, who could afford liability, were co-opting the model and expanding it. Small, underground private raving was made practically impossible, while large, commercial EDM music festivals, like Coachella and the Electric Daisy Carnival, became extravagant, exclusive and very expensive playlands for the rich and famous (Conner 2015). Flow, re-routed.

Numerous other examples come to mind, such as the way capitalism has absorbed every kind of scene - punk rock became Hot Topic, sci fi conventions became Comic Con. As critic Fredric Jameson observes in his analysis of “the cultural logic of late capitalism,” the system has “colonized” hobbies, parks, games, holidays, weddings, funerals and births (Jameson 1991). Capitalism has come for practically everything, and that is the point - this effect is at work in all the social institutions that shape our society. As Gramsci, Althusser and Bourdieu noted, almost everything we encounter from the state to the economy to our schools and homes are shaping us, not just to play the roles of our class, but in so doing, to constantly enhance capital flows in ways great and small.

Perhaps the most illustrative example of this selection process is that of the schools, one of Althusser’s most important ISAs. As he notes, teachers are not even class elites, yet through the schools, they reliably reproduce class relations (Althusser 1971, 12). This happens because schools and teachers who threaten capital’s smooth operation, by downplaying grades or challenging the logic of competitive economics, get swiftly punished: defunded, discredited, sidelined, or disciplined (Freire 1970; Aronowitz 2004). Meanwhile, institutions that churn out compliant, punctual test-scorers are lavished with resources, legitimacy, and expansion, because these are the skills that promote capital’s efficient flow (Bowles & Gintis 1976). This selective process ultimately drives all aspects of society in converging directions.

### **Flow Efficiency Through Legibility and Territorial Control**

Flow efficiency selection is the process by which all of Althusser’s ISAs, from the state to the home, come into ideological alignment, interpellating people into class roles, all without

direct instructions. But it's not only people and institutions which are subject to this process; the very land itself and all of nature are being mapped and measured and charted to smooth capital flows.

This process is described by Peter Vandergeest and Nancy Lee Peluso as “territorialization,” the purpose of which is to rationalize, standardize, and optimize the flows of resources, people, and administrative power for more efficient extraction. For example, in Thailand, a territorial village and household registration was established which “fixed” people in the landscape so they could be “located, identified, counted, characterized, categorized, and mapped,” and most importantly, taxed (Vandergeest & Peluso, 400). This is efficiency selection at work. As they note, “territorialization enabled increased efficiency in the collection of regular taxes” (390). This process also allowed the government to take over of large tracts of national territory by re-defining them as “forest” and organizing them for the efficient extraction of teak (Vandergeest and Peluso, 401). Meanwhile, practices that impeded capital, such as swidden agriculture or informal settlement, were criminalized and displaced. The resulting landscape has become an efficient flow architecture - meticulously engineered to channel resources, labor, and profit along pathways that serve elite interests, and wearing away resistance, by making alternative arrangements legally unintelligible.

Additionally, we can observe our continual optimization for capital flows in the accelerating shift from state to corporate control. As James C. Scott describes in *Seeing Like a State*, states are already attempting to reconfigure land and even people into a legible, optimized surface, by standardizing names, language, city design and even forests, for control and extraction (Scott 1998). While this state-driven process has been extractive enough, Scott notes that the process has intensified as corporate actors take over the tasks of optimizing everything

for profit. Says Scott, "...general, large-scale capitalism is just as much an agency," perhaps even overtaking the state as "the most powerful force for homogenization" in the world today (Scott 1998, 8). The uniformity, grids, over-simplification and legibility are examples of flow engineering that makes it easier than ever to turn the natural land into capital.

These examples of territorialization are just further demonstrations that class is not just a cultural or ideological construct, but part of a material arrangement of both people and land, all continuously calibrated for the smooth passage of capital.

### **Conclusions and Directions**

So, what can we conclude from all this? Class is not a cultural script but a material architecture - an arrangement of people, institutions, and territories into positions that regulate and optimize the flow of capital, which are arranged with the help of self-organizing selection. This framework directly answers our two central questions.

First, it explains the "Molly Brown" effect – how Mrs. Brown walked the decks of the Titanic with the other elites, despite her lack of training in their worldview, and theirs in hers. Her lack of elite manners, social connections, or cultural fluency was irrelevant – not because culture doesn't matter, but because capital flows reconfigure cultural legitimacy itself. Class position and habitus are downstream effects of one's location in the flow architecture. It is not schooling, etiquette, or "inculturation" that determines who belongs – but who harvests or redirects capital.

The second question the constructal theory answers is why all of the ISAs and every institution and law and person is continuously enacting class behavior, without overt directives,

even and especially when it reproduces profound injustice. It's not just because we are trained by our culture, which we then reproduce, an endless chicken-and-egg model of determinism. It's because the self-organizing principle of flow architecture is continuously selecting for processes and methods and practices which increase the efficiency of the flow of capital. Any configuration that impedes capital flow is gradually worn away, bypassed, or replaced by one that doesn't.

By applying the thermodynamic principles of self-organizing flows to our social arrangements, as a Critical Constructal Theory, we gain insight into human behavior at many levels. From critical theorists Gramsci, Althusser and Bourdieu to political ecologists like Scott, Vandergeest and Peluso, thinkers have meticulously described a process going on all around us every day. Critical Constructal Theory helps explain in a unified way what this process is and how it works, and the explanatory power of this perspective is just beginning.

An urgent matter for further explanation is how to expand the critical aspects, for humans are not passive in this process. While flows self-organize, elites actively reinforce and engineer these channels once they emerge, amplifying extraction. Elites make conscious decisions to increase their flow and oppress their fellow human beings, and while that is efficient for their accumulation, it's starving other parts of the system. Elites get away with this because they are shielded from feedback. This is a matter for another whole paper at least.

A second matter of equal urgency is to turn this understanding into a recipe for social change. It would be swimming against the current to try to change every single institution in society to fight class oppression. But because culture follows flow, changing the vital flows could allow class and cultural transformation to occur rapidly. If flows can be re-engineered, class does not need to reproduce exploitation. We can design social architectures that optimize the flow of well-being instead of capital, and designing those flows is where the Constructal Law

will be most useful of all. Because as history shows, when elites concentrate capital flows too much, with a grand sense of their own invincibility, it masks structural fragility that cannot withstand a blow. Our heavily bifurcated society is like the Titanic, split into separate classes, and headed for a climate iceberg. If the classes on the Titanic had worked together, more would have been saved that fateful night. We will have to value flows that allow cooperation, or fewer will be.

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