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The i-frame and the s-frame:

How focusing on individual-level solutions has led behavioral public policy astray

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Short Abstract

Many behavioral scientists propose and test policy interventions that seek to ‘fix’ problems with individual behavior (adopting an “i-frame”) rather than addressing the system in which individuals operate (an “s-frame”). The impact of such i-frame interventions has been disappointing and can reduce support for much-needed systemic reforms. Highlighting individual responsibility for societal problems is a long-established objective of corporate opponents of s-frame policies such as regulation and taxation. Thus, researchers advocating i-frame solutions may have unwittingly promoted the interests of the opponents of systemic change. Behavioral scientists can best contribute to public policy by employing their skills to develop and implement value-creating system-level change.

Long Abstract

An influential line of thinking in behavioral science, to which the two authors have long subscribed, is that many of society's most pressing problems can be addressed cheaply and effectively at the level of the individual, without modifying the system in which the individual operates. We now believe this was a mistake, along with, we suspect, many colleagues in both the academic and policy communities. Results from such interventions have been disappointingly modest. But more importantly, they have guided many (though by no means all) behavioral scientists to frame policy problems in individual, not systemic, terms: to adopt what we call the "i-frame," rather than the "s-frame." The difference may be more consequential than i-frame advocates have realized, by deflecting attention and support away from s-frame policies. Indeed, highlighting the i-frame is a long-established objective of corporate opponents of concerted systemic action such as regulation and taxation. We illustrate our argument briefly for six policy problems, and in depth with the examples of climate change, obesity, retirement savings, and pollution from plastic waste. We argue that the most important way in which behavioral scientists can contribute to public policy is by employing their skills to develop and implement value-creating system-level change.

1. The i-frame and the s-frame

The behavioral and brain sciences primarily focus on what we call the i-frame: on *individuals*, and their thoughts and behaviors. Public policy, by contrast, typically focuses on the s-frame: the *system* of rules, norms, and institutions usually studied by economists, sociologists, legal scholars, and political scientists.

Historically, i-frame insights engage with public policy through evidence about which s-frame policies will work. Thus, research on neural and cognitive mechanisms of imitation has been linked to the impacts of media violence (Bandura, Ross & Ross, 1963; Hurley, 2004). The neuroscience and psychology of addiction has informed the regulation of recreational drugs, cigarettes, alcohol, and gambling (Robinson & Berridge, 2000; Verdejo-Garcia et al, 2019; Volkow & Boyle, 2018). Health psychologists, epidemiologists, and public health doctors have studied the physiological and psychological mechanisms that convert s-frame factors (e.g., status, inequality, isolation, food environments) into health outcomes (see, e.g., Harris, Bargh & Brownell, 2009; Leigh-Hunt et al, 2017; Marmot, 2004; Marteau, Hollands & Fletcher, 2012; Pickett & Wilkinson, 2015). Insights about individual psychology thus inform regulation, taxation, social support, and institutional reform. We advocate deepening and extending this work.

Recently, there has been increasing enthusiasm for a more direct approach: using i-frame insights to create *i-frame policies* (Camerer, Issacharoff, Loewenstein, O'Donoghue & Rabin, 2003; Sunstein & Thaler, 2003; Thaler & Sunstein, 2003). Two founding papers identified individual limitations (e.g., excessive self-interest, present bias, confirmation bias), not systemic issues, as the source of social problems. Sunstein and Thaler (2003:1162) wrote “Drawing on some well-established findings in behavioral economics and cognitive psychology, we emphasize the possibility that in some cases individuals make inferior decisions in terms of their own welfare – decisions that they would change if they had complete information, unlimited cognitive abilities and no lack of self-control.” Camerer et al. (2003) likewise note “To the extent that the errors identified by behavioral research lead people not to behave in their own best interests, paternalism may prove useful.” The first three chapters of *Nudge* (Thaler & Sunstein, 2008), including the updated “final edition” (Thaler & Sunstein, 2021), contrast the biases and self-destructive behaviors of “humans,” with the rational actors of economic theory. Unlike traditional policies, i-frame interventions don’t fundamentally change the *rules* of the game, but make subtle adjustments to help fallible individuals play the game better.¹

These approaches are not mutually exclusive. For example, the battle against cigarette smoking includes individual and systemic measures (e.g., gruesome labels on cigarette packages *and* tobacco taxes and smoking bans). Similarly, in pensions, the i-frame change of auto-enrollment is often part of wider changes (e.g., requiring or incentivizing executives to offer pensions to workers). Moreover, the boundary between i- and s-frame policies is not always clear-cut. For example, if individuals aren’t sufficiently aware of a default setting, then changing that default

¹ Many in our field have taken a broader perspective. For example, Oliver (2013) includes chapters promoting the perspective we advocate here (e.g., Marteau, Hollands & Fletcher, 2012; Verplanken and Wood, 2006).

could be a mandate by subterfuge: the veneer of free choice is maintained without the substance. But i-frame interventions which slide into s-frame mandates are against the spirit of the new approach, which is to encourage “good” choices while respecting individual liberty.

Freedom aside, shifting the focus to i-frame interventions is also pragmatically appealing. Traditional public policy measures often get snared in legislative thickets (especially when politics is polarized) and can be dauntingly costly. The hope is that “small changes can make a big difference.”² As the labels “libertarian paternalism” and “regulation for conservatives” hint, clever interventions to help people help themselves are intended to be politically uncontroversial.

The goal is not merely to create a smoother “interface” between government and citizens (by analogy, say, with mobile phone design), which we see as entirely appropriate. It is much more ambitious: to provide an alternative to traditional s-frame policies. For example, in a TED talk the year before he became the British Prime Minister David Cameron, who established the first “nudge unit,” said “The best way to get someone to cut their electricity bill is to show them their own spending, to show them what their neighbors are spending, and then show what an energy conscious neighbor is spending... Behavioral economics can transform people’s behavior in a way that all the bullying and all the information and all the badgering from a government cannot possibly achieve.” Presumably, the ‘bullying’ and ‘badgering’ is traditional regulation: taxes and energy efficiency standards. Cameron hopes that i-frame solutions make old-fashioned s-frame approaches redundant.

We shared such hopes, and most of our own policy-oriented research has focused on i-frame interventions. But we now worry that in advancing i-frame solutions to problems, we have inadvertently assisted corporations which oppose s-frame reforms. These corporations consistently cast societal problems as issues of individual weakness and responsibility, the solutions to which involve ‘fixing’ individual behavior.

In the remainder of this section, we outline our overall argument. Next, we illustrate our concerns in a series of case studies. Finally, we outline the crucial positive role that we believe the behavioral and brain sciences can and should play in informing s-frame policy.

Let us begin with an analogy: that seeing individual cognitive limitations as the source of society’s problems is like seeing human physiological limitations as the key to the problems of malnutrition or lack of shelter. Humans are vulnerable to cold, malnutrition, disease, predation, and violence. An i-frame perspective would focus on tips to help individuals survive in a hostile world.³ But human progress has arisen through s-frame changes---the invention and propagation of technologies, economic institutions, and legal and political systems has led to spectacular

² This is the subtitle of Halpern (2015), a strategy Martin, Goldstein & Cialdini (2014) label “the small BIG.” Similarly, Kahneman (2013) sees the goal as “achieving medium-sized gains by nano-sized investments.

³ A reviewer pointed out the potential value of an i-frame ‘tip’ to eat citrus fruits to avoid scurvy. But such important matters are rarely left to individual choice, but imposed by s-frame interventions. Cook (2004) notes “the *compulsory* administration of genuine lime juice *under supervision* in the merchant service seems to have exerted a significant effect” on reducing scurvy in the British merchant navy in the 19th century (p. 224, emphasis added).

improvements in the material dimensions of life. Human physiology varies little over time. But the systems of rules and institutions we live by have changed immeasurably. Successful s-frame changes have been transformative in overcoming our physiological frailties.

Our suspicion is that the same is true of our cognitive frailties. Just as mechanisms for governing common resources help counteract self-interest (Cramton et al., 2017; Ostrom, 1990), many institutions help overcome psychological frailties (Heath, Larrick & Klayman, 1998; Laibson, 2018). For example, competition in science or the adversarial nature of legal disputes is a partial antidote to confirmation bias (Kunda, 1990) and motivated reasoning (Nickerson, 1998). Likewise, the impersonal framing of the law counteracts favoritism (Greenwald & Pettigrew, 2014); limited liability may help overcome risk and loss aversion (de Meza & Webb, 2007), which might otherwise stifle entrepreneurial activity; workplace and state pensions help deal with the bias for present gratification (Laibson, 1997); social taboos and legal restrictions counteract visceral impulses (Loewenstein, 1996); and arbitrary markers for distinct cultural groups may help people coordinate their behavior (Efferson, Lalive & Fehr, 2008). In short, history shows that the solution to individual frailty is to change the system, not to enhance the individual.

I-frame interventions alone are likely to be insufficient to deal with the myriad problems facing humanity. Indeed, disappointingly often they yield small or null results. DellaVigna and Linos (2022) analyze all the trials run by two large U.S. Nudge Units: 126 RCTs covering 23 million people. Whereas the average impact of nudges reported in academic journals is large – at 8.7% – their analysis yielded a mean impact of just 1.4%. Why the difference? They conclude that selective publication in academic journals explains about 70% of the discrepancy.⁴ DellaVigna and Linos also surveyed nudge practitioners and academics, to predict the effect sizes their evaluation would uncover. Practitioners were far more pessimistic, and realistic, than academics, presumably because of their direct experience with nudge interventions.

Even when i-frame interventions *are* highly effective, their impact may be modest. For example, a recent large-scale field trial which showed that over 85% of Swiss individuals and 75% of businesses who were defaulted into a more expensive green energy tariff stuck with this tariff over many years (Liebe, Gewinner & Diekmann, 2021). The authors estimate this mechanism could yield very large carbon savings. In an optimistically-titled commentary on this work (“Green defaults can combat climate change”), Sunstein (2021, p.548) begins by contrasting i- and s-frame approaches:

“It has long been thought that to reduce environmental harm, the best approach is an economic incentive, perhaps a corrective tax. In recent years, however, increasing attention has been given to non-monetary interventions including ‘nudges’, such as information disclosure, warnings, uses of social norms, and

⁴ Mertens et al. (2022) analyze more than 200 nudge interventions, acknowledging that publication bias may undermine their positive results. Indeed, one reanalysis finds no evidence of the effect of nudges once publication bias is taken into account (Maier et al. 2022). (See <https://www.economist.com/science-and-technology/2022/07/27/evidence-for-behavioural-interventions-looks-increasingly-shaky>.)

default rules. A potentially promising intervention would automatically enroll people in green energy, subject to opt-out.”

But the ultimate impact is likely to be slight. The energy system does not respond by instantaneously producing more green energy for newly defaulted consumers. Rather, existing green energy is reallocated, with *no* direct impact on the energy mix. Moreover, the policy could not be applied universally because there would be insufficient green energy to ‘go round.’ Admittedly, if it could be rolled out almost universally, the policy might generate a sufficient price “premium” for green energy to boost investment---but that very premium would push people away from the green tariff, and likely generate a media and political backlash. Worse, investment costs would be inequitable and divisive, allowing free-riders to avoid investing in the public good of green energy. This type of i-frame intervention is not an alternative to the s-frame measures that have successfully decarbonized the power system in many countries.

There is a deeper concern: i-frame interventions may draw attention and support from crucial s-frame changes. Five increasingly specific lines of evidence suggest that this is a serious problem.

1. The brain represents stimuli of all kinds in only one way at a time. Thus, once a representational “frame” is adopted, other frames are difficult to access. This is evidenced throughout the cognitive and neurosciences, from perceptual rivalry (e.g., Kornmeier & Bach, 2012), functional fixedness in problem-solving (Duncker, 1945), or limitation to a single “mental model” in reasoning (e.g., Johnson-Laird, 1983). Irrespective of cognitive domain, different frames compete; where several are available, a focus on one tends to crowd out others.
2. Work on causal attribution indicates that people see responsibility as divisible---the causal responsibility associated with one factor or agent varies inversely with that of any other (Chockler and Halpern, 2004; Lagnado, Gerstenberg & Zultan, 2013). This implies that voters and policy-makers alike will judge s-frame causes as less important, when focusing on i-frame factors.
3. A possible mechanism for such displacement effects is “single-action bias” (Weber, 1997). Weber found that U.S. farmers who had adapted their agricultural practices to climate change were less supportive of government climate policies, and Hansen et al. (2004) found parallel results in Argentina. Weber (2006) hypothesized that action to cope with a problem reduces fear, and hence the perceived importance of other risk reduction strategies. This effect occurs even if the action taken is not the most effective option, or where multiple actions are needed.
4. The “competition” between i-frame and s-frame explanations of behavior may be tilted towards the i-frame. Indeed, the tendency to underestimate situational factors and overestimate individual factors is viewed by many as *the* key finding of social psychology, known as the “fundamental attribution error” (Ross, 1977) or “correspondence bias” (Gilbert & Malone, 1995). Thus, business interests advancing i-frame solutions may have benefit from a tail-wind of human psychology.⁵

⁵ Crucial for present argument is the overemphasis on individual causes *where situational factors are decisive* (e.g., Jones & Davis, 1965). The secondary claim, that this overemphasis is reduced for own

5. Finally, direct experimental evidence shows that the i-frame can “crowd out” s-frame considerations in policy-relevant contexts (Thøgersen & Crompton, 2009). Hagmann, Ho and Loewenstein (2019) show that merely alerting people (including policy makers in one study) to the possibility of an i-frame intervention (a green energy nudge) reduces support for more substantive policies (a carbon tax). Moreover, they find that a green energy nudge appears to crowd out support for a carbon tax by providing the false hope that climate change can be addressed without costlier (but immeasurably more effective) policies. When individuals are informed about the limited impact of the green energy nudge, however, their support for a carbon tax increases.

Werfel (2017) finds these effects in the field. Households in Japan who were randomly assigned to report actions they took to save energy were less supportive of a carbon tax, and those who reported more actions were especially unsupportive. Werfel concludes that the effect is “driven by an increase in the perceived importance of individual actions relative to government regulation” (Werfel, 2017, p. 512). Truelove et al. (2014) find mixed results when it comes to support for recycling policies, but greater overall support for negative than positive spill-overs.

Finally, Maki et al. (2019) conclude in their meta-analysis of pro-environmental behavioral (PEB) that spillovers from PEBs to *intentions* is positive; but spillovers from PEBs to actual behavior and, crucially, policy support, is negative (though small).⁶ Collectively, these studies highlight a general propensity for i-frame solutions to undermine support for available s-frame policies.

Beyond crowd-out effects in public support, there are three further ways in which i-frame interventions can undermine s-frame policies. First, policies require human and financial resources: pursuing one policy can interfere with pursuing others. Covid provides a recent illustration: China⁷ and New Zealand⁸ relied on isolation, and did not initially push hard on vaccination. Furman (2016, p3) notes that “policymakers have a finite amount of time and attention, so every policy action taken has a cost in terms of other actions that they are unable to undertake as a result... Thus, even a high benefit-to-cost ratio may not be sufficient justification for pursuing a policy if it crowds out the time and attention that might have gone into other policies with higher absolute net benefits.”

Second, there will also be unavoidable crowd-out of research resources. Social and behavioral scientists face constraints on time, effort, and funding, so a focus on nudges almost inevitably reduces effort elsewhere. We are by no means calling for the suppression of specific types of research; but, as we argue below, a re-prioritization could help both science and society.

behavior is controversial (see Malle, 2006). The precise nature of the bias (e.g., Gawronski, 2004; Gilovich & Eibach, 2001; Sabini, Siepmann & Stein, 2001) and its rational basis (Walker, Smith & Vul, 2015) are not crucial here.

⁶ Raimi (2021) proposes strategies to encourage pro-environmental behaviors without crowding out public support for climate policies.

⁷ <https://www.nytimes.com/2022/02/18/business/china-coronavirus-vaccines.html>

⁸ <https://www.ft.com/content/bb1de4e4-7b42-43a0-b118-bb35719daca1ch>

Third, a focus on i-frame interventions can shift the standards of what counts as quality *evidence* for public policy. For many i-frame policies, randomized controlled trials are seen as the gold-standard for evaluating and incrementally improving policy, and as *the* crucial contribution of behavioral insights research (Luca & Bazerman, 2021).⁹ But this gold-standard itself pushes towards i-frame interventions (where different individuals may be randomly assigned to distinct interventions) and away from s-frame interventions where it is rarely possible to change the “system” for some subset of the population.^{10,11} As Hansen (2018:193) relates about his interactions with policy makers, “It is my repeated experience that we can quite easily run a letter-tweaking experiment involving thousands of taxpayers, but only provoke strenuous smiles when we say, “We could also try to rethink the policy assumptions.”

S-frame policies are not inherently superior to i-frame policies. Many do not have their intended effect,¹² or even backfire.¹³ But to evaluate the likely efficacy of s-frame policies, the natural approach is rarely experimental. Instead, the s-frame encourages us to ask where, when, and why a problem arose, and to explore differences between and within countries. Such analyses can provide clues about problems’ origins, as well as ideas about how they could be addressed, perhaps by reversing the historical changes or adopting s-frame approaches that have proven successful elsewhere.

The idea that support for i-frame interventions crowds out support for more substantive and effective s-frame ones receives indirect support from another observation, which is the central focus of this review: the powerful and consistent support that i-frame interventions have received from interests that are opposed to s-frame reform. Picking up our previous analogy, slum landlords (by analogy with corporations opposing s-frame reform) will see illness as arising from poor hand-washing or unhygienic food and drink preparation. And well-intentioned behavioral scientists may suggest i-frame interventions to increase the use of soap and boiled water, probably to little effect. But the i-frame perspective may itself weaken the impetus for tried-and-tested s-frame reform: regulations to enforce quality housing, with heating, sanitation, and safe drinking water.

Over many decades we show that public relations specialists representing corporate interests have effectively deflected pressure for systemic change by reframing social problems in i-frame terms. They have learned to back i-frame interventions that pose little threat to the status quo while simultaneously lobbying heavily against proven s-frame changes that threaten their

⁹ See, for example, Haynes, Service, Goldacre & Torgersen, 2012; Halpern & Mason, 2015.

¹⁰ Two notable s-frame studies are the RAND health insurance experiment, in which individuals were randomly assigned different health insurance policies (see Aron-Dine, Einav & Finkelstein, 2013), and the Move To Opportunity experiment in which families in multiple cities received different types of housing support (Chetty, Hendren & Katz, 2016). Recent field experiments testing conditional and unconditional cash transfers are another example. While influential, these studies are expensive (e.g., the RAND study cost roughly \$295M in 2011 dollars).

¹¹ See Deaton (2020) and Deaton & Cartwright (2018a,b) for a parallel critique of experimental development economics, and Akerlof (2020) on how methodological preferences shifts research and policy priorities.

¹² For example, data on people who move location suggests that eliminating “food deserts” would have little impact on nutrition (Allcott, Diamond, Dubé, Handbury, Rahkovsky & Schnell, 2019).

¹³ See https://en.wikipedia.org/wiki/Perverse_incentive.

interests. The billions of dollars spent promoting i-frame interventions should make behavioral scientists uneasy. With the best of intentions, proponents of i-frame policy, including ourselves, may have inadvertently weakened support for crucial systemic changes.¹⁴ As we review below, there is every reason to believe that this has happened.

These considerations do not imply that i-frame research should be abandoned. Indeed, many influential advocates of i-frame policies have long seen them as complementing, rather than replacing, s-frame policy (e.g., Thaler & Sunstein, 2021; Sunstein, 2022a). But it does imply that behavioral scientists need to be aware of, and actively counter, any tendency to view i-frame interventions as alternatives to system change. Moreover, the relative impacts of i- and s-frame interventions strongly suggests that behavioral scientists should prioritize applying behavioral insights to s-frame reform.

1.1 Climate change and the i-frame

In the early 2000s, the world's second largest non-state-owned oil company, BP, began an enormous media campaign with the tag-line *Beyond Petroleum* to improve its environmental image. Mann (2021) documents how BP and its fossil fuel allies had long challenged the reality of climate change by supporting climate-skeptical academics and discrediting legitimate climate scientists. As this approach became increasingly indefensible, they shifted gears. Rather than opposing climate science directly, they worked to reframe the problem of carbon reduction in i-frame, not s-frame, terms, beginning what Mann calls the “new climate wars:” promoting the idea that opposing climate change demands individual responsibility, not systemic reform.

A key strategy was to promote the personal “carbon footprint” (Safire, 2008), in part through BP's carbon footprint calculator, which was completed by nearly 300,000 people in 2004 (Solman, 2008). The campaign succeeded spectacularly: Individuals, campaigners, media organizations, and government agencies all created their own carbon calculators to help people reduce their impact on the planet.¹⁵

BP's campaign promotes the i-frame by helping individuals reduce their own personal carbon footprint, and behavioral scientists have jumped aboard by testing, and advancing the implementation of, a variety of ‘green energy nudges.’ The most prominent, based on an idea pioneered by Cialdini (1984) and highlighted by Cameron in his TED talk, involves showing people graphs comparing their own home energy use with that of their neighbors (Schultz, Nolan, Cialdini, Goldstein & Griskevicius, 2007).

BP's campaign may seem constructive, or at worst innocuous. But Mann (2021) suggests that it is in fact a clever exercise in *framing*: describing a problem in a particular way to shape the

¹⁴ We are *not* claiming that the focus on the i-frame in behavioral science is *responsible* for persistent social problems. The influence of academic policy research is surely modest compared with the vast commercial and political forces (and inertias) within and between nations.

¹⁵ See, e.g., the U.S. Environmental Protection Agency's carbon calculator; and the New York Times guide on “How to Reduce Your Carbon Footprint.” BP's wider campaign won a Golden Effie in 2007, a major advertising industry award (https://www.affie.org/case_database/case/NA_2007_1528).

solutions that come to mind (Chong & Druckman, 2007; Lakoff, 2014). BP’s campaign, which included personal appeals such as “It’s time to go on a low carbon diet” (Learmonth, 2020), frames the challenge of combating climate change as a matter of individual responsibility.¹⁶

Carbon footprints have certainly attracted, and perhaps distracted, behavioral scientists including ourselves. In consulting and advisory work, we have thought a lot about what interventions can help individuals reduce their use of heating, insulate their homes, shift to low carbon transport and more plant-based diets (e.g., Chater, 2020a; see also Allcott & Rogers, 2014). But we now doubt that carbon emissions can be substantially reduced by i-level interventions such as providing small incentives, better (or more transparent) information, more feedback, more awareness of social norms, or greener “defaults.”¹⁷ Having a real impact will require systemic transformation on a huge scale: changing how we heat our homes, travel, ship goods, and produce and consume food; rethinking manufacturing; and vastly expanding the production, storage and transmission of green electricity. Such transformations would likely include a substantial carbon tax alongside extensive regulation (e.g., Cramton et al., 2017; Energy Transition Commission, 2021; Markard, 2018), as well as redistributive transfers to deal with issues of unequal impacts.

The case of carbon footprints is part of a wider pattern (which we illustrate in the next section):

1. Corporations with an interest in maintaining the status quo promote PR messages that the problem at hand is one of individual responsibility, and that people need help to exercise that responsibility more effectively. That is, the challenge is cast in the i-frame.
2. Behavioral scientists enthusiastically engage with the i-frame, and focus on frailties of thought and behavior as the source of problems. It thus seems natural that behavioral scientists are well-positioned to solve them, by helping individuals overcome their limitations.
3. There are hopes that i-frame interventions (nudges, providing individual-level incentives, information, and education) provide cheap and effective alternatives to conventional s-frame policies, such as regulation and taxation. This hope distracts from the s-frame. It also promises that “heavy-handed” s-frame interventions can be avoided in favor of cheap, incremental, and often politically palatable light-touch measures.

¹⁶ BP’s approach has been widely adopted by the media (e.g., the New York Times has published dozens of articles on how individual behavior can combat climate change). Environmentalists have developed sophisticated analyses of how individuals can reduce their carbon footprints (e.g., Goodall, 2007).

¹⁷ The i-frame perspective can also drive a wedge between supporters of s-frame reforms. Mann (2021: 82) notes “Dividers have sought to target influential experts and public figures in the climate arena as ‘hypocrites’ by accusing them of hedonistic lifestyles entailing huge carbon footprints.” This also emphasizes the i-frame by implying that advocates of s-frame reform should prioritize personal i-frame change (Attari, Krantz & Weber, 2016). Fossil fuel industry allies have also “carbon shamed” climate scientists and activists for driving, flying, or eating meat (Woodward, 2021).

4. The i-frame interventions yield disappointing results, and divert attention and effort from much needed s-frame reforms, bolstering the status quo.

5. Corporations relentlessly target the s-frame, where they know the real leverage lies. They spend substantial resources on media campaigns, lobbying, think-tanks, and academic research sponsorship to ensure that the “rules of the game” reinforce the status quo.

Our focus in this paper is the unwitting (by academics) alignment of interests between corporations and behavioral scientists focusing on the i-frame. We leave aside the many direct attempts by business to coopt academia, dating back at least to the cigarette industry’s mobilization of academics skeptical of a link between smoking and cancer (Brandt, 2012). Across the topics outlined below, there are direct initiatives by businesses to back academics who support specific industry-friendly positions. The same motivation likely underlies (more indirect) corporate campaigns to advance i-frame interpretations of societal problems.

While some corporate tactics (e.g., regarding tobacco and climate disinformation) have been challenged as both legally and ethically deeply questionable, the broader tendency of companies to invest in PR and lobbying to promote their interests is almost inevitable, as predicted by economic theory (e.g., Grossman & Helpman, 1994), and described in the empirical literature (e.g., Bombardini & Trebbi, 2019). Here, too, an s-frame perspective is appropriate, rather than attributing the problem to the “greed” or other moral failings of individual executives. They too are working within the incentives and rules of a system which virtually requires that they promote their companies’ interests, irrespective of their personal views. We take it to be uncontroversial that companies lobby to oppose s-frame reform. What is less obvious is that such PR and lobbying often operates by an indirect, but very powerful, mechanism: the promotion of i-frame solutions.

We now illustrate our argument in detail for four more policy domains (obesity, retirement savings, plastic waste, and rising healthcare costs), then more briefly for six others. Lastly, we outline a positive vision for an s-frame-oriented behavioral public policy.

2. Case studies: How i-frame behavioral public policy went wrong

INSERT TABLE 1 ABOUT HERE

Table 1 reviews prototypical i-frame and s-frame interventions for the four examples we discuss in detail, as well for climate change. Each case conforms (with variations) to the five steps outlined above.

Although we primarily focus on behaviorally-inspired i-frame interventions, i-frame thinking also includes legal disclaimers, conflict of interest disclosures, information provision (e.g., calorie or carbon labeling), which are aimed at helping people make better decisions. Behavioral scientists tend doubt of the effectiveness of such strategies---and with good reason (Golman, Hagmann & Loewenstein, 2017; Loewenstein, Sunstein & Golman, 2014).

2.1 Obesity

The problem of obesity is one of the major public health challenges facing the developed world: we are, collectively, eating too much and exercising too little (Hill, Wyatt & Peters, 2012). But why? Drawing on a vast literature on intertemporal choice from neuroscience (McClure et al., 2004), experimental psychology (Rachlin & Green, 1972), behavioral economics (O'Donoghue & Rabin, 1999), and philosophy (Parfit, 1984), researchers have often seen obesity as exemplifying the i-frame weakness of *present-bias*, by which lure of cake now overwhelms the long-term benefits of better health (see chapters 13, 17 and 18 of Loewenstein, Read & Baumeister, 2003; but see also chapter 16).

Yet variations in obesity over time and across counties reveal the limitations of such a perspective. There is no evidence that present bias has changed over time or place in ways that explain variations in obesity. Indeed, we know of *no* empirical evidence causally connecting obesity to present-bias. There is, however, strong evidence that people who migrate often take on the obesity characteristics of their new locality (Schulz et al, 2006). Obesity is not the product of individual fallibility, but systemic factors.

The food industry encourages academics to focus on i-frame solutions to obesity, including attempts to deflect concern away from food as the source of the problem¹⁸ and discredit academics with opposing views.¹⁹ Brownell and Warner (2009) identify the central plank of the industry's strategy: "Focus on personal responsibility as the cause of the nation's unhealthy diet," *taking the food system as a given*.

Behavioral scientists have unwittingly jumped on this i-frame bandwagon, proposing and testing a wide variety of i-frame interventions.²⁰ Large bodies of research, including many papers by one of us, have explored (i) proximate interventions in people's interactions with food, including innovative calorie labeling and advanced ordering of meals (see Downs & Loewenstein, 2011); (ii) specially crafted incentives to motivate weight loss (e.g., Volpp et al., 2008); and (iii) promoting exercise, typically by paying people to go to the gym (Charness & Gneezy, 2009).

These i-frame interventions are often viewed as alternatives to legislation and taxation. In advocating for his HealthierUS initiative, for example, which promoted exercise and healthier food choices, former President George W. Bush expounded that:

We have a problem when people don't exercise and eat bad food. Obesity can cause serious health problems, like heart disease and diabetes... We must reverse the trend, and we know how to do it. It's exercise and good dieting. Good foods

¹⁸ For example, Coca-Cola financially supported academics to argue that "Americans are overly fixated on how much they eat and drink while not paying enough attention to exercise" (O'Connor, 2015).

¹⁹ This opposition includes personal attacks. Searching the website of the "Center for Consumer Freedom" which says it is "supported by restaurants, food companies, and thousands of individual consumers" yields 275 results for food policy researcher "Kelly Brownell," many of which taunt him for his physical girth.

²⁰ Though not generally agreeing that the primary problem is exercise, not diet.

and regular exercise will reverse the trend and save our country a lot of money but, more importantly, save lives. (Bush, 2003)

But i-frame interventions have proven disappointing: (i) proximate interventions on food ordering produce small, though statistically detectable effects (e.g., VanEpps, Downs & Loewenstein, 2016), (ii) people regain weight once incentives are removed (John, Loewenstein & Volpp, 2012); and (iii) while incentives increase gym visits, a measurable impact on actual weight has not been demonstrated (Charness & Gneezy, 2009).

While publicly promoting an ‘i-frame’ perspective on obesity, the food industry and agribusiness relentlessly lobbies at the s-frame: to maintain and modify laws and regulations to their advantage.²¹ Individual consumers are no match for concentrated firms united by industry associations and armed with lobbyists, in line with Olson’s (1965) classic analysis in *The Logic of Collective Action*. Individuals often care desperately about their waist-lines and health, devoting huge amounts of time and money in (usually unsuccessful) attempts to get, and stay, thin (e.g., Polivy & Herman, 2002). It is not in any individual’s interest to expend time or money to exert an infinitesimal influence on the overall food system.²² But it *is* in the interests of a concentrated and highly organized food industry to spend vast sums to do so.

This argument in no way denies the fallibility of human behavior, or that such fallibility matters for s-frame public policy. Indeed, as we discuss in Section 3, an i-frame *understanding* of human weakness is crucial to explaining how it can be exploited so effectively— e.g., by producing and marketing products that cater to our evolved weakness for sugar and fat. As public health researchers Nestle and Jacobson (2000) note, “Changes in the food environment help explain why it requires more and more willpower for Americans to maintain an appropriate intake of energy.” Moss (2013) documents a meeting of top food industry executives at which some acknowledged their leading role in the obesity epidemic, but could not agree on initiatives to curb it. Moss explains how the food industry uses the physiology and psychology of food

²¹ See the words of Ric Keller, a Florida Republican Congressman who sponsored a bill to ban lawsuits against food companies paralleling those that have been executed against tobacco companies. Speaking to CNN, Keller said “We’ve got to get back to those old-fashioned principles of personal responsibility, of common sense, and get away from this new culture where everybody plays the victim and blames other people for their problems” (Barrett, 2004).²¹ In the same CNN segment, then House Majority Leader Tom DeLay, added “It’s hard to believe that trial lawyers want to make the claim that ‘Ronald McDonald made me do it.’ The point of this debate [is] all about personal responsibility. If you eat too much, you will gain weight.”

²² Agribusiness and the food industry spend accordingly, with over 1,000 lobbyists and a budget of \$106 million in 2020, according to the website “OpenSecrets.” A New York Times investigation (Jacobs & Richtel, 2017) which reviewed corporate records, epidemiological studies, and government reports, concluded that, “a sea change in the way food is produced, distributed, and advertised across much of the globe is contributing to a new epidemic of diabetes and heart disease, chronic illnesses that are fed by soaring rates of obesity in places that struggled with hunger and malnutrition just a generation ago.” Focusing on Brazil, the article documents payments totaling \$158 million to Brazilian legislators by food and beverage conglomerates, opposing government promotion of breast-feeding, bans on junk food advertising to children, and sugar taxes.

consumption to reach consumers’ “bliss points,” maximizing craving and in some cases suppressing cues for satiation.²³

Focusing on individual-level causes and remedies for obesity risks displacing researcher time, financial resources, and journal pages from deeper thinking and in-depth research about what caused the obesity epidemic, about s-frame interventions to reverse it, and about how to marshal behavioral science to help make such interventions successful. Misattributing problems to individual weakness rather than systemic factors also implicitly blames individuals – and encourages them to blame themselves – for their inability to swim against powerful currents they have little hope of resisting.

2.2 Inadequate provision for retirement

The citizens of the U.S. and many high-income countries are financially unprepared for retirement. Half of U.S. families have no retirement savings whatsoever (Morrissey, 2019), and over half of workers between 60 and 65 believe their savings are not “on track” for retirement (Board of Governors of the Federal Reserve System, 2021). Indeed, the median retirement account savings balance for people approaching retirement is just \$21,000 (Morrissey, 2019). Although the average Social Security payment is only \$1,543/month (Social Security Administration, 2021), over two thirds of U.S. retirees identify Social Security as their *primary* income (Transamerica Center for Retirement Studies, 2020).

Inadequate saving vies with obesity as behavioral scientists’ favorite illustration of “present-bias” (e.g., Laibson, 1997): the long-term benefits of saving are presumed to be overwhelmed by the immediate pleasures of spending. But, as with obesity, this story is implausible in a historical and cross-national context.

Preparing for retirement was, until quite recently, achievable for Americans. Until the 1980s, most companies offered pensions paying predictable amounts on retirement (typically pegged to their final salary).²⁴ Problems began with the emergence of “defined contribution” retirement plans (a euphemism for “save for your own retirement”). Originally envisioned to supplement pensions,²⁵ in the 1980s, companies found they could drastically reduce the cost, administrative burden, and risks of pension schemes by offloading funding, and investment decisions, to their employees. And, once some employers ceased to fund pensions, competitive pressures forced their competitors to follow suit. Defined benefit plans are now largely confined to public sector workers, and, even there, there is a trend toward defined contribution schemes. Some employers do match employee contributions; but many offer no retirement plans at all.

²³ Much of this work has been conducted with help from consultants such as Howard Moskowitz (who holds a Harvard psychology PhD).

²⁴ There were, admittedly, problems with the old system of pensions, both because companies used unorthodox accounting approaches to under-fund them and because pension liabilities could be eliminated through bankruptcy.

²⁵ <http://www.pbs.org/wgbh/frontline/article/teresa-ghilarducci-why-the-401k-is-a-failed-experiment/>

Cross-national comparisons reveal that inadequate savings is not a universal problem. Australia is a particularly telling example.²⁶ Not long ago, it was one of the few countries with lower retirement savings levels than the U.S., but it is now a frontrunner in retirement preparedness following far-reaching systemic reforms: universalizing retirement saving, mandating substantial employer and employee contributions, and prohibiting withdrawals for almost any reason. The U.S. has taken the opposite route: not mandating contributions by employers or employees, permitting withdrawals for a range of reasons, and even permitting borrowing against retirement funds.²⁷

A rapid shift back to conventional pensions would be financially onerous for most U.S. companies, but especially for the financial services industry, built on the management of defined contribution retirement plans. Not surprisingly, therefore, the industry adopts the i-frame: taking the defined benefit system as given, and focusing on helping people cope with it more adequately. Ads contrast the happy futures of those who put sufficient resources aside, with the struggles of those who do not. Likewise, the TIAA Institute, the research arm of the huge financial services company that manages many academics' retirement accounts, funds and posts on its website numerous research studies testing interventions to improve retirement preparedness, almost all of which aim to increase the level of saving within traditional defined contributions plans.²⁸ From this perspective, the fate of struggling savers lies in their own hands. Such an i-frame perspective is understandable: financial services firms could not be expected to propose policies that might put them out of business.

If defined contribution retirement plans have such disastrous consequences, asks *Atlantic* author Frank Pasquale, then “why are policy makers so enamored of it?” Pasquale suggests that one reason is the hope that, with the right behavioral interventions (“nudges”), citizens can solve the problem on their own. But he suggests this hope is illusory:

Because the nudge is really a fudge—a way of avoiding the thornier issues at stake in retirement security. The most worrisome unexpected costs of old age, including medicine and personal care, should be addressed by politicians via programs such as Medicare and Medicaid. But by focusing on individuals' decisions to save up for retirement, they can shift responsibility.

This focus on the individual, rather than the wider social context, is not surprising, given that nudging comes out of microeconomics and psychology, two disciplines that tend to break the world into dyadic transactions between isolated individuals and firms. A sociological or political perspective, on the other hand, points to the real roots of retirement insecurity: a great shifting of risk from corporations to

²⁶ See <https://www.thinkingaheadinstitute.org/research-papers/global-pension-assets-study-2021/>.

²⁷ The Australian system is also a defined contribution system, but a far superior one to those prevailing in the U.S. and the U.K. Unfortunately, similar to these other systems, it does typically require workers to make their own investment decisions.

²⁸ The title of one project on their website, “Preparing for retirement reforms: Potential consequences for saving, work, and retirement plans,” seems to refer to potential reforms to the defined contribution system. But quite the opposite. It takes as given that Social Security (a kind of crude defined benefit plan) will become insolvent, and asks how defined contribution plans might make up the difference.

individuals. Workers can be urged to take all manner of “personal responsibility” for saving—but if their wages are stagnant while other costs are rising, it is hard to imagine that strategy really working.

Behavioral scientists have embraced the i-frame enthusiastically, proposing and testing different mechanisms to help people make the right pensions choices. As with green energy, one lever has been the power of defaults: across the U.S., the U.K., and many other nations (OECD, 2020), people have been auto-enrolled into pension schemes, albeit with the possibility of opting out.²⁹ Present-bias has been tackled via ‘auto-escalation’ – i.e., allowing people to make low initial pension contributions, and ramp up contributions as their income grows (Thaler & Benartzi, 2004). In parallel, conventional i-frame interventions, such as improving customer understanding of pensions, and increasing ‘financial literacy’ (Lusardi & Mitchell, 2014) are proposed and tested (e.g., Mandell & Klein, 2009).³⁰

An interesting counterpoint to the i-frame interventions explored by behavioral scientists is provided by Willis’s (2008) provocatively titled “Against Financial-Literacy Education.” Specifically critiquing i-frame interventions involving disclosure, Willis writes:

The dominant model of regulation in the United States for consumer credit, insurance, and investment products is disclosure and unfettered choice. As these products have become more complex, consumers’ inability to understand them has become increasingly apparent, and the consequences of this inability more dire. In response, policymakers have embraced financial-literacy education as a necessary corollary to the disclosure model of regulation (page 197).

Willis questions whether such education really helps, and concludes:

Harboring this belief [that financial literacy is the solution] may be innocent, but it is not harmless; the pursuit of financial literacy poses costs that almost certainly swamp any benefits... When consumers find themselves in dire financial straits, the regulation through education model blames them for their plight, shaming them and deflecting calls for effective market regulation... The search for effective financial literacy education should be replaced by a search for policies more conducive to good consumer financial outcomes (page 198).

I-frame interventions provide a tempting alternative to urgent-needed s-frame reform: radical reform of current defined-contribution plans.

Advocates of behavioral interventions acknowledge the difficulties with defined-contribution plans, but argue that i-frame interventions should be part of the solution. For example, Thaler (2009) writes “Everyone’s lost a lot of money on their 401(k) plans. I’ve heard some people calling them 201(k) plans. So it’s even more important to get people to be saving more for retirement. Behavioral economics has helped us learn a lot about how to do that. One simple way

²⁹ <https://www.ipe.com/auto-enrolment-grows-globally/10029254.article>.

³⁰ Helping customers obtain good quality, independent, financial advice (to help with their individual pension decision making) is also viewed as potentially important.

is... automatic enrolment.” Former President Barack Obama called automatic enrolment a “common-sense, practical solution” to retirement savings (Jacobson, 2012).

Auto-enrolment and auto-escalation are among the most ingenious and elegant i-frame interventions in any domain. Yet their impact has been disappointing, despite often being seen as the major success story for behavioral public policy.³¹ David Laibson, once a leading advocate of i-frame solutions, concluded in a 2020 keynote³² that neither auto-enrolment nor auto-escalation have moved the needle on retirement saving.

First, even without auto-enrolment, many employees end up enrolling in the firms’ retirement plans; auto-enrolment only slightly accelerates the process (Choi et al., 2004). Second, and more significant, is the problem of ‘leakage’ (Argento, Bryant, & Sabelhaus 2015): employees often removed funds from retirement savings accounts, e.g., when changing jobs, or borrow at low interest rates using their retirement balances as loan collateral. Third, auto-enrolment cannot help the many workers at companies which don’t offers matches or provide no plan at all.³³ Incentives for companies to implement auto-enrolment were built into the Pension Protection Act of 2006, and pension enrolment did rise substantially at those firms that offered their workers defined contribution pension plans (Engelhardt, 2011). But even when defaults apply, workers are often defaulted to low rates of contribution (Butrica & Karamcheva, 2013). A decade after these reforms, U.S. retirement saving remains stagnant (Morrissey, 2019).

In the U.K., auto-enrolment has been particularly undermined by default contributions often being set very low. Thus, many people wrongly believe they have “ticked the pensions box” while remaining woefully under-prepared for retirement (Decision Technology, 2017). Indeed, the tendency of low defaults to actually reduce contribution rates for workers who otherwise would have saved more was documented in the very first paper on the impact of defaults (Madrian & Shea, 2001).

Responding to an earlier paper (Loewenstein & Chater, 2017), in the concluding pages of *Nudge: The Final Edition*, Thaler and Sunstein (2021) rightly stress that pension reforms in the U.S. and U.K. involve both i- and s-frame changes. For example, the NEST pension scheme in the U.K. (which helps employers of all sizes provide workplace pensions), is almost entirely an s-frame reform. Crucially, employers are *required* to provide such pensions. The i-frame “nudge” element -- that they are defaulted in *with an opt-out* -- is a relatively minor detail. It is typically the s-frame issues that really matter: whether, as in the U.S., employees can withdraw money from, or take loans against, their pension; or in the U.K., the default pension contribution level.

For pensions, unlike most of the topics we discuss, there has been relatively little active lobbying against reinvigorating defined benefits schemes or their equivalent. We suspect this is because

³¹ In a 2019 discussion with behavioral economists and policy specialists, Stephen Dubner congratulated Thaler for work on auto-enrolment and auto-escalation, which he called “the most successful nudge, and the greatest triumph to date of behavioral economics.” But Dubner then, continued, “So, congratulations, and thank you. But: what does it say about the field of behavioral economics, and behavior change generally, that this largest victory took place a couple decades ago? Where are all the other victories?”

³² <https://www.aeaweb.org/webcasts/2020/aea-afa-joint-luncheon-nudges-are-not-enough>.

³³ See <https://humaninterest.com/learn/articles/average-401k-match/>

there are few firms that would benefit from a shift back to such schemes, and many that would be harmed. If strong public support were to emerge for such reform, we would anticipate a reaction from the financial services industry paralleling that in healthcare (see below).

2.3 Plastic waste

The production and disposal of plastics, cans, bottles, bags, and containers provides a further illustrative example. Plastic bags clog sewage systems, kill about 100,000 marine mammals every year, and degenerate into toxic microplastics that pollute oceans and landfills. Worldwide, shoppers use around 500 billion single-use plastic bags annually.³⁴

Readers who see reducing waste as a matter of individual responsibility may be surprised, as we were, to discover that this i-frame perspective can be traced to the influence of industry. Consider, for example, the famous 'Crying Indian' ad (Mann, 2021: 52-60). In the ad, an actor in Native American dress paddles a birch bark canoe on water that becomes increasingly polluted, pulls his boat ashore and walks toward a bustling freeway where a passenger hurls a paper bag out a car window. The ad concludes with an encapsulation of the i-frame perspective "People start pollution. People can stop it." The wider "Keep America Beautiful" campaign (ubiquitous from the 1950s until today), of which the ad was a part, was conceived and funded by beverage and packaging corporations including the American Can Co., Owens-Illinois Glass Co., and later Coca-Cola and Dixie Cup.³⁵

Behavioral scientists have generated many potential interventions, particularly focusing on reducing littering (e.g., Keep Britain Tidy, 2015). For example, pictures of "watching eyes" are widely deployed in the U.K., in the light of studies indicating that these prime prosocial behavior (Bateson, Nettle & Roberts, 2006; Haley & Fessler, 2005), and especially litter reduction (Bateson, Robinson, Abayomi-Cole, Greenlees, O'Connor & Nettle, 2015). A highly cited intervention tested in Copenhagen in 2011 involves painted footprints leading to brightly colored trash bins, was found to reduce littering by a 46%.³⁶ Unfortunately, despite its apparent success, this approach does not seem to have been tested further, and appears to have been implemented in one other locality: Stirling, Scotland.³⁷ This highlights a broader problem: even where interventions do work, they are difficult to sustain or scale-up. To our knowledge, there are currently no proven anti-littering initiatives operating at scale with a strong evidence base.³⁸ Putting "watching eyes" on packaging (which reduced littering of a leaflet in one field study) may be scalable (Bateson, et al, 2015). However, considerations of cost, displacement of other packaging information, and potential diminution in impact if "watching eyes" become almost ubiquitous, all argue for caution.

³⁴ <https://plasticoceans.org/the-facts/>

³⁵ Dunoway (2017) notes "By making individual viewers feel guilty and responsible for the polluted environment, the ad deflected the question of responsibility away from corporations and placed it entirely in the realm of individual action... The Keep America Beautiful leadership lined up against the bottle bills, going so far, in one case, as to label supporters of such legislation as "communists.""

³⁶ <https://inudgeyou.com/en/green-nudge-nudging-litter-into-the-bin/>

³⁷ <https://www.zerowastescotland.org.uk/litter-flytipping/nudge-study>

³⁸ There is some controversy over the replicability of "watching eyes" interventions, but a recent meta-analysis concludes in its favor (Dear, Dutton & Fox, 2019).

For over 50 years the oil and plastics industry have further resisted efforts to curb plastic packaging by promoting the myth that large-scale plastic recycling is technically and economically feasible, in order to allay concerns about new plastic.³⁹ Yet, according to the EPA, less than 10% of plastic has been recycled in the last 40 years. An NPR investigation titled “Plastic Wars: Industry Spent Millions Selling Recycling – to Sell More Plastic” found internal documents from the 1970s confirming that the industry always knew that recycling at scale would never be economically viable. Moreover, the plastics and oil industries has created and funded nonprofit organizations with names that belie their true purpose. The promisingly pro-environment sounding “Earth911” (<https://earth911.com/about-earth911-mission-and-history/>), for example, with industry partners including ExxonMobil, which promotes the recycling myth and focuses on the i-frame, states that “Thousands of individual small changes create a large, positive impact.”

While promoting the i-frame publicly, the food, beverage, and packaging industries have correctly identified that s-frame change is far more important. Indeed, s-frame interventions banning or taxing plastic use have proven highly effective. For example, in San Jose, CA, a plastic bag ban led to 89% fewer plastic bags in storm drains (60% in rivers and residential areas), and the average number of bags used per person decreased from 3 to 0.3.⁴⁰ As standard political economy considerations would predict, industry has therefore have lobbied heavily against such s-frame interventions, with great success. While in the U.S. only two states (CA and HI) have banned plastic bags, ten (AZ, FL, IA, ID, IN, MI, MN, MO, MS, WI) have legislated statewide *preemptive bans* on banning plastic bags, preventing municipalities from imposing bans or fees. These bans aren’t spontaneous expressions of public hostility to an obscure policy; they arise from concerted lobbying.⁴¹

Corporate interests have also actively opposed “Extended Producer Responsibility” measures for packaging, cigarettes, bottles, and other waste, an s-frame approach that aims to make producers bear the full social and environmental cost of their waste, thereby incentivizing product redesign to reduce that waste (Walls, 2006). Where implemented, such schemes can be highly effective (Walls, 2006; Hanisch, 2000), and the approach is gaining momentum in the EU and U.K.⁴²

³⁹ See <https://www.ecowatch.com/plastic-recycling-myth-2647706452.html> and its embedded links for relevant online discussions.

⁴⁰ Plastic bag taxes do have unintended consequences, such as increased sales of other environmentally problematic bags (e.g., Taylor, 2019).

⁴¹ Here, too, organizations masquerading as pro-environmental and pro-consumer groups have been created to advance corporate interests. For example, the “Alliance to End Plastic Waste” (<https://endplasticwaste.org/en/about>) which advertises itself as a collective “working together to end plastic waste” is funded by Shell and ExxonMobil, chemical companies including Covestro and Dow, and others. The Washington Post (<https://www.washingtonpost.com/blogs/govbeat/wp/2015/03/03/a-plastic-bag-lobby-exists-and-its-surprisingly-tough/>) documents a \$3M campaign by the misleadingly labeled “American Progressive Bag Alliance,” “which is supported by major plastics manufacturers” which derailed a statewide plastic bag ban set to start in 2015 (the ban was subsequently implemented).

⁴² <https://www.pwc.co.uk/services/legal/insights/implications-of-european-and-uk-extended-producer-responsibility-changes.html>

2.4 The high cost of U.S. healthcare

Healthcare is increasingly expensive, especially in the U.S., both for individuals and the economy at large; and results are often disappointing. As usual, time trends and international comparisons are telling. The U.S. has not always been an outlier. In the 1980s, the U.S. population was primarily insured in managed care plans with incentives to insurers and providers to keep down costs (Draper et al., 2002). Providers were mainly paid salaries, which were high but not lavish. In the 1980s, however, the U.S. began a crucial systemic shift: to a fee-for-service system and highly fragmented private insurance market, with high administrative costs and incentives to over-provide expensive, low benefit tests and services, as well as overpriced medications (Lesser, Ginsburg & Devers, 2003). U.S. healthcare costs soon departed dramatically from those in comparable countries, and at this point U.S. health costs are roughly twice the OECD median, with no better than median results on almost all measures of health and health care. Higher U.S. health costs do not arise because Americans are, individually, less healthy than people in other countries. For example, smoking rates in the U.S. are far lower (14% in 2019) than many countries with much lower health costs (e.g., France, Germany and Spain; all with smoking rates substantially higher than 25% in 2021).⁴³

The U.S. healthcare industry (e.g., insurers and providers) promotes an i-frame perspective: that high healthcare costs stem from poor health, which itself depends on individual fallibility. The message is conveyed through actions such as the provision of rewards for exercise (or subsidization of fitness clubs), despite little evidence that such incentives impact health (Redmond, Solomon & Lin, 2007).

Behavioral economists have often taken a similar line. In a typical passage from a large literature, Loewenstein, Brennan and Volpp (2007) wrote:

Individual behavior plays a central role in the disease burden faced by society. Many major health problems in the United States and other developed nations, such as lung cancer, hypertension, and diabetes, are exacerbated by unhealthy behaviors. Modifiable behaviors such as tobacco use, overeating, and alcohol abuse account for nearly one-third of all deaths in the United States (page 2415).

A huge range of i-frame interventions have been proposed to improve health.⁴⁴ But incentives, reminders, and apps have shown little success, either in changing behavior or improving outcomes (e.g., Volpp et al, 2017). In parallel, more traditional i-frame solutions, such providing information (e.g., alcohol labelling), injunctions on products (e.g., “please drink responsibly”), and industry-funded self-help programs (e.g., <https://www.drinkaware.co.uk/>) have typically yielded disappointing results, as with obesity.

Behavioral researchers have also proposed i-frame inventions to help people reduce their own healthcare costs by optimizing their choice of insurance plan, e.g., using calculation aids and defaults (Johnson et al. 2013). The researchers extrapolated from their promising results that the

⁴³ <https://worldpopulationreview.com/country-rankings/smoking-rates-by-country>. Note, however, that cigarette consumption per person is slightly lower in France than in the U.S., which has more casual, and fewer heavy, smokers (see <https://tobaccoatlas.org/challenges/product-sales/>).

⁴⁴ <https://chibe.upenn.edu/news/the-healthy-nudge/>

approach could save Americans \$9B/year (although scaling up i-frame interventions is often difficult and disappointing; see Kalkstein et al., 2022). S-frame differences between the U.S. system and that of comparable countries account cost over \$1T/year (Centers for Medicare and Medicaid Services, 2021). Even the best i-frame intervention is no substitute for s-frame reform.

If s-frame changes caused the problem, then reversing those changes is surely the most natural solution. We know from history, however, that such s-frame reform meets concerted opposition. Following Olson’s logic of collective action, the concentrated interests of the healthcare sector trump the diffuse benefits that system reform could give individuals. As President Obama (2020) wrote on the challenges of even modest reform:

Unlike the insurance companies or Big Pharma, whose shareholders expected them to be on guard against any change that might cost them a dime, most of the potential beneficiaries of reform—the waitress, the family farmer, the independent contractor, the cancer survivor—didn’t have gaggles of well-paid and experienced lobbyists roaming the halls of Congress.

Healthcare is poor value-for-money in the U.S. because there has not been the political consensus to drive through s-frame reforms. Without that consensus, the power of special interests to dilute and derail change is considerable: the U.S.’s major recent attempt at reform, the Affordable Care Act, left most problems facing U.S. healthcare intact, as President Obama implicitly acknowledges above.⁴⁵

The world provides a number of successful healthcare systems with better services and far lower costs than in the U.S. The key to lowering health care costs is to move decisively to a system proven to work elsewhere.⁴⁶ Insights from the behavioral sciences may thus be best focused primarily on understanding how damaging s-frame policies become embedded, and how to build consensus for s-frame reform, rather than “patching” the problem with new i-frame interventions.

2.5 The broader picture

The pattern we have identified applies more widely. Here, we briefly consider six further areas: educational inequalities, discrimination, privacy, misinformation, addiction to prescription drugs, and gun violence.

2.5.1 Educational inequalities. Across most of the world, while elites obtain high-quality education for their children, educational opportunities for the disadvantaged are often poor (UNESCO, 2020). It is uncontroversial that educational inequality is a systemic phenomenon (Morrow, 2017). As affluent parents send their children to private schools, their interest in maintaining the quality of publicly-funded schools declines, hurting the quality of public schools

⁴⁵ For example, the UK National Institute for Health and Care Excellence is empowered to make difficult cost-benefit decision on drugs and services covered by the NHS.

⁴⁶ Note that this would not necessarily entail eliminating private insurance. Several well-functioning systems, such as those in Holland and Switzerland, retain private insurers, but regulate the terms of competition far more tightly than does the U.S.

(Scott & Holme, 2016). In consequence, people at decreasing levels of affluence find it worthwhile to make the financial sacrifice to send their children to private schools, creating a pernicious ‘tipping’ effect (Darling-Hammond, 2017). Even within the publicly-funded school system, similar feedback loops occur between school catchment areas and property prices, which can rapidly divide localities into affluent communities with “good” schools and less affluent communities whose children are consigned to “bad” schools. In the U.S., the divide is exacerbated because education is funded by local property taxes (EdBuild, 2019). Inequalities in education can substantially be reduced with the right systems in place: most Scandinavian countries, for example, have well-funded universal education with no significant private educational sector (Abrams, 2016).⁴⁷

How have behavioral scientists contributed to the debate? Much of our work has focused, not on changing the system, but on helping individual students: shifting students’ attributions for outcomes from a ‘fixed mindset’ to a ‘growth mindset’ (Dweck, 2008; Hochanadel & Finamore, 2015), instilling ‘grit’ (Duckworth, 2016), and reducing ‘stereotype threat’ (Steele, 1998). Much of the research along these lines has hinted, or even explicitly proposed, that these interventions can counteract the impact of low-quality education.⁴⁸ Here, as in the many other cases we discuss, there is the real danger that well-intentioned research providing a false hope of radical change from i-level interventions will undermine public pressure for fundamental systemic change.

2.5.2 Discrimination. Poor and unequal education is, of course, closely linked with race- and class-based discrimination, not just in education, but in housing, nutrition, criminal justice, economic opportunities, and beyond. These are highly entrenched systemic problems that warrant far-reaching s-frame reforms. With its embrace of diversity, equity and inclusion as top goals for institutions, academia, perhaps more than any other profession, has taken the problem to heart. Yet the interventions that are proposed and embraced – mainly dealing with individual-level solutions such as measuring, acknowledging and combatting ‘implicit bias’ (Banaji & Greenwald, 2016), are, we suspect, likely to make only a small dent in the problem (Dobbin & Kalev, 2018). We believe it is crucial that these policies reinforce, rather than distracting from, the case for deep systemic changes, including a massive reallocation of resources and opportunities.

2.5.3 Privacy. The rapid transition to the digital age has seen rules for maintaining privacy lag far behind technological and commercial innovations that undermine privacy. Currently, even

⁴⁷ Private schools offer bursaries to poorer children, and top universities engage in outreach. Such actions provide a defense of the huge educational inequalities, while surely only scratching the surface of the problem.

⁴⁸ For example, a summary of stereotype threat interventions in *The Conversation* reported that “black participants performed worse than white participants on verbal ability tests when they were told that the test was “diagnostic” – a “genuine test of your verbal abilities and limitations.” When this description was excluded, no such effect was seen.” Likewise, it was claimed that an online growth mindset intervention (Yeager et al., 2019) “delivered in less than an hour... a substantial proportion of the effects on grades of the most effective rigorously evaluated adolescent interventions of any cost or duration in the literature within the pre-registered group of lower-achieving students” (page 368). Such claims seem to promise that years of substandard schooling can be overcome by quick, inexpensive, behavioral interventions.

with the protections put in place by the European Union's GDPR,⁴⁹ privacy is unachievable for anyone who owns a smart phone, shops at supermarkets, drives a car, or browses the web. We each leave a digital trail that is all too easy for companies, governments, or malign individuals to track and exploit.

Technology companies promote i-frame solutions while opposing tighter s-frame regulation. The movement toward "notice and consent," whereby people click a consent button allowing their data to be used, is a paradigm example. Here, a behavioral perspective provides a useful corrective, pointing out that few people read, let alone understand, the lengthy and legalistic policies attached to products, apps, and services (Loewenstein, Sunstein & Golman, 2014); and in any case, they have little choice but to consent, or be denied access.

As elsewhere, behaviorally-inspired i-frame interventions have been proposed (e.g., Acquisti et al., 2017). A particular puzzle is the 'privacy paradox' (Acquisti, Brandimarte & Loewenstein, 2015; Barnes, 2006): people claim to care about privacy, yet readily reveal private information when on-line. Merely identifying the puzzle seems implicitly to blame individuals for their carelessness. But achieving digital privacy is not within the power of individuals, however motivated they might be. As elsewhere, s-frame regulation, rather than individual-level prompts, is crucial (Acquisti, Brandimarte & Loewenstein, 2015).

2.5.4 Misinformation. In today's politically polarized atmosphere, the problem of *misinformation* is especially pressing. Rational public debate requires agreement on the facts. But in many countries, and especially the U.S., there are powerful interests actively promoting conspiracy theories and "alternative facts," sowing confusion and uncertainty among the general public. Again, regulation lags far behind technological and social change.

Behavioral science provides a powerful i-frame analysis of *why* people are so vulnerable to misinformation---and should be taken to imply that protecting against these vulnerabilities requires s-level interventions. People are excessively credulous (Gilbert, Tafarodi & Malone, 1993), strongly underestimate the power of conflicts of interests (Dana & Loewenstein, 2003), and are influenced by the many non-epistemic benefits of new information: reducing cognitive dissonance, shoring up personal beliefs systems, creating or cementing identification with 'like-minded' others, providing ammunition in hypothetical or real debates, and many more (Chater & Loewenstein, 2016; Wojtowicz, Chater & Loewenstein, 2022).

There have been wide-ranging academic discussions on how to tackle misinformation (Zucker, 2020), but a major focus of behavioral science has been on i-frame interventions, such as training individuals to detect fake news (van der Linden, Roozenbeek & Compton, 2020). One representative study on misinformation about climate change (van der Linden et al., 2017), for example, forewarned participants that some political actors try to mislead people on the issue, and gave facts and arguments to refute the misinformation before they encountered it. This "inoculation" had some of its intended effect, although one might wonder about the scalability of such an approach given the huge quantity and diversity of misinformation. Likewise, Pennycook et al (2020) showed a powerful impact on truth-discernment and information forwarding of

⁴⁹ While the state-of-the-art in privacy regulation, GDPR may already have been coopted by industry (Utz et al., 2019).

either asking research participants to judge the accuracy of a piece of information or reminding them that information might be inaccurate. Disappointingly, this finding barely replicated (Roozenbeek, Freeman & van der Linden, 2021) and quickly disappeared, and again seems difficult to scale. Yet another approach involved having individuals play a game – *Bad News*⁵⁰ -- in which they seek to distinguish between real and fake news (Basol, Roozenbeek & van der Linden, 2020). With a very large sample, rates of correct detection increased slightly, although even this small effect is difficult to evaluate, as the study lacked a control group.

The problem of misinformation is urgent. If behavioral scientists could find an effective i-level remedy in advance of systemic reforms, this would be a hugely important. We worry, however, that the “promise” of i-level solutions (which, we suspect, will continue to disappoint) will reduce the perceived need for s-level change, which would surely entail the dramatic tightening of regulation of social media. The negative consequences of “information pollution” are, after all, potentially even more damaging to society than chemical pollution, by destabilizing the common base of facts that must underpin any well-functioning democracy.

2.5.5 Addiction to prescription drugs. There has been wide coverage of the corporate malpractice and government complicity which created a wave of addiction and overdoses that currently kills more than 100,000 Americans each year. Purdue, the company most notorious in fueling the disaster, heavily funded academic studies promoting the idea that pain was under-treated and that opioids provide the best treatment. Purdue-funded academics baselessly claimed that only 1% of patients put on opioids become addicted, and even promoted the bizarre concept of ‘pseudo-addiction,’ according to which people who appeared to be suffering from withdrawal were actually suffering from *under-treatment* (Greene & Chambers, 2015).

Crucially for the present argument, Purdue consistently promoted an i-frame perspective on the problem it had helped create, portray its addict victims as weak-willed, irresponsible, individuals. Purdue’s Richard Sackler, for example, wrote in an email detailing his company’s proposed legal and PR defense, “We have to hammer on the abusers in every way possible. *They* are the culprits and the problem. *They* are reckless criminals” (emphasis added).⁵¹ Highlighting the i-frame put the focus of federal and state policy makers on law enforcement, targeting the illegal use of opiates, but not restricting medical prescriptions -- the s-frame intervention that could have had a decisive impact. Moreover, framing addiction as a crime not a disease led addicts to hide their addiction from doctors and others who could potentially help, and compounded the misery of the addicts by adding self-blame to the other devastating consequences of addiction.⁵²

While advancing the i-frame perspective to the media and government, Purdue relentlessly lobbied against s-frame regulation to limit opioid prescribing. Just how powerful s-frame actions could have been is indicated by international comparisons. For example, Germany, the country second to the U.S. in opioid prescriptions (and hence a conservative point of comparison),

⁵⁰ www.getbadnews.com

⁵¹ <https://www.nytimes.com/2019/01/15/health/sacklers-purdue-oxycontin-opioids.html>

⁵² <https://www.nytimes.com/2022/01/26/opinion/oregon-drug-decriminalization-addiction.html>

resisted efforts by Purdue to foist opioids on patients, and managed to largely avoid the addiction epidemic and rash of overdoses experienced in the U.S.⁵³

2.5.6 Gun violence in the U.S. Why are there so many more mass shootings, and gun-related murders and suicides in the U.S. than in other developed nations? The consensus in criminology is that systemic factors are decisive: the availability of cheap and powerful firearms is a distinctive feature of the U.S. Many nations have imposed strict s-level regulations on weapons, rules on gun ownership, and on locking guns safely. Such s-level interventions have generally proven remarkably successful. For example, increasing restrictions on firearms in the U.K. has led to steady declines in gun-deaths by homicide, to around 30 per year in England and Wales in 2020.⁵⁴ By contrast, the U.S., figure is over 50 *per day*. There have been only two mass shootings in Great Britain in more than 20 years, while mass shootings in the U.S. (in which at least 4 people are killed) occur *almost daily* in the U.S..⁵⁵ The NRA has fought every attempt at regulation, adopting the ubiquitous catch-phrase “guns don’t kill people; people kill people,” succinctly encapsulating the i-frame perspective.

Behavioral scientists have at times pursued i-frame policies to combat gun violence. In New York City, the behavioral insights firm ideas42 (founded by Harvard behavioral economists) was asked by the city to conduct a campaign to “discourage would-be shooters from carrying guns” (Gardiner, 2017). Researchers at the University of Chicago Crime Lab point to field experiments showing that interventions to promote cognitive behavioral therapy techniques among male youths reduce violent crime arrests (Heller et al., 2017). While these types of interventions might prove useful in the unlikely event that they could be rolled out to a broader population, there is a risk that the promise of such approach could nudge policymakers away from the s-frame actions so urgently required to address the structural roots of gun violence.⁵⁶

2.6 A Success Story: Tobacco.

Perhaps the best evidence that corporate interests *can* be overcome and problems (largely) solved via s-level reforms comes from the long but ultimately successful battle against cigarettes in many countries. In the U.S., government interventions played a key role in decreasing the

⁵³ Addiction is, of course, a much broader problem: people become addicted to attention (as many tweeters have discovered), games, or gambling. In each case, the same i-frame arguments are made by commercial interests who would lose from tighter regulation. Schüll (2012) describes how slot machines are designed to be addictive, and how casinos and slot machine manufacturers influence policy makers, the public, and even gamblers to believe that the problem is with the gamblers and not the technology. Schüll cites a 2010 white paper released by the American Gaming Association titled “Demystifying Slot Machines” which asserts that “the problem is not in the products [players] abuse, but within the individuals.”

⁵⁴ <https://commonslibrary.parliament.uk/research-briefings/cbp-7654/>

⁵⁵ <https://www.pewresearch.org/fact-tank/2022/02/03/what-the-data-says-about-gun-deaths-in-the-u-s/> Switzerland has high gun ownership (individuals can keep guns after military service) but fairly low gun violence. But regulation is far stricter than in the U.S (Fisher & Keller, 2017).

⁵⁶ Chicago sociologist, Robert Vargas, critiques the lab’s work: “the root of the problem lies in the Crime Lab’s strong focus on individual behavior.” <https://www.chicagomaroon.com/article/2020/6/11/time-think-critically-uchicago-crime-lab/>

smoking rate, from around 50% in the mid-1900s to below 15% today.⁵⁷ A range of different factors turned the tide of public opinion, including Surgeon General Luther Terry's 1964 report definitively linking cigarettes and cancer, and, later, the movement opposing second-hand cigarette smoke, ultimately resulting in legislation and regulation, against tobacco.

Despite concerted and well-funded opposition from the tobacco industry, s-frame reforms, starting shortly after the 1964 report, collectively contributed to the decline in cigarette sales and smoking (Cole & Fiore, 2014). These include large cigarette excise tax increases, clean indoor air laws, efforts to prevent adolescents from purchasing tobacco, more dramatic labeling of cigarette packing, and the pressure and consequences of litigation against the tobacco industry by private individuals, the states, and the United States Department of Justice (DOJ). The success of these efforts shows both that individual initiatives can, under the right conditions, overcome corporate resistance, and that s-frame policies can address entrenched problems. While some policies (e.g., labeling) have more of an i-frame flavor, others (taxes and clean indoor air laws) are squarely s-frame; and the far-reaching nature of the policies taken as a whole are unambiguously s-frame in character.⁵⁸

3. Toward an s-frame behavioral public policy

We have argued that i-frame interventions won't provide cheap and effective solutions to pressing social problems. In retrospect, perhaps this should have been obvious, as the message has been conveyed, repeatedly, by colleagues in political science, law, and sociology.

Our faith in i-frame interventions came from attributing diverse societal problems to frailties in individual behavior. But the history of culture, technology, law, science, technology, and politics is not merely one of human potential continually undermined by human folly (though there is plenty of folly). It is also a story of how humans can flourish *despite* our physical and cognitive weaknesses, by reshaping the rules and systems by which we live. The invention of language, writing, diagrams, maps, and notations of all kinds allow us to share and store our ideas, overcoming the limitations of our memories. Religious, moral, and judicial systems keep selfishness in check. The division of labor helps overcome individual limitations in knowledge and skill acquisition, and radically increases efficiency. Legal and political institutions help us coordinate our actions, determine the allocation of power and property, and save us from Hobbes's "war of all against all." The adversarial processes of the courts, political debates, and scientific exchange mitigate confirmation bias and related effects. And these institutions are entwined with the invention of money, joint stock companies, taxes, governments, the market economy, international organizations and agreements, and the logistical, informational, and financial architecture underpinning modern economies---allowing us, collectively, to achieve,

⁵⁷ Governments substantially *boosted* smoking through much of the 20th century (Stern, 2019). Cigarettes were included in WWI rations; and of the \$3B dollars of "food-related" funding for Europe in the Marshall Plan, \$1B dollars was earmarked for tobacco, with the expressed aim of increasing future demand (Proctor & Proctor, 2011).

⁵⁸ Similar strategies may work elsewhere. Powell and Leider (2021) examined the impacts of Seattle, Washington's Sweetened Beverage Tax (SBT) using a difference-in-differences estimation approach with Portland, Oregon, as the comparison site. Two-years post-tax, volumes of taxed beverages fell by 22%, with especially large declines for family-size items and soda.

understand, and produce far more than we could operating as lone individuals. In short, the history of humanity is one of astonishing s-frame innovation (Hayek, 1945; Ostrom, 1990; Polanyi, 1941; Sugden, 1989). This innovation has occurred despite our cognitive failings, and, in fact, in remediation of them.

Given that human society and its decision makers have historically demonstrated an extraordinary ability to create rules, systems, and institutions to solve social problems, why do the urgent challenges discussed here remain unaddressed? The answer is not, we believe, that these problems are particularly intractable. For most of the problems discussed here, tried-and-tested s-frames solutions are available, many of which are currently successfully implemented in some parts of the world. Nor is the problem any lack of will, attention, long-term focus, or deficiency in moral fiber. Rather, these problems remain unresolved primarily because of the active and coordinated efforts to block s-frame reform by concentrated commercial interests who benefit from the status quo (see, Mayer, 2017), and who seek to maintain it in part by promoting the perspective that these problems are solvable by, and the responsibility of, individuals.

This pattern of opposition to change is another constant of human history. S-frame, and indeed technological, innovations, have been continually and actively opposed by powerful interests that benefit from the status quo, and whether such opposition succeeds has dramatic consequences for mass prosperity and well-being (Acemoglu & Robinson, 2012). It has been argued that the same pattern arises regarding corruption, dictatorships, and even civil wars (Collier & Hoeffler, 2004). Deep and persistent problems arise not because individual humans are not sufficiently ingenious, far-sighted, or unselfish enough to solve them; but because powerful groups benefit from, and defend, the status quo, whatever the consequences for the population at large.

Looking back, we realize that we, and many of our colleagues, had excessive faith that a specific and quite narrow subfield of research on individual judgment and decision making could substantially help address some of society's most pressing problems. By understanding present-bias, loss-aversion, and judgment biases such as over-confidence, we thought it might be possible to re-design the decision-making environment -- the "choice architecture" -- perhaps in quite subtle ways, that would help nudge the individual "players" in society to make better choices for themselves and society at large. But the real problem lies not in human fallibility, but in institutions, laws and regulations that render such fallibility largely irrelevant. In short, we had mistaken deep systemic problems of political economy and conflicts of interest, for problems of individual human folly and responsibility.

But individual-level research remains crucial to informing s-frame policy. Systems operate through their impact on individuals, and their design, operation and impact depend crucially on human psychology. There are long traditions of applied work in health and educational psychology, clinical psychology, political psychology, and criminology, as well as basic findings in the behavioral and brain sciences, that are directly relevant to the design, implementation, and testing of s-frame public policy. Here we illustrate this relevance by considering three key issues: seeing the problem, increasing public support for effective s-frame policies, and policy design.

3.1 Seeing the problem

The role of human psychology is important, first, for understanding when and why people perceive the existence of a problem that warrants attention. If people are unaware of (or doubt the reality of) climate change, the rising epidemic of obesity, or the crisis in retirement savings, they are unlikely to seek out or support policy solutions (Weber, 2006).

Unfortunately, our minds and brains are not well-adapted for identifying and reacting to long-term systemic problems, however severe. Natural selection operates primarily at the level of individual, and most human evolution occurred in radically simpler times, when most of what mattered for survival and reproduction was in our local environment and occurring in the immediate present. This is especially true of our evolutionarily older emotion system, which evolved to help us deal with immediate threats, such as falling from heights, attacks from predators (Gray, 1987), and problematic social interactions involving norm violations or uncooperativeness (Frank, 1988). Our emotion system is ill-adapted to responding to slowly evolving, complex, large scale social problems.

Our emotion system is adaptive. If an adverse situation persists over time, or worsens gradually, our emotional reactions diminish (Frederick & Loewenstein, 1999). Emotions evolved to motivate action. But when we fail to act, or action brings no immediate result, it is taken as a sign that maintaining emotions serves no function. Our emotion system is, therefore, not well designed to motivate action against most of the problems discussed in this paper, such as climate change, obesity, and gun violence, that have gradually climbed to levels which, if we experienced them abruptly, would horrify us. As Dubos (1865) wrote prophetically in *Man Adapting*, “This very adaptability enables [us] to become adjusted to conditions and habits which will eventually destroy the values most characteristic of human life.”

Our emotion system is also largely oriented to the present, which is a major cause of present-bias (McClure et al, 2004). In part because our emotion system is so much more responsive to immediate than delayed outcomes, we fail to clamor for solutions to problems that threaten us in the future. Governments may be in an even worse position than individuals, trapped in a short-term election cycle or concerned about imminent unrest.

Finally, the most effective way to diminish negative emotional reactions to perceived threats is often not to tackle the threats themselves, but to ignore them or persuade ourselves that they don't exist – a major theme in the literature on ‘fear appeals’ (e.g., Leventhal, 1970; Witte & Allen, 2000). As Marshall (2015:228) writes in *Don't Even Think About It: Why Our Brains Are Wired to Ignore Climate Change*, “The bottom line is that we do not accept climate change because we wish to avoid the anxiety it generates and the deep changes it requires.”

Emotions are also oriented to the vivid and the tangible, and to narratives, rather than to facts and statistics. Constantino and Weber (2021) insightfully argue that narratives

“...play a vital role in shaping environmental publics, policy and politics. They can be strategically crafted and disseminated, or they can emerge, be reinforced or revised through social relations. To the extent that those with vested interests in

the existing system also have power over information flows, uncertainty may create the conditions for the intentional manufacturing of narratives that reproduce existing power relations and serve those interests, including discourses of denial, uncertainty and delay” (page 152).

Constantino and Weber review evidence that narratives have played a key role in forestalling action on climate change (Bushell et al., 2017; Lamb et al., 2020), but also have the potential to motivate successful reform (Hinkel et al., 2020).

Our emotional reactions are often remarkably disconnected from factors that are most important for survival and well-being. We cry in movies about fictional characters, but not when we read about calamities in the newspaper. We are outraged by someone jumping line at a restaurant, but unperturbed by extreme wealth inequality. We are swayed more by stories than statistics (Johnson, Bilovich & Tuckett, in press). Again, this lack of proportionality makes us vulnerable to manipulation. Powerful interests are often perfectly aware of these features of human emotions, and actively exploit them. We can be manipulated into risking our life in war, or into committing atrocities, by primal appeals to identity, including nationalism; and we can be distracted from crucial policy challenges by the emotional appeal of “hot-button” issues (Lobel & Loewenstein, 2005).

3.2 Increasing Public Support for Effective S-frame Policies

Human psychology critically determines which policies people support---and in a democratic system (or an authoritarian one in which rulers need to maintain popularity) public support can have a powerful influence on policy. Applying behavioral science to this issue is therefore an important development (e.g., Goldberg et al, 2021; Rinscheid, Pianta & Weber, 2021; Sherman et al., 2021).

Consider emotional adaptation, discussed above, which crucially shapes reactions to beneficial s-frame policies, both before and after implementation. People systematically *underestimate* how much they will adapt (Mazar, Tomaino, Carmon & Wood, 2021; Riis et al., 2005; Ubel, Loewenstein & Jepson, 2005). This provides a powerful brake on the public appetite for systemic change, and a tendency to want to maintain the status quo (Samuelson & Zeckhauser, 1988; loss aversion exacerbates this problem, Tversky & Kahneman, 1991). Those opposing the s-frame reforms needed to shift world economy to net zero carbon emissions, or to reform pensions, healthcare, or the redistribution of wealth, have found that threats to the status quo (e.g., to the “American way of life”) are highly effective tools in resisting reform.

Yet once an effective s-frame policy is implemented, people often adapt surprisingly quickly. Janusch et al. (2021), for example, examined individuals’ acceptance of a “congestion charge” before and after its implementation in a six-player-two-route congestion game. Although the charge curbed congestion effectively, people often vote against it initially. But when the positive effects of the charge were experienced, many embrace an s-level reform they had previously resisted.

Policymakers, too, may significantly underestimate how rapidly people can adapt to new circumstances and how quickly social norms can change (e.g., initial resistance to masks rapidly reversed in many countries during the Covid 19 pandemic, Denworth, 2020). Indeed, people consistently underestimate how much of their behavior is driven by habits (Mazar & Wood, 2022) and social norms (Cialdini, 2005) rather than preferences—and hence overestimate how much they will dislike a shift to new patterns of behavior.

Moreover, adaptation can lead us into futile “arms races,” in which competition expends resources to no-one’s overall benefit (Frank, 1985, 2005; Hirsch, 1976). Frank argues that goods can be divided into those which increase human welfare directly (e.g., freedom from pain) and “positional” goods which are valued partly because we have them, and others do not (obtaining a place at a prestigious college, winning a race, or holding high political office).

Frank argues that a larger than optimal fraction of consumer spending is devoted to what are primarily positional goods (e.g., large houses, fast cars and ‘luxuries’ of all kinds), creating an arms race which funnels human activity and economic resources to activities that leave people, in aggregate, no better off. Frank’s argument is bolstered by neural and behavioral evidence that the physiology and psychophysics of the senses are inherently comparative (Laming, 1997), with only crude judgments of absolute levels magnitudes such as loudness or brightness (e.g., Stewart, Brown & Chater, 2005). Similarly, reward value is coded relatively in at least some neural systems (e.g., Tremblay & Schulz, 1999), and behavioral experiments (e.g., Ariely, Loewenstein & Prelec, 2003; Vlaev et al., 2009) as well as research on happiness (Boyce, Brown & Moore, 2010; Clark, Frijters & Shields, 2008) tells a similar story. The accumulation of money (rather than leisure, time with family and so on) may itself generate an arms race leading to a large loss of human welfare. The challenge of diffusing such arms races (e.g., by s-frame measures such as taxation and redistribution, Frank, 2005), is therefore crucial, though not straightforward.

Psychological insights can also provide direct guidance for designing policies that will garner popular support. For example, banning single-use plastic bags might be perceived as intruding on individual rights. But charging consumers a token amount for using single-use plastic bags is remarkably effective in reducing their use (Homonoff, 2018).

These same “implementational” questions arise when considering how to implement a carbon tax. Psychological insights, and research using psychologically-informed research methods, can contribute tremendously to design decisions regarding whether a carbon tax should be imposed upstream (e.g., on miners, drillers, manufacturers or retailers) or downstream (on consumers), if such a tax should be integrated with the price of the product or segregated (Chetty, Looney & Kroft, 2009), and, crucially, how tax revenues should be returned to the public. Moreover, some of the same psychological forces that undermine calls for immediate climate action can also help make interventions more palatable (see, Loewenstein & Schwartz, 2010; Schwartz & Loewenstein, 2017). If people discount the future and ignore small changes, then it may be appropriate to use capital markets to generate the dividend from future carbon tax revenues in an up-front lump sum. Indeed, a “people’s payout” model, in which carbon tax revenues are largely or entirely redistributed, rather than supporting government spending, has gathered enough support to be implemented in many provinces in Canada (Nuccitelli, 2018). Behavioral research

on these questions will be crucial in making carbon taxes publicly acceptable (Carattini, Kallbekken & Orlov, 2019; Kallbekken, Kroll & Cherry, 2011).

3.3 Improving Policy Design

The behavioral and brain sciences can also provide i-frame insights that inform better s-frame policies. “Behavioral insights” have been at the heart of the i-frame interventions defining the nudge movement. But individual-level psychology is equally important in designing effective s-frame interventions. Table 2 illustrates the many ways in which the behavioral and brain sciences can inform public policy. We briefly discuss a selection of these issues here.

INSERT TABLE 2 ABOUT HERE

Uncontroversially, s-frame policies should be as “ergonomic” as possible, and they frequently fail badly in this regard. For example, claiming tax credits or benefits often involves navigating a baffling bureaucratic processes, excluding many of the people they are intended to benefit (Goldin, 2018); financial, medical, environmental, or nutritional information is often uninterpretable to consumers and does not improve their choices (Loewenstein, Sunstein & Golman, 2014); processes by which the public express their preferences (e.g., regarding preferred school options for their children) can be mystifying (Johnson, 2022); and information disclosure (e.g., about restaurant hygiene standards) is often optional, while consumers often fail to appreciate the significance of omitted information (Gurney & Loewenstein, 2020; Sah & Read, 2020).

A valuable lesson from the behavioral insights movement has been that ergonomics matters just as much for government policies as for the PC or smart phone (see, e.g., Norman, 1988; Thaler & Sunstein, 2008, 2021). Designing policy around the consumer can frequently make the difference between success and failure, and policy design should be guided primarily by behavioral insights. Policy, like any complex good or service, is best designed by multidisciplinary teams, with subject experts, designers, user-experience specialists, ethnographers, anthropologists, and psychologists, alongside behavioral insights specialists.

3.3.1 Improving the policy-making process. Another crucial target for the behavioral sciences is improving how policy is made. To optimize the process of policy development (including influences of lobbying and even corruption), scrutiny and consultation (with external bodies and other parts of government), and legal and political “sign-off” (see, e.g., Sunstein, 2022b), systemic factors will, again, be crucial. But individual psychology remains important: Do policy makers effectively prioritize the most impactful policies (Toma & Bell, 2022)? Are they overconfident, both individually and in potentially self-reinforcing group discussions? Is there suspicion of ideas borrowed from other countries or contexts that are ‘not invented here’ (e.g., Katz & Allen, 1982), which may impede policy development?

Here the interplay between s- and i-frame analysis is particularly intricate (e.g., Mercier & Landemore, 2012). The process by which diverse opinions and interests are combined provides checks and balances against psychological quirks. Open public scrutiny, or the consultation with a range of interests, may reduce the tendency to “lock in” to particular viewpoints (Chater,

2020b), by uncovering counter-arguments and evidence (e.g., Callon, Lascousmes & Barthe, 2009). Conversely, policy making environments with “like-minded” people, or where there is pressure to be on the “winning side” of any debate (if debate occurs at all), may amplify individual biases, by squashing counter-arguments and evidence (Sunstein, 1999), leading to group polarization (Bray & Noble, 1978), pluralistic ignorance (Miller & McFarland, 1991), and group-think (Janis, 1972). How to make group interaction improve, rather than impede, policy design is a key topic for further investigation.

3.3.2 Understanding and Reversing Industry Exploitation of Human Psychology. Industry often exploits consumer psychology for its own ends.⁵⁹ We have already discussed the food industry’s search for “bliss points” for ultra-processed foods (Moss, 2013). Just as understanding the psychology and physiology of appetite and eating helps industry identify such products (typically nutritionally poor and energy-dense), so that same understanding can shape s-frame regulation to protect consumers. Slot machines (and other gambling products and services) are deliberately designed to maximize the tendency to keep gambling and the desire to return (Schüll, 2012)---capitalizing on human desires for immediate “hits,” loss-chasing, present-bias and so on. Arguably entire industries, including alcohol, cigarettes, gambling, and pay-day lending, are partially dependent on “hooking” consumers. Similarly, “click-bait,” “fake news,” and the propagating of extreme opinions by social media algorithms are all designed to keep our collective eyeballs on our screens; day-trading platforms encourage unsophisticated investors to “burn” their money by over-trading, and so on. Here, too, effective regulation requires psychological insight into when and how people can be exploited to their detriment.

3.3.3 S-frame changes that improve i-frame decision making: helping individuals make better choices. Improving individual decision making has been the focus of i-frame behavioral insights. But often the most powerful way to help people make better decision is not merely to modify their ‘choice architecture,’ but to fundamentally change the “rules of the game.” Thus, eliminating conflicts of interest between professionals and their clients (e.g., in medicine or finance) is likely to be more effective than requiring disclosure (Cain, Loewenstein & Moore, 2005; 2011; Larkin et al., 2017; Kanter & Loewenstein, 2019), or educating consumers to detect potential conflicts. Similarly, removing conflicts between operational and safety considerations (e.g., by separate chains of command, and being bound by agreed protocols) is typically the priority in safety critical contexts (e.g., airlines, medicine), rather than helping individuals manage these conflicts in the moment.

S- and i-frame approaches can still often be mutually reinforcing. For example, i-frame measures, such as health warnings on cigarette packets or anti-smoking public information campaigns, may increase public support for s-frame measures including advertising bans, and outlawing smoking in public places (Sunstein, 2022a). Similarly, standardized procedures, such as checklists in aviation and medicine (e.g., Gawunde, 2009), may enhance s-frame processes for scrutinizing performance (e.g., adherence to procedures is more easily monitored).

⁵⁹ Sunstein and Thaler (Sunstein, 2020; Thaler, 2018) called malevolent nudges “sludge” – e.g., defaulting consumers into products they are unlikely to want, or auto-renewing services they would otherwise terminate.

Finally, in a democracy, key individual decisions citizens make is through voting---and a crucial systemic challenge is to maximize turn-out. Recent work (Mazar, Tomaino, Carmon & Wood, 2022) has revealed that people dramatically underestimate the impact of “frictional” factors (e.g., long-distances to travel) on voter turn-out. Citizens who are particularly prone to this bias are especially supportive of measures that would increase frictional effects. An electoral system based on good understanding of the determinants of individual behavior may be crucial for maintaining a healthy democracy.

3.3.4 Avoiding psychologically naïve policy prescriptions. A central topic is behavioral economics is the impact of incentives on behavior (Gneezy, Meier & Rey-Biel, 2011). Everyday psychological intuitions, rational choice models, and reinforcement learning theories in psychology (Skinner, 1938), neuroscience (Schultz, Dayan & Montague, 1997), and machine learning (Sutton & Barto, 2018) emphasize the power of incentives. But, while carrots and sticks matter, an overly simple view of human psychology as maximizing utility may lead to incomplete policy prescriptions.

One weakness of the rational, maximizing perspective is that it underplays the importance of perceived autonomy, fairness, wider ethical considerations (Rai & Fiske, 2011), and the “logic of appropriateness” (March & Olsen, 2008) that guides so much human behavior (i.e., doing what we are believe we are *supposed* to do). Thus, a criminal justice system based on deterrence, reliance on share-options to incentivize management, or attempts to pay for prosocial behavior and fine antisocial behavior, may need to be reconsidered. As ever, direct evidence from comparison across nations, organizations, and real-world incentive systems will likely play a dominant role in evidencing any s-frame policy changes (e.g., Jeppson, Smith & Stone, 2009; Nagin & Pepper, 2012).

A second complication with a purely incentive-based approach to policy is public ‘reactance’ against incentives for policies which citizens see as ineffective, unfair, or infringing liberty (Taylor & Asmundson, 2021). Such reactance need not be grounded in justifiable concerns or firm evidence, but also in baseless conspiracy theories (e.g., Covid is a hoax, Covid vaccinations lead to sterility, etc., e.g., Imhoff & Lamberty, 2020). In such circumstances, incentives may be counterproductive, by increasing suspicion of government motives.

3.4 Wider issues for the role of behavioral science

3.4.1 Implications for Research Methods. In a policy-making regime emphasizing s- over i-frame reforms, there will be an expanded role of the social and behavioral sciences in predicting the likely consequences of alternative s-frame reforms (see, e.g., Janusch et al., 2021). We discussed above how emphasis on the “gold-standard” of field experimentation may reinforce to the focus on i-frame policies. Yet quasi-experimental studies can often substitute for experiments, when different countries, states, and other entities implement specific reforms at different times. Similarly, regression discontinuity designs are informative when a policy measure is applied based on an abrupt qualifying threshold (e.g., income, age, or test scores). Pioneered by psychologists in the 1960s (e.g., Campbell & Ross, 1968; Campbell & Stanley, 1963), these and related approaches have been refined by economists. These developments provide valuable tools for rigorously evaluating s-frame policies.

3.4.2 Building the information environment for debate about s-frame reform. Meaningful debate over s-frame reform, in whatever domain, requires meeting key preconditions for constructive discussion, and opponents of s-frame reform will often work hard to undermine these preconditions. Three factors appear particularly crucial to stymying agreement: lack of a sufficient common ground on the relevant “facts”; excessive polarization, such that any issue becomes a proxy for all others (and perhaps for social identity); and lack of trust in the good faith of the “other side.” Opponents of s-frame reform engage in disinformation (e.g., big tobacco on the dangers of smoking; the fossil fuel industry’s attempt to undermine climate science, Oreskes & Conway, 2011), thus undermining a common ground of facts from which consensus might be reached. Another common tactic is to align policy problems with existing polarized debates (e.g., painting climate activists or healthcare campaigners as anti-capitalist or anti-freedom). Personal attacks (e.g., on climate scientists⁶⁰ or public health experts), further undermine trust in the good faith of those with whom we differ; and acrimonious social media interactions are often sufficient to block reasoned debate.

Improving the information environment for public debate, and countering active attempts to corrupt it, is a key research topic. Without high quality public debate based on a shared evidence-base, gaining support for systemic change is likely to be very difficult. How can such a goal be furthered? We suspect that substantial s-frame changes are likely to be required, for which consensus will be difficult precisely because that basis has been progressively undermined. It is outside our scope and expertise to identify the most effective s-frame measures: but possibilities include dramatically reducing the concentration of media ownership; imposing rules of impartiality on news providers; treating social media providers as publishers (and hence subject to the laws and regulations that apply to them); associating social media profiles with traceable human identities (addressing both the prevalence of bots, malicious disinformation, and allowing legal redress to defamatory posts); and requiring social media companies to open their algorithms to public scrutiny. Which of these policies will be effective? Which will backfire? Although the specifics of many of these issues are new, some insights can be gleaned by experiences in other countries at different points in time. Insights from social psychology on belief and attitude formation, trust, in-groups and out-groups, social identities, etc., will also be clearly relevant in predicting which interventions are likely to work.

3.4.3 Where to draw the line on ‘heavy-handed’ paternalism. We advocate a more heavy-handed public policy than that inherent in the nudge approach. But where should the line be drawn on regulation? The behavioral and brain sciences won’t answer this question. The public, through normal democratic processes, must balance freedom-to-choose and freedom-from-temptation (or addiction). But behavioral insights should inform this debate, e.g., regarding the power of visceral impulses (hunger, thirst, sex, pain, etc.) which can overwhelm a person’s attention and drive behaviors that may not align with their long-term interests (Critchley & Harrison, 2013; Loewenstein, 2006). The physiology and psychology of addiction is particularly crucial (e.g., Elster & Skog, 1999) to distinguish addiction from free consumer choice (Heather & Segal, 2017). Similarly, understanding of individual differences, including psychiatric disorders, will help in clarifying whether some groups of people may be especially vulnerable, and how they can be protected.

⁶⁰ <https://www.theguardian.com/environment/2017/feb/22/climate-change-science-attacks-threats-trump>.

Exploitation arises, too, from cognitive rather than motivational vulnerability. Products can be misleading and overly complex; advice can be distorted by conflicts of interest (see Table 2). Drawing the line between acceptable marketing (e.g., legitimately putting goods and services in a good light) and malpractice cannot, again, be resolved by scientific evidence---it is political choice to be made by the electorate and its representatives. Here too, insight from the behavioral and brain sciences should inform such deliberations. For example, if product complexity is too great for people to make stable choices (or assess which products are appropriate for which people or purposes), this “sludge” may bamboozle consumers into make choices against their own interests (Sunstein, 2020; Thaler, 2018, Thaler & Sunstein, 2021). Similarly, the fact that people largely discount disclosed conflicts of interest (Loewenstein, Sah & Cain, 2012) should raise alarm bells for regulators relying on mandatory disclosure (e.g., Loewenstein, Sunstein & Golman, 2014). If privacy disclosures are demonstrably incomprehensible, they clearly cannot usefully inform choice.

4. Conclusion

Our goal has been to provoke discussion of how behavioral science can best inform public policy. We have argued that our field has been excessively focusing on policy interventions targeting individual behavior, and that (1) many critical public policy challenges arise from problematic systemic policies, which are defended by the commercial interests they benefit; (2) those commercial interests promote the virtues of i-frame solutions, while lobbying against s-frame reform; (3) many behaviorally-oriented academics, including ourselves, have inadvertently reinforced the ineffective i-frame perspective; and (4) i-frame interventions yield disappointing results, and more importantly, can reduce support for effective s-frame policies.

We have focused on how behavioral scientists have inadvertently assisted efforts by corporate interests to resist systemic changes, but the idea that corporate interests craft the rules to benefit themselves is hardly original (see, e.g., Acemoglu & Robinson, 2012). Nor is the idea that commercial interests promote individualistic perspectives to avoid regulation. Giesler and Verusiu (2014:841) coin the term “responsibilization” to refer to processes “through which responsibility is shifted away from the state and corporations” and toward the “responsible consumer.” Giridharadas (2019) notes that we seem to have collectively

“...lost faith in the engines of progress that got us where we are today—in the democratic efforts to outlaw slavery, end child labor, limit the workday, keep drugs safe, protect collective bargaining, create public schools, battle the Great Depression, electrify rural America, weave a nation together by road, pursue a Great Society free of poverty, extend civil and political rights to women and African Americans and other minorities, and give our fellow citizens health, security, and dignity in old age.”

We see informing s-frame interventions as the future of behavioral public policy. Behavioral scientists’ excessive enthusiasm for i-frame policy has reduced the impetus for systemic reform, just as corporations interested in blocking change intend. We have been unwitting accomplices to forces opposed to creating a better society.

We echo Furman's (2016, p8) call for "behavioral scientists to look further up in the branches toward higher-hanging and potentially better fruit. That entails starting from the big questions... and then determining what behavioral insights and research, often as complements to more traditional policy tools, are needed to help solve them."

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Conflicts of interest

Both authors have served on the academic advisory board of the U.K. Behavioural Insights Team. NC is co-founder and director of Decision Technology (www.dectech.co.uk), a research consultancy that has worked on consumer behavior with retailers, banks, energy companies, the gambling industry, food delivery companies, café chains, telecoms and media companies, and charities. GL consults with health insurers Florida Blue, Highmark, and United Healthcare. None of the ideas expressed in this paper are supportive of the interests of these organizations, and in some cases could be viewed as conflicting with them.

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Table 1. Potential i-frame and s-frame interventions to address public policy problems

| <i>Policy issue</i> | <i>Potential i-frame interventions</i> | <i>Potential s-frame interventions</i> |
|---------------------|---|--|
| Climate change | Social feedback on energy use (Schultz et al., 2007) Smart meters (Department for Business, Energy & Industrial Strategy, 2013) Carbon footprint calculators (West et al., 2016) | Carbon pricing (Best, Burke, & Jotzo, 2020) Decarbonization of the power sector (Jägemann et al., 2013) Green building codes (e.g., LEED certification) (U.S. Environmental Protection Agency, n.d.) |
| Obesity | Calorie labels (Jue et al., 2012; Swartz et al., 2011) Portion size changes (Schwartz et al., 2012; Downs & Loewenstein, 2011) Weight loss incentives (Volpp et al., 2008) Individual incentives to exercise (Charness & Gneezy, 2009) | Sugar tax (Allcott et al., 2019) Subsidies for healthy food (Afshin et al., 2017) |
| Retirement savings | Advisors declare conflicts (Cain et al., 2005) Defaulting into pensions (Madrian & Shea, 2001) Save More Tomorrow (Benartzi, 2012) | Employer-provided pensions (e.g., Australian Age Pension) (Agnew, 2013) Social security expansion (Social Security Administration, n.d.) |
| Healthcare | Medication reminders (Volpp et al., 2017) Choice architecture for insurance exchanges (Johnson et al., 2013) | Government negotiation of prescription drug prices (Ginsburg & Lieberman, 2021) Single-payer health insurance (Woolhandler & Himmelstein, 2019) |
| Waste | Keep America Beautiful campaign (Mann, 2021) Painted footsteps leading pedestrians to trash bins (Keep Britain Tidy, 2015) | “Polluter pay” policies (Corkery, 2020) Plastic bag bans (National Conference of State Legislatures, 2021) |

Table 2. The many roles of the behavioral and brain sciences in policy design and implementation

| <i>Question for i-frame analysis</i> | <i>Example issues</i> | <i>Key policy choices</i> | <i>Supporting input from the behavioral sciences</i> | <i>Examples input from system-level</i> |
|--|--|---|--|---|
| When are individuals vulnerable to exploitation? | <p>Is there a perceived and/or real distinction between addictive behavior and “free choice” (Vohs & Baumeister, 2009)</p> <p>Where does product/service complexity exceed consumers ability to choose (e.g., financial and health decisions)? (Scheibehenne, Greifeneder & Todd, 2010)</p> <p>The problem of conflicts of interests (e.g., in healthcare, Chimonas & Korenstein, 2021; finance services, Bolton et al., 2007)</p> | <p>Extent of regulation of prescription drugs, gambling (Kolodny, 2020; Schull, 2012), taxation of ultra-processed foods, etc. (Brownell et al., 2009)</p> <p>When is regulation justified to simplify options or eliminate poor options?</p> <p>When and how should conflicts be disclosed? (Loewenstein et al., 2012)</p> | <p>Psychology and neurobiology of addiction (Robinson & Berridge, 2000)</p> <p>Social transmission of overeating and addictive behaviors (Christakis & Fowler, 2007)</p> <p>Classic judgment and decision-making effects (Kahneman et al., 1982)</p> <p>Psychology of attention (Pashler et al., 2001)</p> <p>Consumer discounting of known conflicts of interests (Cain et al., 2011)</p> | <p>Comparative study of regulations, food environments across time and place (Perez-Ferrer et al., 2019)</p> <p>Scale and nature of industry lobbying (Brownell & Horgen, 2004)</p> <p>Pressures to make products complex, e.g., to reduce competition (Célérier & Vallée, 2013)</p> <p>Race-to-the-bottom: if some firms exploit conflicts, then they may outcompete those that are more scrupulous (Schwarcz, 2008)</p> |

| | | | | |
|---|--|---|---|--|
| <p>How systemic problems arise from individual frailties</p> | <p>Welfare-destroying arms races over “positional” goods (Frank, 2005)</p> <p>Psychological factors underlying market instability (Barberis, 2018; Shiller, 2000)</p> | <p>How might positional externalities be minimized? (e.g., through a consumption tax, Frank, 2008).</p> <p>“Frictional” taxes to reduce trading volumes and, perhaps, market volatility (Hanke et al., 2010)</p> <p>How should cryptocurrencies be regulated? Should they be banned? (Rogoff, 2022)</p> | <p>Relative nature of magnitude perception (Laming, 1997, Weber, 2004)</p> <p>Hedonic adaptation to objective improvements, including salaries (Clark et al, 2008)</p> <p>Neural and cognitive basis of imitation (Hurley & Chater, 2005)</p> <p>Social transmission of information (Boyd et al., 2011)</p> <p>Naïve extrapolation in forecasting (MacKinnon & Wearing, 1991)</p> | <p>Conspicuous consumption (Veblen, 1899)</p> <p>Amplifying power of marketing, advertising, conventional and social media</p> <p>Industry lobbying for financial deregulation (Igan & Lambert, 2019)</p> <p>Network structure of financial markets (Gai & Kapadia, 2010)</p> <p>Presence of algorithmic trading in financial markets (Sornette & von der Becke, 2011)</p> |
| <p>Improving forecasting of likely impacts of s-frame changes on behavior</p> | <p>When will s-frame policies be accepted or flouted? And by whom? (e.g., Brehm, 1966)</p> <p>Will s-frame interventions have the desired effect and/or generate negative unintended consequences?</p> | <p>Will mask wearing be publicly adopted? (e.g., Dimant et al., 2022)</p> <p>Will social distancing rules be flouted?</p> <p>Who will take up, be suspicious of, or actively oppose vaccination?</p> | <p>Social norms are continually renegotiated, rather than being fixed, and hence can change rapidly (e.g., Chater, Zeitoun & Melkonyan, 2022)</p> <p>Political and social “identity” (Tajfel & Turner, 1979) may decisively influence beliefs and attitudes, especially in a highly polarized society (Huddy, 2001)</p> | <p>Comparison with similar challenges and interventions, across time and between countries (Clark et al., 2020; Newey, 2020)</p> <p>Social and mainstream media environment</p> <p>Levels of trust in government and other people, social cohesiveness, political polarization (Iyengar & Westwood, 2015; Putnam, 2000)</p> |
| <p>Making systemic changes more “ergonomic” and appealing</p> | <p>How can carbon taxes be designed to best obtain public support? (Carattini et al., 2019)</p> | <p>Tax or rebate?</p> <p>Hypothecation of taxes to increase public support?</p> <p>Framing and grouping of issues and policies (e.g., is</p> | <p>Classic judgment and decision-making effects (Kahneman et al., 1982)</p> <p>Psychology of perception, attention, memory, and</p> | <p>Nature of policy innovation, design, and implementation process (openness to scrutiny, external input, who is involved (Murray et al., 2010)</p> |

| | | | | |
|---|---|---|--|---|
| | How to discourage single-use plastic bags? (Disney et al., 2013) | CO ₂ emission classed as pollution?) | relevance to usability (Norman, 1988) | Use of testing, focus groups, experimentation, and polling to fine-tune messaging |
| Building the information environment for debate over support s-frame reform | Building consensus over “the facts” Reducing political polarization (Rollwage et al., 2019.) How to build trust between individuals | Reducing concentration of media ownership? Treating social media as platforms or publishers, or a hybrid? (Samuelson, 2021) | The “credulous mind” (Fessler et al., 2017; Pennycook & Rand, 2019) Social psychology of groups (e.g., in-group/out-group thinking, social identity) | Who controls the media environment? State and non-state actors influencing social media; disinformation and bots Social media echo-chambers (Cinelli et al., 2021) Lobbying on social media regulation |
| Better quality s-frame decision-making: improving the policy-making process | Improving government policy making processes (Sunstein, 2022b) | How should policies be proposed and by whom? Who is consulted inside and outside government, and how does that input block and/or modify policy? | “Defensive” decision making Poor prioritization by policy impact (e.g., Toma & Bell, 2022) Overconfidence “Not invented here” Avoiding “groupthink” (Packer, 2009) | Governance processes; principal-agent problems (Miller, 2005) Corruption, lobbying Openness to public scrutiny Systems for collecting and evaluating relevant information on policy outcomes (Sanderson, 2002) |
| Better quality i-frame decision making: helping individuals | Consumer choice | When does more information help? And how is that information presented? | Classic judgment and decision making (Kahneman et al., 1982) Limits of attention and memory Social cognition | Availability of trusted product information and reviews Access to own choice-relevant data (e.g, following Mydata principles ⁶¹) |

⁶¹ <https://www.mydata.org/participate/declaration/>

| | | | | |
|----------------------------|--|--|--|---|
| <p>make better choices</p> | <p>Improving professional decisions (e.g., in medicine, financial advice, safety-critical engineering)</p> | <p>When does it help to know about other people’s choices</p> <p>How to learn from mistakes, rather than cover them up</p> <p>How to reduce conflicts of interest</p> <p>When are “league tables” helpful?</p> | <p>Nudges: defaults, social proof (Thaler & Sunstein, 2008)</p> <p>Role of automation and AI (Briganti & Le Moine, 2020)</p> <p>Checklists (Gawunde, 2009)</p> <p>Fast-and-frugal heuristics (Marewski & Gigerenzer, 2022)</p> | <p>Existence of a market for “choice engines” (Thaler & Tucker, 2013) to help manage complex choices</p> <p>No blame culture: allowing system-improvement to reduce individual errors (Khatri et al., 2009)</p> <p>Independence between operation and safety decision making (e.g., airline safety)</p> <p>Collecting and analyzing incident data</p> |
|----------------------------|--|--|--|---|