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Stable systems are not necessarily healthy ones. Many ostensibly stable systems in organisational, commercial, and civic contexts are instead characterised by zero-sum dynamics, in which participants are forced to compete for a narrow set of scarce assets rather than satisfying their needs from a state of pluralistic abundance. Insights from behavioural science indicate that conditions of scarcity and competition can have a significant influence on how choices are prioritised and made, suggesting that a behavioural perspective on how people consider options and trade-offs when making decisions under uncertainty can contribute to understanding behaviours in these zero-sum situations. Further, the need to consider value from both individual and communal levels suggests that augmenting these behavioural insights with an understanding of system-level functions can illuminate strategies for reframing value definition and exchange and help reframe zero-sum conditions into positive-sum ones. However, where behavioural design focuses on narrowly defined behavioural change, and immediate decision-making environments in the form of choice architecture, achieving positive-sum outcomes may demand paying greater attention to choice infrastructure, or the more systemic processes, functions, and conditions that underlay and shape behaviours. In addition, encouraging positive-sum outcomes will also benefit from understanding how individuals' specific and non-generic stances on value inform their personal choice postures or inclinations and predispositions toward options that are shaped by personal

experience. This paper proposes that behavioural insights seen through the lenses of choice infrastructure and choice posture can build on current systems and behavioural design approaches, achieving more equitable, positive-sum solutions to system challenges. It then examines Chicago's transportation policy related to fines and fees through these lenses to demonstrate how they might be applied to real-life challenges.

Keywords: systemic design, behavioural design, behavioural science, choice infrastructure, choice posture, zero-sum, positive-sum

RSD: Methods & Methodology, Policy & Governance

Introduction

Many organisational, commercial, and civic contexts are characterised by zero-sum dynamics and competition for scarce assets. This can result in an unhealthy pursuit of singular and narrowly defined sources of value and reinforce false presumptions that all participants value the same things (von Neumann & Morgenstern, 1944). However unhealthy, these systems are also frequently highly stable, in which actions and the exchange of assets create an equilibrium that can feel natural in its consistency and, therefore, difficult to disrupt.

But what if these dysfunctional systems are more malleable than they initially seem? In some cases, systems are built by design to encourage competition or benefit certain system participants over others. But while some of these situations are genuinely zero-sum, others may only appear to be so and can, in fact, be reframed to transcend individual self-interest such that actions collectively generate, rather than extract, new forms of value. Converting these situations into positive-sum outcomes requires disrupting deeply embedded zero-sum mental models and actively interrogating assumptions about what is valued in the first place, by whom, and how value is pursued and exchanged within larger systems (Goncher, 2017). The process of reframing zero-sum system states into positive-sum ones is therefore likely to benefit from coupling systems methodologies, which allow designers to understand how value is

exchanged within systems, with behavioural ones that consider how individuals perceive value and how this informs trade-offs when making decisions.

This paper will first distinguish the features of zero-sum situations from positive-sum ones and indicate why systems and behavioural design methodologies might be usefully employed to convert the former to the latter. It will then describe how new behaviourally-informed notions of choice infrastructure—the design of underlying choice conditions that support decision-making and behaviour—and choice posture—the personal predispositions and inclinations that inform one's perspective on choice—can help encourage and support positive-sum outcomes. The paper concludes by considering how these concepts might function using the context of Chicago's transportation fines and fees program as a concrete example.

The nature of zero-sum situations

Game theory's classic Prisoner's Dilemma presents a case in which two criminals must independently decide whether to stay mum in exchange for a lighter sentence (if their co-conspirator does the same) or a heavier one (if their comrade turns them in) or rat their partner out to reduce their personal risk (Poundstone, 1993). This thought experiment interrogates how people make strategic decisions in communal contexts under uncertainty, where choice-making requires simultaneously weighing self-interest and others' decision-making motives. This does not always result in optimised outcomes, as in instances of pluralistic ignorance, where misguided strategising based on others' presumed beliefs causes people to act against their best interests; for example, when voters choose not to vote for their preferred female candidate due to the assumption that others find women unelectable (Bateson, 2020; Bicchieri & Mercier, 2014).

But where some situations, like athletic competitions, are deliberately constructed to reward acting in self-interest at the expense of others, our tendency to position other interactions as competitive—whether grading students on a curve or rank-ordering institutions—can accidentally introduce zero-sum bias by imposing zero-sum framing even when true scarcity does not exist (Meegan, 2010). However, even when assets are genuinely limited, the assumption that we all value the same things equally can

reinforce that systems require zero-sum outcomes by default when the truth may be more complex.

Some have suggested that these inclinations have their origins in cognitive mechanisms to navigate naturally occurring instances of intra-group competition (Wright, 2000). This view aligns with notions that behavioural attributes, rather than being seen as flaws in deliberative judgement, are genuinely useful adaptations to address human decision-making needs (Gigerenzer and Selten, 2022). Other theories posit that humans' reliance on comparative structures to rank or compare relative value has contributed to over-adopting perceptions of artificial scarcity, as seen in tendencies to tether one's status to where others stand a la 'keeping up with the Joneses' (Kahneman & Tversky, 1979; Meegan, 2010). Regardless of the rationale, these mechanisms tend to oversimplify our relationship with what we value; at worst, they can tempt individuals to game the system by pursuing what 'wins' over what actually matters.

From zero-sum to positive-sum

In contrast to the winners-and-losers mindset that encourages individuals to protect their own interests against others, framing conditions to encourage reciprocity and a desire for mutual benefit can create a kind of market for achieving positive-sum outcomes instead of negative- or zero-sum ones (Goncher, 2017; Sugden, 2021). Positive-sum outcomes are ones in which system participants function as collaborators rather than rivals, and interactions generate, rather than extract, value. Wikis are one example where achieving a critical mass of collaborative effort generates value for many rather than functioning as a platform for individual gain. Public health efforts grounded in prosocial and communal activities, such as encouraging widespread immunisation to achieve herd immunity, provide another instance of collective effort for communal gain.

We can see the differences between zero-sum and positive-sum situations by comparing four key characteristics: the operational mindset for perceiving value; how value is activated; how participants are positioned relative to one another, and the target unit of fulfilment (Table 1). Each is described in more depth below.

Table 1. Typical characteristics of zero-sum and positive-sum situations.

	Zero-sum	**Positive-sum**
Operational mindset for perceiving value	Scarcity (limited resources, narrowly defined and distributed)	Abundance (plentiful resources and pluralistic representation)
Value activation	Extraction of value	Generation of value
Relative positioning of participants	Rival ('othering' of competitors; winner v. loser)	Anti-rival (cooperation)
Unit of fulfilment	Individual (Self-interest)	System (Collective benefits)

Operational mindset for perceiving value. The fundamental mindset of zero-sum situations is scarcity, in which competitive urges are fed by the pursuit of limited and narrowly defined assets. Even perceived scarcity matters: a presumed limitation to the distribution of good grades has been shown to reinforce zero-sum bias in students (Meegan, 2010). This scarcity mindset can reduce the potential of attaining positive-sum outcomes because it frequently fails to consider alternative values or goals. Constraining the perceived value provided by restaurants to ordering and consuming food, for example, neglects other potential benefits (e.g., dining as a means to socialise, the ability to kill time by having a drink at the bar, an opportunity to support local businesses) that may be genuinely and equally desirable.

Value activation. The extractive and competitive nature of zero-sum situations typically presume that the pursuit of value is centred on self-interest, where benefits gained by any one actor are compensated by losses for another. In contrast, positive-sum outcomes are defined by a generative and "better than the sum of its parts" mentality, in which communal benefit is created through collective action. Ideally, cultivating new forms of value results in a system that gets better over time. In the context of mass immunisation introduced earlier, for example, herd immunity creates long-term, wide-scale value that far exceeds its initial investment.

Relative positioning of participants. The third characteristic of zero-sum situations is participants' tendency to perceive one another as rivals for scarce assets rather than as

compatriots. For example, grading on a curve pits individuals against one another, given that one person's success comes at another's expense. Positive-sum solutions create an environment in which everyone can rise to and be rewarded for their best abilities or result in collective rewards or benefits based on widespread participation and accomplishment.

Unit of fulfilment. Finally, zero-sum contexts tend to position individual actors as the unit of gain or loss, whereas positive-sum outcomes are often measured at the order of collectives or larger system outcomes that can include non-human actors. This is illustrated quite starkly, for example, in the context of sustainability behaviours; the ultimate losers of this zero-sum game are the future generations who find earth increasingly uninhabitable, not to mention the planet itself.

Tools at hand: behavioural science and systems design

The key role of judgement and decision-making when evaluating or exchanging value in both zero-sum and positive-sum contexts indicates that insights drawn from behavioural science may be highly useful to practitioners. The field of behavioural science originated from the recognition that people often systematically fail to act in accordance with rational models of judgement, decision-making and behaviour, especially under conditions of uncertainty. Identifying and addressing these shortcomings has been shown to increase the chances that preferred behaviours are adopted or acted upon (Thaler & Sunstein, 2008; Kahneman & Tversky, 1979). Applied behavioural science approaches traditionally target behavioural change as the preferred unit for interventions; the more narrowly defined, the better. For example, behavioural approaches for achieving better health might focus on encouraging individuals to visit a gym three times a week rather than relying on more loosely defined outcomes of exercising more. To accomplish this, behavioural designers employ a wide range of tactics to create improved choice architecture or the deliberate adjustment of a user's immediate decision-making environment to encourage better (i.e., more rational) actions (OECD, 2019). This can entail strategies such as reducing friction to make preferred behaviours easier, increasing the relative attractiveness of better options through framing them more desirably, employing social cues and self-imposed peer

pressure, and introducing information at the precise moment of decision-making to increase its impact (Thaler & Sunstein, 2008; Behavioural Insights Team, 2012).

States of scarcity and abundance represented by zero- and positive-sum interactions, respectively, are also situated within systems. For example, a student's perception of grades as zero-sum requires comparison with other students and the belief that good grades have system value, such as a higher chance of being accepted to a good college or increased access to professional opportunities. Similarly, the value generated by positive-sum actions, such as herd immunity, is desirable specifically because of its system-level benefits. This suggests that systems methodologies such as identifying leverage points (Meadows, 1999), using system models to indicate how explicit and implicit conditions foster or inhibit system functionality (Kania, Kramer, and Senge, 2018), and analysing action situations to break down complex interactions into their component parts to reveal underlying patterns and underutilised infrastructures (Ostrom, 2000; Buchanan, 2020; Trochim et al., 2006) may also be highly relevant. Systems design approaches can also illuminate the power dynamics that hold zero-sum conditions in place; for example, by identifying who benefits from existing system structures—and therefore who might be resistant to change—or how infrastructures might need to be configured to achieve more equitable ends (Bradley et al., 2020; Greenhalgh, 2020; Rutter et al., 2017).

However, these traditional behavioural and systems approaches have their limitations. While behavioural science's choice architecture strategies are well-equipped to take on targeted behavioural change at the unit of individuals, they are typically less adroit at applying behavioural insights at broader institutional scales or at addressing system conditions (Schmidt, 2022; Schmidt & Stenger, 2021). For example, solutions designed to encourage individual behavioural change often fail to consider the presence of perverse or contradictory incentives at a systems level, as when targeting gym-going behaviours to increase good health ignores different social norms and cultural approaches to exercise, the existence of fitness deserts, and the high costs of gym membership that may limit access (Forberger et al., 2019). Even interventions that successfully achieve discrete behavioural change can introduce new downstream consequences; for example, when interventions to address inequities in hiring practices, such as blind

auditions or blinded resumes (Goldin & Rouse, 2000), are successful, they can also exacerbate existing inadequacies by creating larger populations of minoritised individuals who already lack sufficient support in accessing mentoring or opportunities for advancement. In such situations, what may initially seem like a positive-sum solution can instead result in zero-sum outcomes. At worst, these efforts can perpetuate or amplify existing inequities within systems.

In addition, neither behavioural nor systems design methodologies systematically identify and design for plurality of value. Despite recognising that individual context is critical to successful solutions, behavioural science tends to presume that humans' underlying cognitive characteristics are essentially generic and that rational decisions are well-known and uniformly shared. This can contribute to a presumed coherency of values—such as a belief in good health—that belies how cultural differences and social norms at societal and community levels impact judgement and behaviours. It also tends to ignore those individual perspectives of what is valued and what options seem viable or available, which are personal, contextualised, and informed by experience (Banerjee et al., 2019; Haushofer, Jang, and Lynham, 2015). At the same time, while system design's emphasis on infrastructure at macro, meso, and micro scales can provide high-level insight into values and how they are exchanged, it tends to forgo inquiry into how specific individuals decide and make trade-offs.

What's missing? Choice infrastructure and choice posture

Successfully reframing zero-sum challenges into positive-sum ones, therefore, may benefit from expanding on traditional systems and behavioural design approaches with two additional lenses: applying behavioural insights to more extensive underlying system conditions in the form of *choice infrastructure* and illuminating how individuals' decision-making judgement within complex systems is informed by their *choice posture* or their predispositions toward options and conceptions of value.

Choice infrastructure: cultivating fertile conditions for behaviour

Where choice architecture attempts to achieve targeted behavioural change by improving very specific attributes within users' immediate decision-making

environments, choice *infrastructure* employs behavioural findings to shape broader system conditions that make systems more hospitable to a wider range of behaviours that support system-level goals (Schmidt, 2022). Choice infrastructure's focus on behavioural plumbing rather than individual solutions can therefore broaden designers' abilities to address behavioural challenges, many of which are embedded in system operations or are not limited to simple instances of behavioural change (Andersson et al., 2020; Schmidt & Stenger, 2021). For example, performance management processes that reward sales but not mentoring are likely to discourage individuals from developing good mentoring skills, even in the face of interventions that are designed to make mentoring interactions easier to schedule and conduct. In other words, inattention to choice infrastructure can result in systems rife with perverse incentives in which desirable behaviours are inhibited, while well-designed choice infrastructure helps to cultivate a receptive environment in which desirable values and behaviours can flourish.

Reconfiguring choice-making conditions with an eye toward system infrastructure also has the potential to disrupt embedded power structures that often hold zero-sum dynamics in place or put the onus on individuals to change or adapt to faulty systems rather than on fixing the systems themselves (Jones, 2000). For example, evaluation measures that require customer service representatives (CSRs) to meet first-call resolution and calls-per-hour metrics can pit CSR performance against customer needs and result in meeting quotas at the expense of quality customer service, a clear zero-sum outcome. Rather than requiring CSRs or customers to choose between acting against their own self-interest or accommodating the system as currently configured, methodologies that examine existing standards, processes and policies, accountability, institutional culture, and evaluative feedback can suggest how to reconfigure infrastructures and measures of success that benefit CSRs, customers, and companies alike (Schmidt, 2022).

Choice posture: predispositions and inclinations

If addressing choice infrastructure enables practitioners to shape system conditions, insights into individuals' choice considerations—what we might call choice posture—provides a lens on what system individuals value and how this informs how

they perceive their options and make decisions (Schmidt & Stenger, 2022). Unlike traditional behavioural science, which tends to direct interventions at the unit of humans who have generic cognitive responses to prompts, choice posture emphasises that individuals are unique and that their perceptions toward decision-making are informed by their distinctly personal and embodied experiences. The insight that individuals may have different but equally valid preferences, predispositions, and personal perceptions and that what is valuable to one person may be less so to others helps puncture the default zero-sum assumption that resources and rewards are narrowly defined and naturally scarce. As a result, attention to choice posture can help design practitioners develop positive-sum solutions that are designed to represent a diverse set of personal and contextualised values. Considering choice posture at interpersonal levels can also further illuminate how second-order reactions inform behaviour, as in situations encountered by women or Black individuals who must continually counter assumptions that they are assistants or nurses rather than leaders or doctors (Clair et al., 2012) by strategically and preventively "pre-sponding" based on their awareness of others' predispositions.

The addition of choice infrastructure and choice posture as lenses to achieve successful positive-sum outcomes augments narrower notions of choice architecture, allowing solutions to pursue system-wide best interests and outcomes rather than solely human-centred ones. This can clearly be seen in areas such as sustainability, which must balance individual and system benefits. Perceiving positive-sum outcomes as both human and non-human, infrastructural and postural, also reinforces the value of interrogating the traditional false binary of hard (techno-structural system processes) and soft (social interactions and structures) system agents and instead emphasises their interconnectedness and co-equal-ability to motivate and constrain behaviours (Nold, 2020; Latour, 1992). Considering these holistic and interconnected dimensions and dynamics of choice can help practitioners reconfigure system operations to generate, rather than extract, value, while also developing a better understanding of what values are meaningful to the stakeholders involved.

Applying choice infrastructure and posture to pursue positive-sum outcomes in sustainability

Exploring the concepts of positive-sum situations, choice infrastructure, and choice posture in a concrete setting can provide a more concrete illustration of how this approach might work. Below, Chicago's transportation fines and fees program provides an example of converting a system currently grounded in unidirectional value extraction to one that also provides benefits to residents.

While primarily enacted in the name of public safety, Chicago's current fines and fees program is a zero-sum game in which citizens pay in the form of money, time, and effort to generate revenue for the city. This creates an artificial and misaligned relationship between safety and the enforcement of rules that punish residents for infractions without rewarding them for beneficial safety behaviours and positions safety purely as an individual responsibility rather than addressing system flaws, despite a lack of robust data showing how the threat of fines actually impacts behaviours as presumed (Worthington 2020; San Francisco Fines and Fees Task Force, 2017).

Further, while fining rule-breakers on an individual basis seems outwardly reasonable, these processes typically fail to interrogate the extent to which transportation choices are truly voluntary or recognise that reliance on driving is not equally distributed across the city. Where some (predominantly white, upper-middle-class) communities benefit from a robust and accessible public transit system, other areas in Chicago (predominantly Black and brown, and low SES (socioeconomic status)) must navigate a patchwork of public transportation options that require multiple transfers and significant commutes. This disparity is exacerbated by findings that many options explicitly intended to reduce driving costs—like I-PASS transponders that reduce the cost of tolls—require the use of a credit card or electronic bank accounts that those living in stressed financial situations are less likely to have (CMAP, 2021).

The regressive nature of fine structures also does not take into account individuals' ability to pay and often extracts fines and fees that are misaligned with the actual threat posed by specific behaviours (Menendez, 2019). Unsurprisingly, this disproportionately impacts and penalises communities of colour and of low SES with the least capacity to

absorb additional financial hits. In addition, not only must these populations shoulder the most significant burden of fines, but the revenue collected as a result is often directly applied to paying the costs of the legal system's activities (Worthington, 2020). This essentially forces defendants to financially sustain the operational mechanics of their punishment, feeding a vicious cycle that incentivises more enforcement as a means to drive revenue and cover costs (Worthington, 2020; Menendez, 2019).

Applying a positive-sum frame to the challenge

Bringing choice postural and infrastructural lenses to this challenge can help to a) surface alternative forms of value that can augment the financial nature of fines and fees, and b) reconsider how infrastructures can be reconfigured to capture and exchange these new forms of value.

Where the only currency currently in play is centred on dollars, with fines used as a punitive cudgel toward zero-sum ends, the transportation system also generates an enormous amount of data. Re-centring data as a new source of value has the potential to support more positive-sum problem-solving. For instance, data collected by parking meters or devices like red light cameras that are used to document speeders might instead be used to measure parking space and road usage, which can subsequently inform investments and improvements. This might take the form of managing acute issues like snow removal but can also extend to investment in broader community benefits such as fixing broken infrastructure, improving street conditions, or maintaining or enhancing communities through beautification efforts. Using data collected across the city to inform learning and future-facing investment, in other words, converts transportation oversight from a punitive mechanism to managing a new form of currency. This offers the opportunity to shift the city's sole focus on revenue to one that prioritises longer-term civic transit developments that benefit the city and the citizenry alike.

Even at a purely financial level, however, employing a choice infrastructure lens can help reframe how value is generated and exchanged by indicating how policies work in conjunction within the system rather than as isolated functions. For example, where revenue generation is often seen as the primary goal of the fines and fines program,

examining revenue in isolation neglects to consider not only residents' ability to pay but the substantial costs of collections and the funnelling back of revenues to financially support the mechanics of prosecuting those who receive citations. Addressing choice infrastructure can help suss out and address conditions that support and reward civic employees' self-interested behaviours rather than those that contribute to system health, such as ticket quotas that encourage officers to meet artificial performance metrics. Reconsidering how these incentives and flows of revenue can be rerouted or reconfigured at a city level can allow policymakers to balance finances more effectively while still supporting public safety, as San Francisco has managed to achieve (San Francisco Fines and Fees Task Force, 2017).

To supplement these choice infrastructural considerations, explorations into choice posture can inform perspectives on what residents value and how potential exchanges and trade-offs might be reframed. Not only can understanding these representative postures inform possible behavioural solutions, but it also highlights the importance of recognising when perceptions may be more influential than facts in shaping behaviour. For example, community predispositions toward police based on historical or past personal experience may inform residents' perceptions of traffic rules and regulations, rendering what might come across to other populations as ordinary policing as gotchas designed to mete out punishment. Inquiry into choice posture at community levels can also prove enlightening in highlighting how choices are framed or shaped at a larger unit of analysis, as when neighbourhoods with limited public transportation options (a choice infrastructure issue) dismiss alternative transport options with scepticism or view them through the lens of stigma rather than support (a choice postural one).

In combination, therefore, using lenses of choice infrastructure and choice posture can be used to reframe current zero-sum conditions into more positive-sum outcomes as a starting point for design. Table 2 presents an overview of these shifts across the four characteristics presented earlier.

Table 2. The fines and fees program mapped to a zero-sum/positive-sum framework.

	Presumption of zero-sum	**Conversion to positive-sum**
Operational mindset for perceiving value	Punitive mindset grounded in city residents paying for infractions	Abundance mindset focused on communal outcomes and benefits (data, community safety)
Value activation	Extraction of revenue/finances	Generation of new value (e.g. data, improved civic infrastructure, public safety)
Relative positioning of participants	City interests are positioned as rivals to citizen interests, with communities of colour and low SES individuals disproportionately affected	Residents seen as participants, not potential scofflaws
Unit of fulfilment	Individual citizen	Civic populations and neighbourhoods

From a practical standpoint, activities that elicit insight into choice posture and choice infrastructure can take several forms. These may include methods such as participatory or co-design processes, which allow practitioners to gather perspectives from a variety of system participants while also building trust and legitimacy into solutions (Blomkamp, 2018). The use of choice infrastructure frameworks like SPACE, which analyse institutional capabilities across standards and definitions, process mechanics and policies, accountability, institutional culture, and evaluative and interactive feedback, can also contribute to the design of more equitable solutions by surfacing system dynamics and concentrations of power (Schmidt, 2022). This can inform perspectives on what to change, what to measure, and how to determine success that helps ensure hospitable incentive structures and conditions and subsequently inform new solutions, structures, and processes to encourage and reinforce behaviours that match desired outcomes.

Conclusion

While the methodology for reframing zero-sum conditions to positive-sum ones is still nascent, the prospect of creating conditions that support wide-scale value generation rather than value extraction and depletion is appealing as a means to address challenges that may initially present simply as competition over scarce resources. Achieving this will require several methods to help practitioners frame challenges so that alternative forms of value can be recognised and exchanged at a systems level. This task can benefit from expanding traditional systems and behavioural design tools to encompass two additional conceptual lenses: choice infrastructure, which can assist help practitioners in analysing current contexts and platforms and inform improved system plumbing, and choice posture, which employs a qualitative and contextualised view on what values matter at the individual, institutional, and systemic levels.

Employing these concepts in areas such as Chicago's fines and fees program demonstrates how surfacing and reframing new notions of value at a systems level can inform the way challenges are perceived and addressed. However, choice infrastructure and choice posture may also prove useful when tackling larger systems challenges that require solving simultaneously for behaviours and infrastructural-level conditions across multiple human- and non-human stakeholders, such as those related to sustainability. Further exploration of these approaches promises to expand the potential nature of insights and solutions to system-level challenges.

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