

ON THE DYNAMICS OF HUMAN BEHAVIOR: THE PAST, PRESENT, AND FUTURE OF CULTURE, CONFLICT, AND COOPERATION*

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ABSTRACT: I provide a theoretically-guided discussion of the dynamics of human behavior, focusing on the importance of culture (socially-learned information) and tradition (transmission of culture across generations). Decision-making that relies on tradition can be an effective strategy and arises in equilibrium. While dynamically optimal, it generates static ‘mismatch.’ When the world changes, since traits evolve slowly, they may not be beneficial in their new environment. I discuss how mismatch helps explain the world around us, presents special challenges and opportunities for policy, and provides important lessons for our future as a human species.

Keywords: History, evolution, culture, mismatch.

JEL classification: C73; E14; N01; N10; Z1.

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There is a remarkable amount of variation in the beliefs and values held by people around the world. These views are often cultural, meaning that they are, at least to some extent, socially learned and socially transmitted. They are often shaped by tradition; namely, the transmission and persistence of cultural values across generations.¹

In many domains, this diversity results in genuine disagreement about what is right and wrong. This is seen most clearly if one thinks of different religious values and beliefs, which are often in conflict with each other. But there is also disagreement about more general normative issues. For example, should one give preferential treatment to another if they are from the same community? From the same country? Are we obligated to help those from other groups? Should women have equal rights as men? Scholarship has shown that people have very different views about the right answers to these questions (Fortin, 2005, Fernandez, 2007, Enke, 2020) and in the extent to which individuals tolerate views different from their own (Gelfand, 2018). This moral variation also manifests in debates about economic and social policies, such as immigration, gay marriage, gun regulations, funding of police, affirmative action, reparations, and the role of government. For many, views about these issues are based on socially learned ideologies (Cohen, 2003), and thinking about them is often governed by moral conviction and emotion rather than by rational logic (Gampa, Wojcik, Motyl, Nosek and Ditto, 2019, Webster and Albertson, 2022).

While there are important differences between countries, there is also significant disagreement within countries. In fact, the within-group variation tends to be much larger than the between-group variation (Desmet, Ortuno-Ortin and Wacziarg, 2017). The events of the United States in the recent past provide a striking example of the within-society conflict and disagreement. There have always been divides in the values and beliefs held by individuals. But, events like the 2016 presidential election, the COVID pandemic, the George Floyd protests, the 2020 presidential election, and the January 6, 2021 capital riots, make clear that these differences are deeply held and have important real-world effects.

These issues raise a number of open questions. Why do we hold on to these beliefs so firmly? Why are there such stark differences in the values we hold? What factors heighten the disagreement? What does this imply for policy and the future of cooperation within society? In short, is there a logic to all the disagreement we observe in the world today?

¹Here, I use the definition of ‘culture’ from the evolutionary anthropology literature: “socially learned information stored in individuals’ brains that is capable of affecting behavior” (Boyd and Richerson, 1985).

It is these questions that motivate the inquiry of this article. Specifically, my aim is to draw from a standard conceptual framework from evolutionary anthropology, which models socially transmitted knowledge, values, and beliefs (i.e., culture) and their transmission over time (i.e., tradition), in an attempt to provide an informed discussion about these issues.

1. Conceptual framework

A. Basic setup

To help fix ideas and structure thoughts, I will rely on a simple theoretical framework. I'll describe the simplest and most transparent model that I know of that illustrates the concepts and dynamics that are the focus here. The model is taken from Giuliano and Nunn (2021), which reproduces the basic logic of the classic model by Alan Rogers (1988).

In the model, the players consist of a continuum of members of a society. Each period, a new generation is born and the previous generation dies. When a player is born, they make a once-and-for-all choice between two possible actions, which we denote a and b . Which of the two actions yields a higher payoff depends on the state of the world, which can be either A or B . If the state is A , then action a is better, yielding the payoff β , while action B yields the payoff $-\beta$. If the state is B , then action b yields β and action a yields $-\beta$.

In each period, with probability $\Delta \in [0,1]$, there is a shock, which results in a new draw of the state of the world. When this occurs, it is then equally likely that the draw results in the world being in either state. The state of the environment is initially unknown by the players.

There are two types of players. The key distinction between the two is how they decide what action to undertake during their lifetime. The first type is what we call “traditionalists” and denote by “T.” These are individuals who are influenced by the values, beliefs, and actions of the previous generation, which are used guide the individual’s choice. This is modeled by assuming that each player adopts the action of a representative person – namely, a randomly chosen person – from the previous generation.

The assumption that individuals are influenced by a randomly-chosen individual, while not to be taken literally, does have appealing properties that are intuitive and capture first-order aspects of reality. First, the assumption implies that more common actions are more attractive and more likely to be copied. Second, it means that the distribution of actions is reproduced

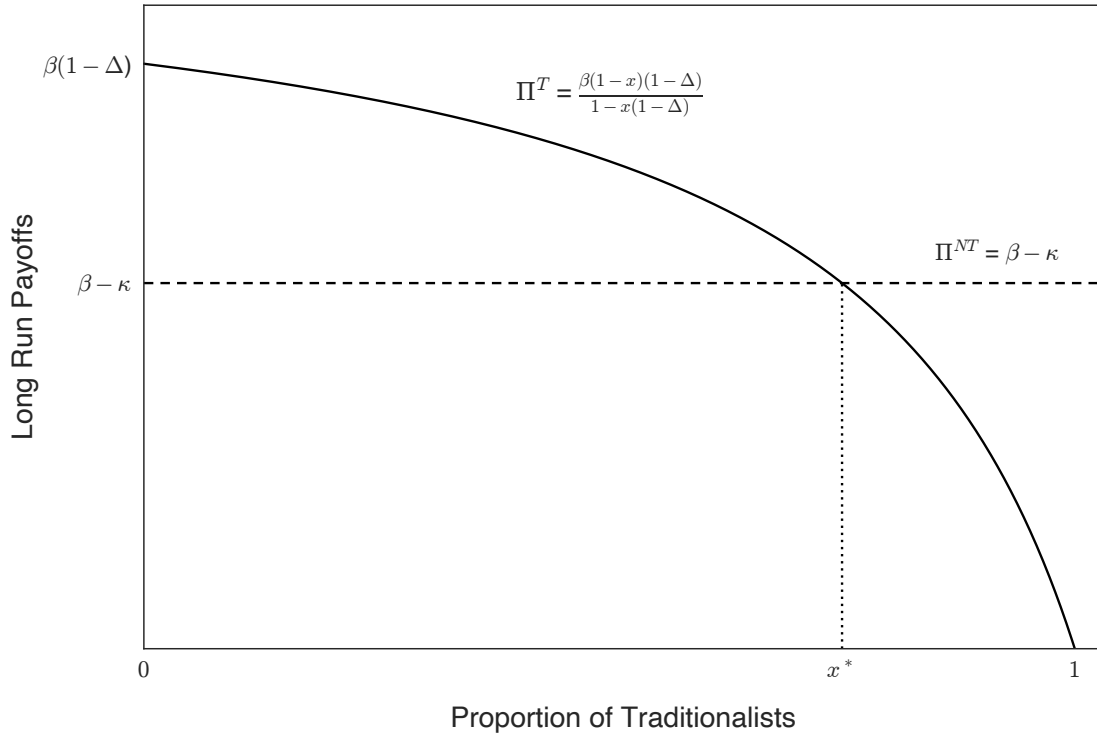


Figure 1: The equilibrium proportion of traditionalists (T) and non-traditionalists (NT).

by the next generation of traditionalists. Third, it allows for both vertical transmission (parents to children) and oblique transmission (non-parents to children) and, therefore, does not simply assume children always adopt the actions of their parents, which we know is not true in reality.²

The second type of player is what we refer to as “non-traditionalists” and denote “NT.” These individuals place no value at all in tradition and ignore the actions of the previous generation. Rather than being influenced by the previous generation, they expend costly effort to learn the state of the world with certainty and they choose their action with this knowledge. The cost of learning the state of the world is given by $\kappa > 0$. It can be very small, but we assume that it is positive. In reality, this cost can be thought of as a time or resource cost needed for learning. We denote the proportion of traditionalists in the society by $x \in [0, 1]$.

In reality, we might think that other strategies are possible. However, focusing on these two possible extremes allows us to understand the costs and benefits associated with decision making that relies on socially learned information (i.e., culture) and its transmission across generations (i.e., tradition).

²The model does not allow for horizontal cultural transmission. Thus, it should be viewed as highlighting the dynamics that arise from cultural transmissions across generations and not across individuals within generations.

B. The emergence of tradition

To understand the equilibrium in this setting, I consider the equilibrium prevalence of the different types. To see this, consider Figure 1, which shows the payoffs to both types as a function of the proportion of traditionalists in the society, x . The payoff to non-traditionalists is independent of x and is given by $\Pi^{NT} = \beta - \kappa$. The expected payoff to traditionalists, which is given by: $\Pi^T = \frac{\beta(1-x)(1-\Delta)}{1-x(1-\Delta)}$, is decreasing in x .³ Intuitively, as the fraction of traditionalists increases, it is less likely that a traditionalist will copy a non-traditionalist who obtained the optimal action for the environment of their generation. At the extreme, where everyone in the population is a traditionalist ($x = 1$), each traditionalist copies another traditionalist and the expected payoff is 0. Half the time they get $-\beta$ and half the time they get β . At the other extreme, where everyone else is a non-traditionalist ($x = 0$), a (potential or ‘mutant’) traditionalist would copy the action of someone in the previous generation and, as long as the environment does not change, she would obtain the right action. Thus, with probability $1 - \Delta$, a traditionalist’s payoff is β . If a shock does occur, which occurs with probability Δ , then there is an equal probability that the environment is subsequently in either state and the expected payoff is 0. Therefore, the expected payoff is $\beta(1 - \Delta)$.

To see how tradition can emerge, consider the case where the environment is very stable; namely, Δ is close to zero. In this case, the payoff to a traditionalist in a society where everyone else is a non-traditionalist is β . This will always be greater than the payoff to non-traditionalists, which is $\beta - \kappa$. Thus, as long as Δ is not too high and κ not too low, there cannot be an equilibrium without tradition where $x^* = 0$. Intuitively, in such an equilibrium, a traditionalist can always come along and freeride on the information learned by the earlier generation by copying their action without learning for themselves the current state of the world. Thus, they avoid bearing the cost κ . Of course, this only works if the environment of the previous generation is the same as this generation, which is more likely if Δ is low. Thus, relying on culture and tradition involves a tradeoff between cost savings, κ , and imprecision due to the potential for the world to change, given by Δ .

If we assume that the relative payoffs of different types affect their fitness and/or survival, then as long as $\frac{\kappa}{\beta} > \Delta$, traditionalists are present, $x^* > 0$. Thus, the society will tend to feature tradition, social learning, and cultural transmission across generations. This is more likely to

³See Giuliano and Nunn (2021) for the derivation and details.

occur when the cost of individual learning is higher ($\frac{\kappa}{\beta}$ higher) and when the environment is more unstable (Δ higher).⁴

A reliance on culture, and its transmission across generations, emerges because it has benefits. By following the customs and practices of previous generations, individuals do not have to reinvent the wheel, re-learning what was already learned in previous generations. In the model, this means that individuals avoid the cost κ . In reality, this means that if a society has already learned how to effectively hunt, how to cultivate crops, and which customs help society to exist in harmony, then these can be taken as important and then copied by each subsequent generation. As long as the cost κ is high enough and the world today is similar to that of the past (i.e., Δ is low enough), then placing value in and relying on tradition is an equilibrium strategy for many in society.

An interesting aspect of tradition is that people do not need to know about the benefits of a tradition to receive the benefits. In reality, the benefits of tradition is seldom known. Instead, the tradition is followed because of the belief that it is important to do so. Consider the example of religion. Individuals tend to believe religious teachings and follow them because they believe that they are true. They do not follow the teachings because they believe that the religion has material benefits for themselves or society as a whole. This is exactly what is presumed by the model. Individuals copy the action from the previous generation. They do not exert costly effort trying to figure out how beneficial that action is. (This would be more akin to the strategy of non-traditionalists.) Instead, they simply adopt the action, placing value in maintaining that tradition in the next generation.

There are many real-world examples of functional cultural traits being followed despite the population not knowing their benefits.⁵ One of the best-known examples is the alkali processing of maize, which is the traditional method of preparing maize in most of Latin America. During the process, dried maize is boiled in a mixture of water and limestone or ash, before being mashed into a dough called 'masa'. Although it was unknown at the time, putting limestone or ash in the water before boiling prevents pellagra, a disease resulting from niacin deficiency, which occurs in diets that consist primarily of maize. An alkaline solution increases the body's ability to absorb the small amount of niacin that is present in maize (Katz, Hediger and Valleroy, 1974).

⁴ In an equilibrium with both types present, the equilibrium proportion of traditionalists, x^* , is given by $\frac{\kappa - \Delta\beta}{\kappa(1 - \Delta)}$.

⁵ See chapter 7 of Henrich (2016) for more examples.

The benefits of traditional cooking appear to be fairly general. A study by Billing and Sherman (1998), which examines data for 43 spices from 4,578 meat-based recipes in 93 cookbooks from 36 countries, finds that, in general, the traditional use of spices occurs in ways that tend to maximize their antimicrobial properties.

Beyond food preparation, there are many other examples of traditions – often spiritual, religious, or moral in nature – being adopted because of beliefs about their inherent importance rather than an understanding of their benefits. An example is high god religious beliefs, as in Islam or Christianity, which have been shown to increase social cohesion and prosperity, allowing societies to cooperate even among very large groups (Norenzayan, 2013). Smaller-scale spiritual beliefs have also been found to have (unknown) benefits. For example, the Naskapi, an Indigenous society that traditionally lived on land that today is in Quebec, Newfoundland, and Labrador, practiced pyromantic scapulimancy, which is divination using a shoulder blade that is burned in a fire. Ancestral spirits communicated to those alive through the cracks and marks created by the fire. An important element of this communication was spirits helping those who were alive know where to hunt (Speck, 1935). This tradition, although it was followed because of spiritual beliefs, had the benefit of allowing hunters to effectively randomize where they hunted despite humans being poor randomizers (Bar-Hillel and Wagenaar, 1991). In this setting, which is effectively a multi-dimensional version of the game matching pennies, there is no pure strategy Nash equilibria; only a mixed strategy Nash equilibrium where each player – i.e., the hunter and caribou – randomizes the locations that they go to.

Another example is the magical beliefs and rituals of the Trobriand Islanders of Melanesia. The rituals provided the islanders with a way of coping with the dangers of deep-sea fishing. Malinowski (1948) documents that rituals and magic were associated with deep-sea fishing, which was dangerous and uncertain, but not lagoon fishing, which was safe. Deep-sea fishers performed elaborate magical rituals to help ensure a safe trip and good results. More recent research in experimental settings confirms that rituals do provide benefits, including less stress and anxiety, and better performance (e.g., Brooks, Schroeder, Risen, Gino, Galinsky, Norton and Schweitzer, 2016).

This implication of the model provides insight into why we observe many behaviors in the real world which, at first glance, may appear irrational. It explains why societies have customs and traditions, deeply held religious beliefs, moral values, and even political ideologies. The

model also provides insights into why we observe certain behavioral biases such as motivated reasoning, confirmation bias, and cognitive dissonance. These are all examples of non-rational inference when provided with new information. With motivated reasoning and confirmation bias, for example, rather than updating one's beliefs rationally, inference is biased towards a pre-existing belief or motive. Interpreted within the framework of the model, the prior is a socially learned belief that is transmitted from the previous generation. Unwavering faith in these socially transmitted values and beliefs is what makes tradition an effective strategy.

It also provides insight into why humans engage in dual process thinking. In other words, why we do not only engage in analytic and logical thinking but also have a second system that is more automatic and affective (i.e., associated with feelings or emotions). There are many conceptual models of dual process thinking with different labels for the deviation from purely rational thinking. Examples include Seymour Epstein's (1973, 1989) 'experiential thinking,' Daniel Kahneman's (2003) 'system 1 thinking,' or even Jonathan Haidt's (2006) analogy of an elephant that can sometimes be (imperfectly) controlled by the rider (which is the rational system). In his words, "the elephant includes gut feelings, visceral reactions, emotions, and intuitions that comprise much of the automatic system" (p. 17).

The framework helps us understand why non-rational thinking is effective and exists. It may seem inferior or suboptimal when a single slice of time is studied, but can be understood as optimizing when the full dynamic process is considered. Thus, the framework here provides the micro-foundations for many of the theoretical models in the cultural economics literature where it is assumed that parents want to and are able to transmit their preferences to their children (e.g., Bisin and Verdier, 2001, Tabellini, 2008, Bisin and Verdier, 2017). It also provides a theoretical justification for models of identity and the underlying assumption that a person's sense of self comes with behavioral prescriptions (e.g., Akerlof and Kranton, 2000). The assumptions in the culture/identity literature may, at first glance, seem ad hoc, leaving one inclined to ask: why would anyone ever act that way? The framework here provides an answer to this question.

2. The consequences of tradition

A. Tradition generates persistence

The next implication of the conceptual framework is that tradition generates persistence. This can be seen in Figure 2, which shows how the actions chosen in a society respond to a change in the state of the world that occurs between generations 0 and 1. The y -axis reports the share of individuals in the society who choose the new action, which is the optimal action for the new state. The x -axis reports the generations. The figure shows how the proportion of the population who have adopted the new action evolves over time. This evolution is shown for different societies, each with a different prevalence of tradition.

Immediately following the change, in generation 1, all non-traditionalists switch to the new action. These individuals bear the cost of individual learning and learn the (new) state of the world. In the following generation, some traditionalists also switch as they copy the actions of randomly chosen individuals from the previous generation, some of which are traditionalists who chose the new action. The process continues, with the new action becoming increasingly common until eventually everyone in the society chooses the new action.⁶ According to these dynamics, societies with more culture and tradition – i.e., a higher value of x^* – respond more slowly to a change in the environment.

The gradual adoption of the new action means that the old state of the world, although it is no longer present after generation 0, still continues to have an effect on society. Thus, if we think of the model as applying to a particular region of the world, then those regions that experienced the pre-generation 0 treatment/environment will still be different from those that did not for many generations after the treatment ends.

This provides one theoretical explanation for the now-common finding in the literature that past events and environments have persistent effects well into the future. The most direct evidence of this is from a body of research that shows that for immigrants and their descendants, the ancestral environment has persistent effects. The origin-country environment has been shown to matter for a range of outcomes, including fertility (Fernandez and Fogli, 2006, 2009), female labor force participation (Fernandez, 2007, Fernandez and Fogli, 2009, Alesina, Giuliano and Nunn, 2013), trust (Algan and Cahuc, 2010), corruption (Miguel and Fisman, 2007), aggression (Miguel,

⁶This assumes no change in the environment during this time.

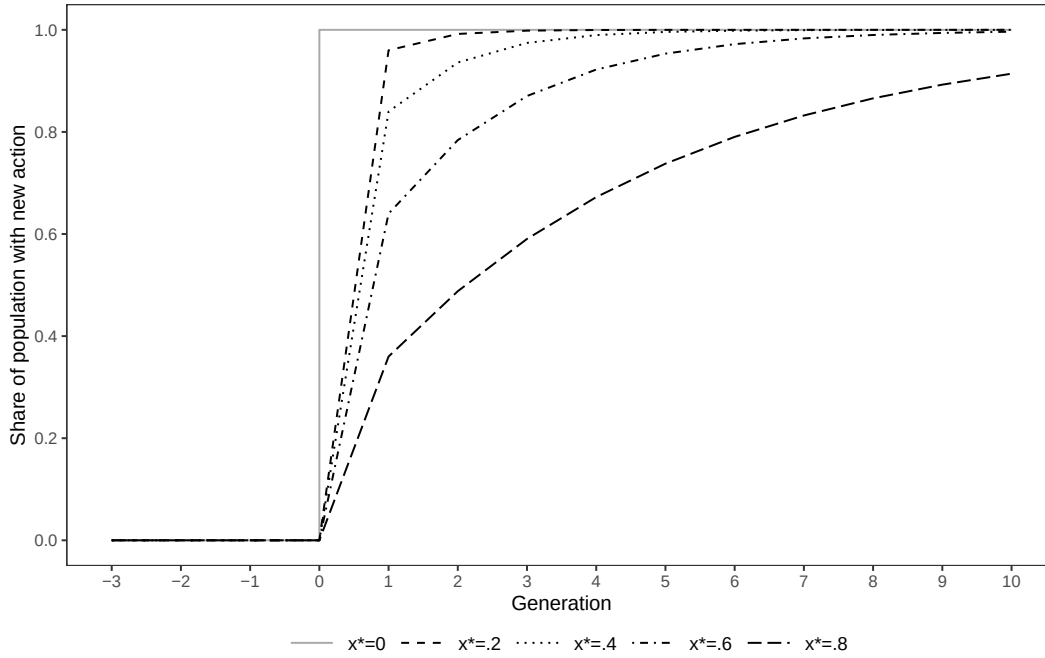


Figure 2: The transition of actions chosen within a society following a change in the state of the world for differing levels of the prevalence of tradition, x^* .

Saiegh and Satyanath, 2011), and whether individuals live with their parents in adulthood (Giuliano, 2007). A complementary line of research has shown that prior events or historical environments, in some cases well in the distant past, have effects that persist until today. The historical factors studied include historical state institutions (Michalopoulos and Papaioannou, 2012, Becker, Boeckh, Hainz and Woessmann, 2016, Guiso, Sapienza and Zingales, 2016, Lowes, Nunn, Robinson and Weigel, 2017, Dell, Lane and Querubin, 2019, Heldring, 2021), European contact (Nunn and Wantchekon, 2011, Michalopoulos and Papaioannou, 2016, Valencia Caicedo, 2019, Lowes and Montero, 2021a), and historical disease environments (Voigtlaender and Voth, 2012, Alsan, 2015), as well as others.

Since the literature has been predominantly empirical, studies have tended to be fairly silent about the exact reason that these historical events continue to leave their imprint today. However, beyond simply asserting that persistence exists, the most commonly-cited conceptual mechanism has been the presence of multiple equilibria and path dependence. In such a setting, if a historical shock causes a movement away from one equilibrium to another, then temporary historical events can have long-term effects. Despite this, the evidence for the presence of multiple equilibria has been mixed, with some studies finding evidence for multiple equilibria (Bleakely and Lin, 2012)

and others failing to do so (Davis and Weinstein, 2002, Miguel and Roland, 2011).

The dynamics that emerge due to culture and tradition provide an alternative explanation for the persistent effects that have been documented in the literature. Because of a reliance on culture and its transmission across generations (i.e., tradition), change occurs in a gradual manner. Thus, historical environments that shape the evolution of cultural traits continue to have effects long after they end.

B. Tradition generates mismatch

A consequence of the persistence generated by culture and tradition is that there can be a mismatch between the action that is dictated by tradition and the action that is best in the current environment. As we have seen, when decision-making relies on cultural transmission across generations, after a change in the state of the world, the switch to the new action is not immediate. Figure 3 shows this transition for two cases. The first is for a benchmark society where there is no tradition, with $x^* = 0$, and the other is for a society where the equilibrium prevalence of tradition is fairly high with $x^* = 0.8$. While it would be best, in terms of short-run material payoffs, for the switch to be immediate, this is not consistent with optimization in the larger dynamic game. The difference, which is indicated by the cross-hatched lines in Figure 2, is a form of cultural mismatch. A large proportion of individuals in society are choosing an action that was optimal for a past environment but not for the current environment.

The example of cultural mismatch shown here follows the same basic logic as ‘evolutionary mismatch,’ which is a dynamic process that is very well understood in evolutionary biology. The quintessential example of this is baby sea turtles. Mother sea turtles bury their eggs on sandy beaches. Once the baby sea turtles hatch, they need to make their way back to the ocean. They have evolved a method that allows them to do this simply. After they are born, typically at night to avoid predators and prevent overheating, they head towards any bright light. In their natural environment, the only bright light is the reflection of the moon off of the water. By moving towards the moon’s reflection, sea turtles navigate towards the water (Ehrenfeld and Carr, 1967). This evolved mechanism worked extremely well until the environment changed. In the modern world, where cities and freeways with bright lights are often located next to beaches, this biological heuristic works less well. Instead of heading towards the ocean, they move towards

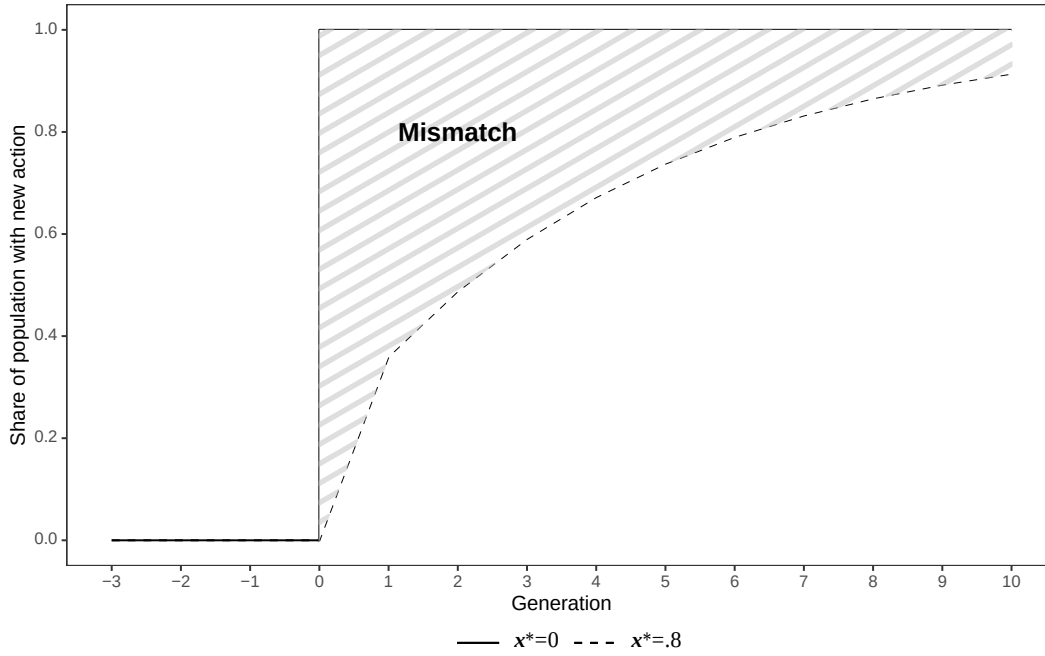


Figure 3: Mismatch for a society with $x^* = 0.8$ following a change in the state of the world in generation 0. Mismatch is shown by the difference between the actions chosen by the $x^* = 0.8$ and $x^* = 0$ society.

city lights which are in the opposite direction of the ocean (Salmon, Tolbert, Painter, Goff and Reiners, 1995).

Within economics, one of the clearest examples of mismatch is from recent research by David Atkin (2016). He documents the presence of variation in food cultures within India. He then shows that when Indians migrate to a different state, which has a new set of food prices, the migrants maintain much of their origin state's food preferences. Because more scarce foods tend to be more expensive, the persistence of their food preferences results in fewer calories being consumed. This is an example of mismatch: food preferences are socially learned, shaped by the historical environment, and, for migrants, they are suboptimal in their new environment. He finds that the cost of mismatch is significant. The most affected migrants in his sample consume seven percent fewer calories than if they had adopted the local food preferences. This is particularly striking given that child stunting and malnutrition are chronic issues in India (Jayachandran and Pande, 2017).

Another example of mismatch emerges from the recent study by Alesina, Teso and Stantcheva (2018), which measures perceptions of intergenerational mobility in Sweden, Italy, France, the U.K., and the United States. In most countries, the measures of perceived mobility and actual

mobility are pretty similar. The United States is a notable exception. The authors show that respondents from the United States have, by far, the most optimistic perceptions of the amount of economic mobility in their country. This is particularly striking since the United States has the lowest mobility of the countries studied. For the United States, perceived mobility is very far above its actual mobility. Thus, the United States appears to be a clear outlier in terms of its (mis)perceptions about mobility.

While this has yet to be studied explicitly, the origins of this misperception are likely because in the 19th century, the United States was a settler economy with very high levels of mobility. Mobility in the United States during this time has been shown to have been much higher than in the United Kingdom (Long and Ferrie, 2013). The U.S. was an environment that helped shaped a belief in the American Dream (anyone can make it if they work hard enough). This belief, in turn, forms the foundation of beliefs about a limited need for government, particularly for implementing policies that provide economic support to populations and/or redistribute income. Since the mid-19th Century, mobility in the United States has steadily declined (Chetty, Grusky, Hell, Hendren, Manduca and Narang, 2017, Song, Massey, Rolf, Ferrie, Rothbaum and Xie, 2020). Due to this decline, by the second half of the 20th century, mobility in the United States was no longer higher than mobility in other comparable industrialized countries (Ferrie, 2005). Thus, while true historically, today it is no longer true that the ‘American Dream’ is alive and well.

The existing evidence suggests that a strong belief in high mobility and the American Dream – that anyone can make it if they work hard enough – appears to be an example of mismatch. Such a belief is socially learned, shaped by the historical environment, and incorrect (and suboptimal) in the current environment.

The last example of mismatch that I note here is particularly relevant given that, at the time of writing, we are in the middle of the fourth wave of the COVID-19 health pandemic. In our modern world, we generally believe that having trust in modern medicine is beneficial. However, there are many historical examples, some more recent than others, where modern medicine had detrimental effects. A number of papers have shown that these episodes led to persistently lower levels of trust in modern medical science. Studies have shown that distrust is a consequence of French colonial medical campaigns in Africa (Lowes and Montero, 2021b), leper colonies in Colombia (Ramos-Toro, 2019), the Tuskegee study in the United States (Alsan and Wanamaker, 2018), and, most recently, the CIA’s fake vaccination campaign in Pakistan which was used in an

attempt to capture Osama bin Laden (Martinez-Bravo and Stegmann, 2022). In each of these cases, distrust, a socially transmitted trait, was shaped by events in the past, but today is detrimental.

C. Tradition and mismatch generate disagreement

An important implication of the presence of tradition is that when there's mismatch, then there will also be disagreement between individuals from the same society about the right action to take. To see this, again consider Figure 2, which shows how the actions chosen by individuals within a society evolve following a change in the state of the world across generations and how this evolution varies depending on the prevalence of tradition in the society, x^* .

For a society that does not have any reliance on tradition, $x^* = 0$, there is no mismatch, and in every period, individuals fully agree on what the right action is. This is true not only in the longer-run, but also immediately after the change in the state of the world. Next consider the case for a society with a strong reliance on tradition, e.g. $x^* = 0.8$. Following the change in the state of the world, there is disagreement about the right action, which persists for many generations. In the example shown, even after 10 generations, nearly 20% of the population has a different (and incorrect) view from the rest of the population. At about the third generation, there is strong polarization in society regarding the optimal action, with 50% of the population choosing the old action and 50% choosing the new action. This example illustrates how a reliance on tradition results in disagreement, and how a greater prevalence of tradition tends to result in more disagreement.

There is also a second reason why a reliance on tradition will affect the extent of disagreement within society. Recall that tradition “works” because individuals value it strongly and follow the chosen custom from the previous generation. A strong conviction in the action being the right action is then part of the mechanism. Thus, we would naturally expect that for those who rely on tradition, there is a stronger moral or normative view about the action. Subsequently, for any disagreement in society, when there are more traditionalists in the society, we expect that the disagreement is more likely to be supported by convictions, normative views, or emotional reasoning rather than rational reasoning.

Consider the case of $x^* = 0.8$ in Figure 2. As noted, by about generation 3, the society is divided on the actions to be taken. In this society, 80% of the individuals are traditionalists, and so there will be traditionalists undertaking both actions: 50% the old action and 30% the new

action. Thus, there will be significant divisions among those who deeply value the tradition that they are following.

This prediction of the framework is important. We know that there is significant variation across societies. But the data also indicate that the within-society variation is even greater (Desmet et al., 2017). Between-society differences can be understood as stemming from different environments. However, the roots of variation and genuine disagreement within societies are less obvious. The framework here provides one explanation for this.

Within the U.S. context, the framework helps us to understand many of the deep-seated disagreements that are present today. To see this, consider two of the most divisive issues in the U.S. today: policies related to gun violence and policies related to race and racism. A 2021 Pew report shows that the partisan divide on these two issues is vast. While 73% of Democrats say that ‘gun violence’ is ‘a very big problem in the country today,’ only 18% of Republicans indicate this. Similarly, 67% of Democrats report that racism is a very big problem, while only 19% of Republicans do (Pew Research Center, 2021).

The question that I consider here is whether mismatch helps us to understand this disagreement. Recall that mismatch occurs when the environment changes, causing socially-learned values and beliefs, that were historically shaped, to be suboptimal in the current setting.

Consistent with the importance of the historical environment in shaping contemporary gun culture, recent studies have shown that the origins of contemporary gun culture have historical roots. Bazzi, Fiszbein and Gebresilasse (2020) show that locations that were at the frontier of settlement for longer durations have greater support for guns ownership rights and less support for restrictions on gun ownership today. Life on the frontier was particularly dangerous. Settlers and Indigenous populations both benefitted immensely from the security that possession of a firearm provided, particularly since governance, laws, and institutions were absent at the time. The use of firearms for hunting was also particularly important on the frontier. Looking at the U.S. South, Buttrick and Mazen (2021) provide evidence linking contemporary gun culture to a history of slavery and, in particular, the historical reliance of white Southerners on firearms in their attempt to assert social and political dominance following the abolition of slavery in 1865.

Many of these historical benefits to gun ownership are no longer present today. There is no longer conflict between frontier settlers and Indigenous populations, the government and a rule of law is now present in former frontier locations, and there is no longer a reliance on use

of coerced or slave labor in the agricultural U.S. south. Despite this, and consistent with the model's prediction, we see continuity in the values and beliefs that underpin support for firearm ownership and limited regulations.

Today, the primary motivation for firearm ownership is perceived threat and the need for protection (Stroebe, Leander and Kruglanski, 2017, Buttrick, 2020). While this view persists, the evidence indicates that in today's environment (perhaps contrary to the past) firearms do not increase one's safety. Household firearm ownership is associated with a 200% increase in the probability that a violent homicide is experienced and a 300% increase in the likelihood of a violent suicide (Anglemyer, Horvath and Rutherford, 2014). In addition, there is no associated reduction in victimization, and conditional on an assault occurring, possessing a gun at the time of assault is actually associated with a much higher chance of being shot or of being killed during the assault (Branas, Richmond, Culhane, Ten Have and Wiebe, 2009). While these are simply correlations, there is evidence that it is unlikely that these findings are primarily driven by selection. For example, Miller, Barber, White and Azrael (2013) examine the link between firearm ownership and death by suicide. They find that firearm ownership is not associated with more suicide attempts, but it is associated with more suicide attempts that use a firearm and a greater likelihood of death conditional on an attempt.

Overall, the evidence seems to indicate that the differing views in the United States about firearms ownership and regulation is likely due to mismatch. These views are shaped by history and the evidence indicates that they are suboptimal in the current setting. The presence of mismatch, as the new beliefs and actions spread throughout society, means that within society, there is deeply-rooted disagreement.

Next consider the issue of race; namely, racial resentment toward Black individuals and the resulting policy views, such as less support for affirmative action. Recent research from Acharya, Blackwell and Sen (2016, 2018) shows that the racial views of white Americans living in the U.S. South today are strongly correlated with the historical prevalence of slavery. Across southern counties, in places with more enslaved individuals in 1860, whites today are more likely to express racial resentment and colder feelings towards Black individuals and are more likely to oppose affirmative action. Undertaking a series of empirical checks, Acharya et al. (2016, 2018) find that this relationship is unlikely to be driven by selection arising from historical migration. Instead, the evidence indicates that the effect is due to a historical reliance on slave labor, which was then

reinforced following abolition, where norms of racism were relied on heavily to maintain control and coerce Black populations. Using data from the Youth-Parent Socialization Panel Survey, the authors provide direct evidence that racial bias is transmitted from parents to children.

While the findings from Acharya et al. (2016, 2018) provide evidence that racial bias towards Black Americans is shaped by history, other evidence suggests that these views may be suboptimal in the current environment. Although these traits were likely beneficial for white U.S. Southerners historically (although obviously, these were extremely detrimental to Black individuals), it appears that this is no longer the case. The economy of the United States (and the U.S. South) has changed dramatically. Production has moved out of agriculture and into manufacturing and services, and it is no longer specialized in traditional agricultural commodities such as cotton, sugar, and tobacco.

A number of scholars have argued that racial bias today harms those who hold the biased views. If correct, then this trait is an example of mismatch. McGhee (2021) argues that historically and today, white Americans tend to view the world through a zero-sum lens. (For experimental evidence supporting this, see Norton and Sommers (2011).) Historically, this view resulted in policies, such as the under-provision of public goods, that hurt Black Americans .

While the relationship between Black and white Americans was certainly zero-sum in nature during slavery, this is no longer the case today. In a zero-sum world, because the interests of two groups are in direction opposition, actions that hurt one group (i.e., Black Americans) will be beneficial to the other (i.e., white Americans). Thus, racial resentment could be beneficial for those holding this view. But in a non-zero-sum world, where interests are not in direct opposition, actions that hurt one group can hurt all of society, even those undertaking the harmful actions. When it comes to race relations, the evidence indicates that while the past (during slavery and Jim Crow) may have been zero-sum, this is no longer the case today.

There are many reasons why, in today's world, racial bias has an adverse effect on all groups in society, including those holding the racial beliefs. One is innovation. Bell, Chetty, Jaravel, Petkova and Van Reenen (2019) have documented lower rates of innovation among Black Americans today. Racial violence – namely, lynchings – has been shown to have reduced rates of Black innovation historically (Cook, 2014). Innovation was low for Black Americans in locations where they faced violence and oppression. Where these were absent, their rates of innovation were as high or higher than other groups (Andrews and Rothwell, 2020).

Racial bias and a lack of innovation is one example of the much broader issue of bias and discrimination leading to a misallocation of talent, which has adverse aggregate consequences. Hsieh, Hurst, Jones and Klenow (2019) find that reductions in bias, which improve the allocation of talent for women and Black Americans, explain up to 40% of the growth in market GDP per capita from 1960–2010.

Thus, contemporary racial resentment and the resulting variation and disagreement in policies related to this can be explained by mismatch. These views are historically determined but suboptimal in the current environment. During the transition to the values and beliefs that fit the modern context, there is disagreement within society.

3. Mismatch matters for policy

A. Policy success

In many fields, but particularly in economic development, interventions that attempt to change individuals' values, beliefs, customs, or actions are common. For example, interventions commonly target traits and behaviors like fertility, gender norms, cousin marriage, age at marriage, savings, investment, education, health take-up, technology adoption, political participation, etc.

Typically, the logic behind the need for an intervention is not made explicit. However, if one takes a step back, it's not immediately obvious why we expect an intervention to be necessary or even helpful. Do we think that individuals are not optimizing? If they are optimizing (as we typically assume in economics), then why do we want them to deviate from this behavior? Why do we think that any intervention, even if successful, will have effects that are not just temporary? After the intervention ends, won't the participants just return to the prior equilibrium?

The dynamics of human behavior outlined here provides one way to understand one possible motivation behind such policies. While not stated explicitly, it is possible that mismatch is one justification (if there is one) in the minds of NGOs, researchers, and policymakers. When mismatch is present (i.e., after a significant change to the external environment), although society is in a (dynamic) equilibrium and all individuals are optimizing, there is still static inefficiency. Following a change in the state of the world, individuals will tend to hold on to pre-existing traditions which will tend to be suited for the prior environment rather than the current one. In

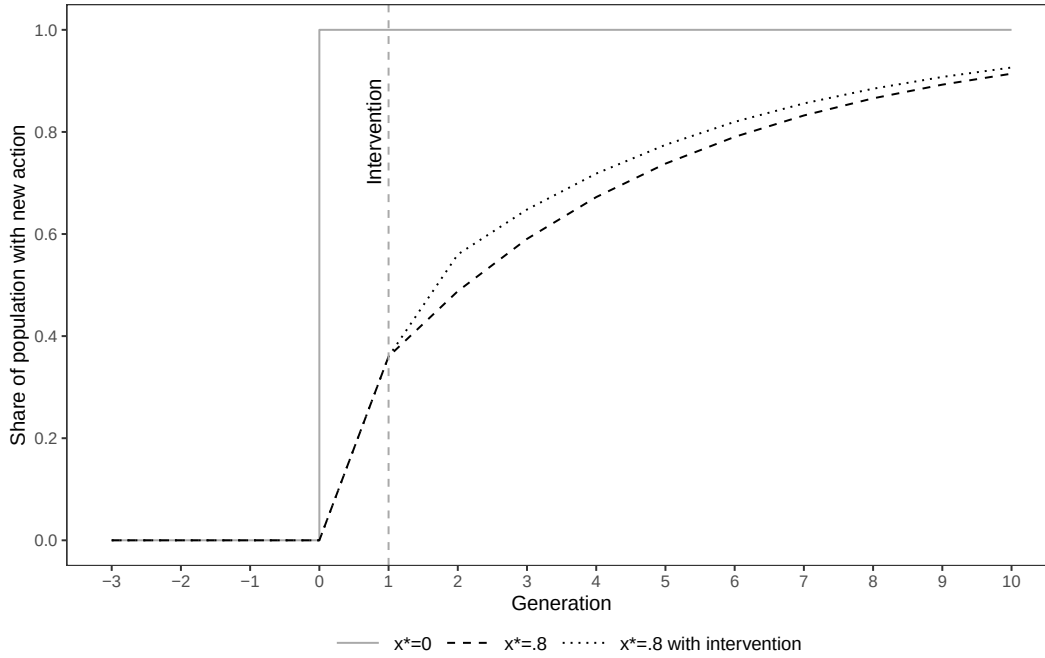


Figure 4: An example of an intervention in generation 1 that leads to a one-time increases in the prevalence of the new action.

these cases, interventions that help to aid the adoption of new beliefs, values, or actions, which are better matched to the contemporary environment, can improve welfare.

The benefits to interventions in the presence of mismatch are illustrated in Figure 4, which shows the effects of an intervention in generation 1 that is able to generate a one-time increase in the proportion of the individuals who have adopted the new action. The intervention reduces the prevalence of mismatch, not just in the generation in which the intervention occurs, but in all subsequent generations.

While many interventions have failed to deliver results (with many of these likely remaining in the ‘file drawer’), there are also many impressive success stories. To my mind, there are two reasons that are particularly important for their success. First, they tend to occur in settings where we expect there to be mismatch. Second, the most noteworthy and successful examples, intentionally or not, have interventions that, rather than attempting to directly move the behavior or beliefs in a certain direction, attempt to reduce the extent of mismatch.

The cleanest example that illustrates this is the recent intervention by Carlana, Ferrara and Pinotti (2022) in Italy. The study first provides evidence of mismatch: the children of immigrants from low-income countries tend to enroll in vocational schools at disproportionately high rates

compared to children with native-born parents with the same ability. Interestingly, this gap is found to be higher among boys than girls. The natural explanation for this difference is mismatch: the aspirations of immigrant children are shaped by the returns to an academic education in their origin country which is lower than in Italy.

The study then evaluates the efficacy of a program that provided tutoring and career counseling to the children of immigrants. They find that this treatment was highly effective, raising the aspirations and confidence of participants as well as the probability that they enroll in an academic school rather than a vocational school. In terms of magnitudes, they find that intervention fully eliminated the mismatch, completely eliminating the gap between immigrant and Italian children.

One particularly interesting aspect of the paper, which provides evidence consistent with policy efficacy due to mismatch, is that they find very different impacts for boys and girls. For immigrant girls, for whom there was not a gap with native girls, the intervention had little effect. For immigrant boys, for whom there was a large gap with native boys, the interventions had significant effects eliminating the gap. Thus, consistent with the goals of the intervention, it provided students with the tools needed to eliminate the mismatch in cases where it was present.

Another example of an intervention that successfully changed cultural values and beliefs in a setting that likely featured mismatch is from Bursztyn, Gonzalez and Yanagizawa-Drott (2020). The intervention was aimed at increasing female labor force participation in Saudi Arabia. The authors study a sample of 500 college-educated, married men, aged 18–35, from the city of Riyadh. A key aspect of this setting is that it is one where we might expect to find mismatch. In the post-WWII world, norms about female employment have become more gender-equal. This is also the case within Saudi Arabia. According to the Global Gender Gap Index, the ‘economic participation and opportunity’ score for Saudi Arabia increased from 0.24 in 2006 to 0.38 in 2020. From 1992 to 2016, the ILO estimate of the country’s FLFP rate increased from 17.9 to 29.3%. Thus, traditional beliefs are changing even in Saudi Arabia.

The authors find evidence of a misalignment between individuals’ beliefs about others’ views regarding the acceptability of female employment and their actual views. Participants were asked whether or not they agree that “women should be allowed to work outside the home,” as well as their guess about the number of members in their experimental session who hold this view. Individuals systematically underestimated the support for women working outside the home.

For a randomly-selected half of the sample, the researchers disclose the information about the reported beliefs of the others in their session. They find that the information increased the likelihood that participants signed up their wives for a job-matching service, and that their wives had applied for a job and had interviewed for a job 3–5 months after the experiment. As we would expect, the effects are greater for those who had larger initial misperceptions. Thus, similar to the intervention in Carlana et al. (2022), by its design, the intervention served to reduce the presence of mismatch rather than simply move beliefs in one direction.

For the next example, it is helpful to recognize that while the conceptual framework I outlined only considers one decision and one setting, in reality, we are faced with numerous decisions that occur in many different settings. In such a world, there can be mismatch due to the environment changing not only over time but also over space. In such a setting, certain traits are better matched to different environments.

The recent study by Heller, Shah, Guryan, Ludwig, Mullainathan and Pollack (2017) exploits this insight in the development of a set of programs, from 2009–2015, that were aimed at improving the outcomes of disadvantaged youth from distressed neighborhoods in Chicago. In this setting, being aggressive and fighting are often necessary to save one’s reputation. While these traits, which have been termed a ‘culture of honor’ in the social psychology literature (Nisbett and Cohen, 1996), are generally adaptive to the youth’s environment, they are mismatched for many other situations, including in school.

The key to the program’s success was that it did not try to change the values of the youth by telling them that sticking up for themselves isn’t the right thing to do. Instead, it helped the youth make sure that they were applying their culture of honor to the right situations. An important part of this is that it helped students develop the mental tools necessary to switch from an automatic reaction based on impulses driven by their learned ‘culture of honor’ to one that is more thoughtful, taking into account the specifics of the situation. In the authors’ own words, the key to the programs was that they taught “a greater sense of occasion” (Heller et al., 2017, p. 6).

B. Policy failure

As these examples show, when mismatch is present, policy can be beneficial. However, interventions can also be extremely harmful if they wrongly assume mismatch where there is none. This

is particularly true if the policies are aimed directly at eliminating values, beliefs, or actions that are assumed to be outdated and mismatched.

The first example is from Bali where the Balinese have a Hindu-based belief system called *Agama Tirtha*. In this system, water is viewed as being central to human life and holy. All water, and all life, flows from the Goddess located at Crater Lake, which lies in the middle of the island. The religion also features an elaborate and hierarchical system of temples that are located at the critical junctures of a complex irrigation system used for wet-rice agriculture. Farmers are organized into local democratic collectives called *subak*. Using religious calendars, all *subaks* in a region coordinate planting with each other. Multi-day and multi-location rituals must occur before planting occurs.

The Green Revolution of the 1970s provided new quick-maturing varieties that could provide two or even three harvests per year. In 1979, the Bali Irrigation Project was launched by the Asian Development Bank. Farmers were legally mandated to adopt new agricultural methods. Rather than only planting one crop per year that was coordinated between all *subak* in the region, farmers were now told to plant as often and as quickly as they could. They could still participate in their elaborate festivals and rituals but they could not tie planting to them.

Much to the surprise of policymakers, the result was not higher output as expected. Instead, the rice plants were consistently overwhelmed by pests. Such problems never emerged under traditional planting techniques but with the new methods, pests became a significant problem. Ex post, we now understand the reason for this (see Lansing, 2007). By coordinating planting in a region and submerging the land during a fallow period, insects did not have food and would die out. Thus, they were naturally kept under control. The religious ceremonies and coordinated planting had a benefit. While this was not known to those practicing these traditions, these benefits still existed.

While policymakers viewed these traditions as ‘backwards,’ they were actually more effective than the modern agricultural techniques that the farmers were forced to adopt. By planting in an uncoordinated manner, the pests always had food, and they were able to multiply with much less constraint.

A more recent example is that of traditional pastoralism within sub-Saharan Africa. For various reasons, pastoral groups tend to have less representation in government than non-pastoral groups (McGuirk and Nunn, 2021). As a consequence, traditional practices of transhumant

pastoralists are seen as outdated, inefficient, and even 'backwards' within government. In other words, the government and policymakers view the customs as mismatched for the modern world. As an example, in his 2005 inaugural speech to Parliament, the President of Tanzania, Jakaya Kikwete, expressed these views arguing: "Our people must change from being nomadic cattle herders to being modern livestock keepers." In a 2006 press conference, he explained: "We are producing little milk, export very little beef, and our livestock keepers roam throughout the country with their animals in search for grazing grounds. We have to do away with archaic ways of livestock farming." (Mattee and Shem, 2006, p. 4).

A consequence of this view is that, within Africa, policies tend to neglect or even discourage pastoralism. One example is conservation lands which are often located in traditional migratory corridors of pastoral groups. Conservation lands typically either outlaw grazing or charge fees. Many countries are considering bans on grazing, meaning a ban on the movement of animals except by motorized vehicles, and Nigeria has already implemented bans in many of its states (McGuirk and Nunn, 2021).

Foreign aid also tends to favor agriculture over traditional forms of pastoralism with many projects actively encouraging settlement and the adoption of agriculture (McGuirk and Nunn, 2022). As Fratkin, Roth and Nathan (2004, p. 533), who have studied the issue extensively, put it: "NGOs involved in famine relief work have encouraged poor pastoralists to settle permanently at famine relief points, in order to deliver food and social services, but also to separate pastoral populations from their nomadic lifestyle, which is seen as primitive and irrational."

In the back of the minds of governments, policymakers, and international actors is the view that the traditional mode of subsistence of transhumant pastoral groups is antiquated and backwards – in other words, that there is a mismatch between it and the modern world. However, when one looks at the facts, this presumption does not appear consistent with the facts. Instead, the evidence appears to indicate that, like the example from Bali, this may be an instance of falsely assuming mismatch where none exists. Nomadic pastoralism is a remarkably efficient mode of animal husbandry. It provides maximum flexibility, allowing animals to move to where water and phytomass are the most available, which helps minimize environmental damage. It also allows the use of lands that are particularly marginal, unstable, and otherwise unusable. Transhumant pastoralism, through the regular seasonal migration of animals where animals graze on fallow farmland after harvest, provides benefits to the local farmers since the manure left by the animals

is an important source of organic fertilizer (McGuirk and Nunn, 2021).

Research finds that restricting the mobility of nomadic pastoralists lowers the efficiency of production and reduces the ecological sustainability of the activity (IUCN, 2011). The cases of sedentarization that have been empirically studied indicate that the adoption of traditional modes of subsistence by pastoralists makes them worse off. For example, Campbell, Leslie, Little, Brainard and DeLuca (1999) compare recently-sedentarized Turkana to pastoral Turkana and find that settled Turkana are worse off in nearly every metric. They have lower fertility and higher morbidity, increased child mortality, and more child stunting. Analysis of women specifically found that the nomadic Turkana were taller, weighed more, and had lower blood pressure. A subsequent studying of the Rendille found similar patterns. Pastoral children were less stunted, less underweight, and had lower mortality than sedentary children, a fact that the authors attribute to greater and more consistent access to milk even in times of drought (Fratkin et al., 2004).

C. Creating successful policies

These examples highlight the importance of successfully identifying the presence of mismatch. We have seen that policies can be successful when there is mismatch, but they can also fail dramatically and cause harm if they assume there is mismatch when there is none. Thus, it is crucially important to design policies that are aimed at eliminating mismatch *only if* it is present. The success stories, particularly the interventions from Carlana et al. (2022) and Heller et al. (2017), designed their intervention to provide participants with the information and tools needed to eliminate mismatch rather than just trying to directly change their beliefs and values. Such smart designs, beyond being more effective, also reduce the possibility of behavior being changed when there is no mismatch, which would make participants worse off. The policy failures discussed here did/do exactly this. They bluntly move individuals away from traditional cultural practices, and, because there was no mismatch, make them worse off.

An alternative, but complementary, strategy is to implement policies that are beneficial whether or not there is mismatch. An example of such a policy is the recent intervention implemented by Alsan, Garrick and Graziani (2019). The authors are motivated by the fact that participation in the medical system is lower and mortality is higher for Black men relative to other other groups. There are differing views on the reason for this. One is that it is due to a

legacy of distrust from historical injustices undertaken by the medical community. The Tuskegee experiments would be one such example, and there is evidence for this event being detrimental in this regard (Alsan and Wanamaker, 2018). This explanation is one of mismatch. However, there is also the view that distrust in the medical system is not an example mismatch. It is a rational and optimal response because medical racism is still prevalent today.⁷

Alsan et al. (2019) implement an intervention that has benefits whether or not mismatch explains the current medical hesitancy among Black American men. They recognize that in the medical profession, Black Americans are under-represented. Whether medical hesitancy arises due to historically-rooted mismatch or contemporary racial bias in the medical system, increasing the prevalence of Black doctors may help. Having more Black doctors should reduce distrust if there is mismatch and if there isn't, we expect Black doctors to be less biased. Creating and implementing a mobile medical unit in Oakland California, the authors find that Black men who were (randomly) assigned a Black doctor rather than a white doctor were more likely to take up free health services, particularly for those that are more invasive. Thus, even if we don't know whether contemporary medical distrust is due to mismatch, an intervention can still be designed to alleviate the issue in either case.

4. The determinants of mismatch

Given the importance of mismatch for policy efficacy, it is helpful to understand when and where we might expect to find mismatch. I now turn to this question and consider the determinants of mismatch. Recall that mismatch occurs when there is tradition in society and the state of the world changes. In the next two subsections, I consider the two determinants of tradition x^* in the model: the cost of individual verification κ and the instability of the environment Δ .

A. Mismatch depends on the cost of individual verification, κ

One determinant of the prevalence of tradition, x^* , which affects the severity of mismatch, is κ , the cost or difficulty of independent logical reasoning. This is illustrated in Figure 5, which shows the increase in x^* for an increase from κ to κ' . Somewhat ironically, this predicts that the more

⁷See for example Dembosky (2021).

complex an issue, the more likely we are to rely on culture and tradition rather than independent logical thinking.

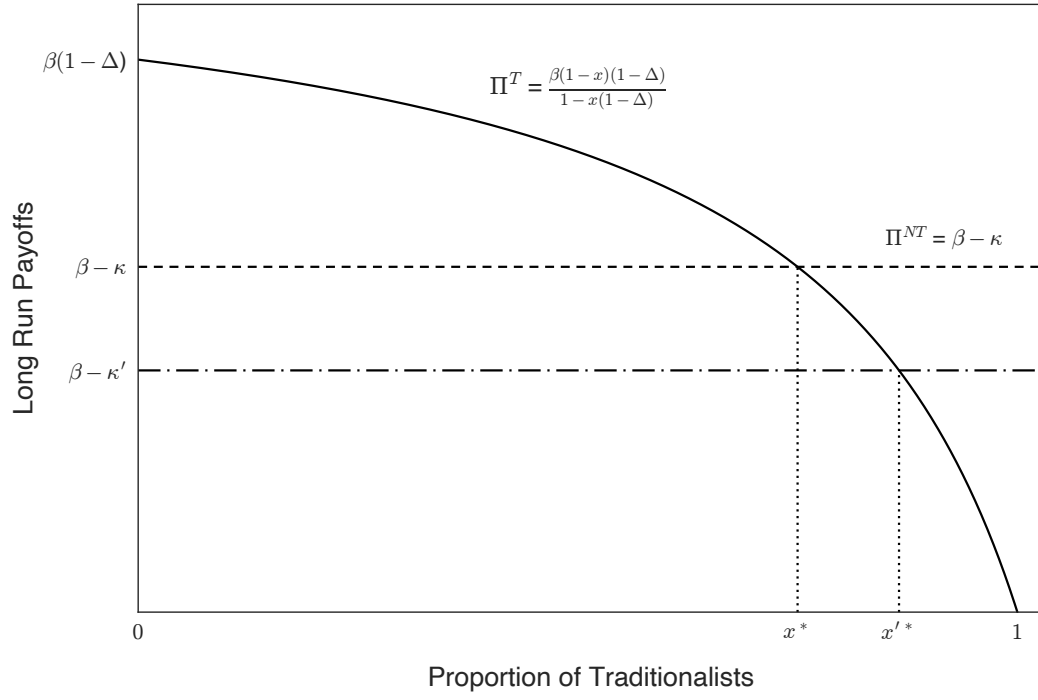
The other notable aspect, which can be seen from Figure 2, is that with more mismatch, there tends to be more disagreement about the best action. For example, consider the situation in generation 3. For the case where $x^* = 0.8$, since the extent of mismatch is quite severe, 50% of the population continues to choose the previous action (and 50% chooses the new action). By contrast, for the $x^* = 0.2$ society, nearly 100% of the population has converged to a common opinion and adopted the new action.

Taken together, this then implies that the more difficult an issue, the greater the reliance on tradition and culture, and in a changing world, the more disagreement we'll observe. This provides insight into why morals and emotion rather than logic govern many political and economic issues. This prediction of the model is consistent with the recent finding by Thaler (2021) documenting the presence of motivated reasoning about a wide range of policy issues, including climate change, gun laws, race, gender, immigration, and income mobility. For many, one might expect that individual differences could be resolved by logic. However, the research shows clearly that traditional values frequently dominate logical reasoning.

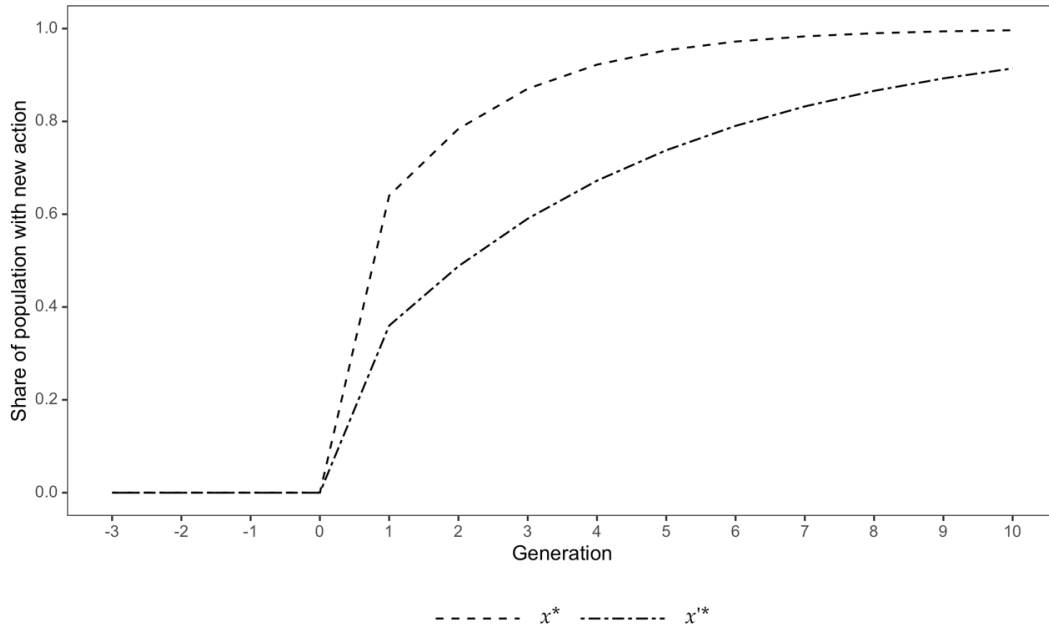
When one stops to consider these issues, it quickly becomes clear that it would be nearly impossible for an individual to come to a definitive conclusion without any form of social learning. To take a simple and timely example, consider the question of whether vaccines are safe. One could read research and come to a conclusion. However, the act of reading research is a form of social learning and cultural transmission. To truly come to a conclusion without social learning, one would need to reinvent all of the knowledge required to individually collect and evaluate the information. Even the act of going to school to learn epidemiology is a form of social learning and cultural transmission. Once one thinks about it, it soon becomes clear that coming to a conclusion on any non-trivial issue requires some learning from others.

B. Mismatch depends on ancestral environmental instability, Δ

The other determinant of the importance of tradition and therefore mismatch is the instability of the external environment Δ . As illustrated by Figure 6, if a society historically had a more unstable environment (i.e., Δ is high) then the importance placed on tradition, x^* , will be lower. Intuitively, a more unstable environment reduces the relative benefit of a reliance on tradition.



(a) Effect on the equilibrium prevalence of tradition, x^*



(b) Effect on the extent of mismatch

Figure 5: The effect of an increase in the difficulty of individual verification, κ .

This is because a more unstable environment increases the likelihood that the traditions that have evolved and survived up to the past generation may not actually be suitable for the current environment.

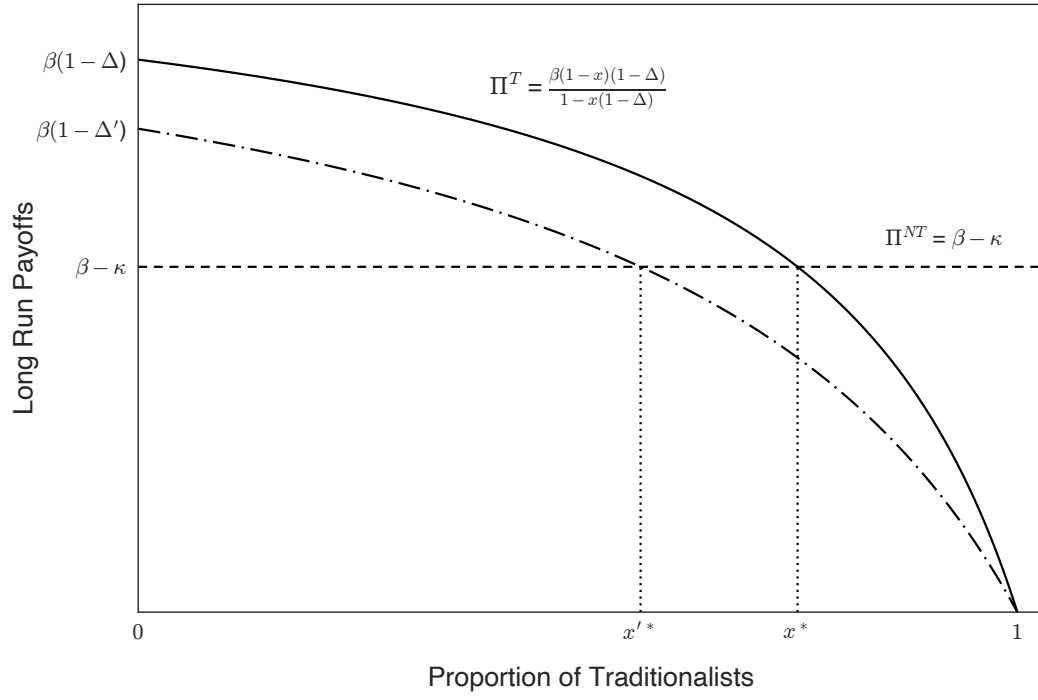
This prediction was recently tested by Giuliano and Nunn (2021) who use paleoclimatic data, combined with information on the historical locations of ethnic groups, to construct estimates of the variability of the ancestral environment for ethnic groups and countries. The country-level average of this measure is shown in Figure 7. Darker shades indicate that the environment inhabited by that country's ancestors was more variable across generations.

The authors find that ancestral climatic stability is associated with greater self-reported importance placed on tradition and more persistence in cultural traits over time. They also examine the descendants of immigrants to the United States and show that those originating in countries with more ancestral climatic instability are more likely to abandon the tradition of speaking their ancestral language and marrying within their own group. Similarly, they also find that ancestral instability is associated with a weaker persistence of the tradition of speaking one's traditional language among Indigenous populations within Canada and the United States.

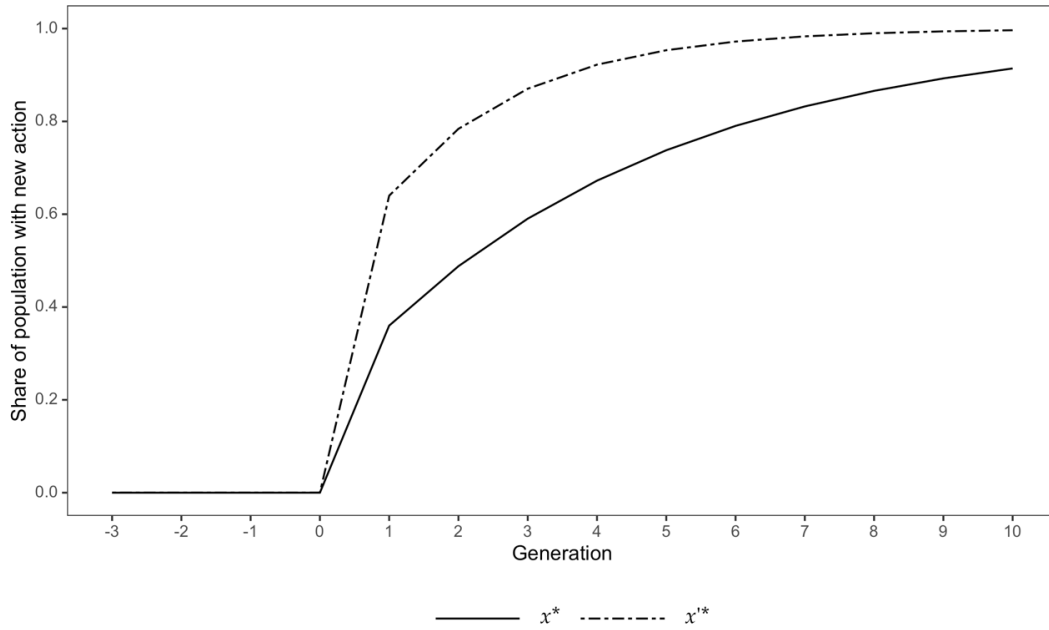
The findings of Giuliano and Nunn (2021) are significant for two reasons. The first is that the variation in ancestral climatic instability provides some insight into which societies are more likely to adjust their values, beliefs, and behaviors and, therefore, less likely to suffer from mismatch when the world changes. These societies can be seen in Figure 7 as the countries with the darker shades. The second is that the analysis provides an empirical test of a falsifiable prediction that is not obvious *ex ante*. While the model presented here is highly stylized, the subsequent literature has developed many more-elaborate models of cultural evolution, and nearly all share the prediction that culture and tradition are more likely to emerge in an environment that is more stable (e.g., Boyd and Richerson, 1985, Aoki and Feldman, 1987, Feldman, Aoki and Kumm, 1996, Boyd and Richerson, 2005).

C. Mismatch occurs when the world changes

As we have discussed, mismatch occurs when there is culture and tradition in society. The more tradition is used in making decision, the more severe mismatch is anytime the state of the world changes. An important point here, which I now discuss, is that mismatch only occurs after a change in the state of the world. This suggests that mismatch is more likely following



(a) Effect on the equilibrium prevalence of tradition, x^*



(b) Effect on the extent of mismatch

Figure 6: The effect of an increase in the instability of the environment, Δ .

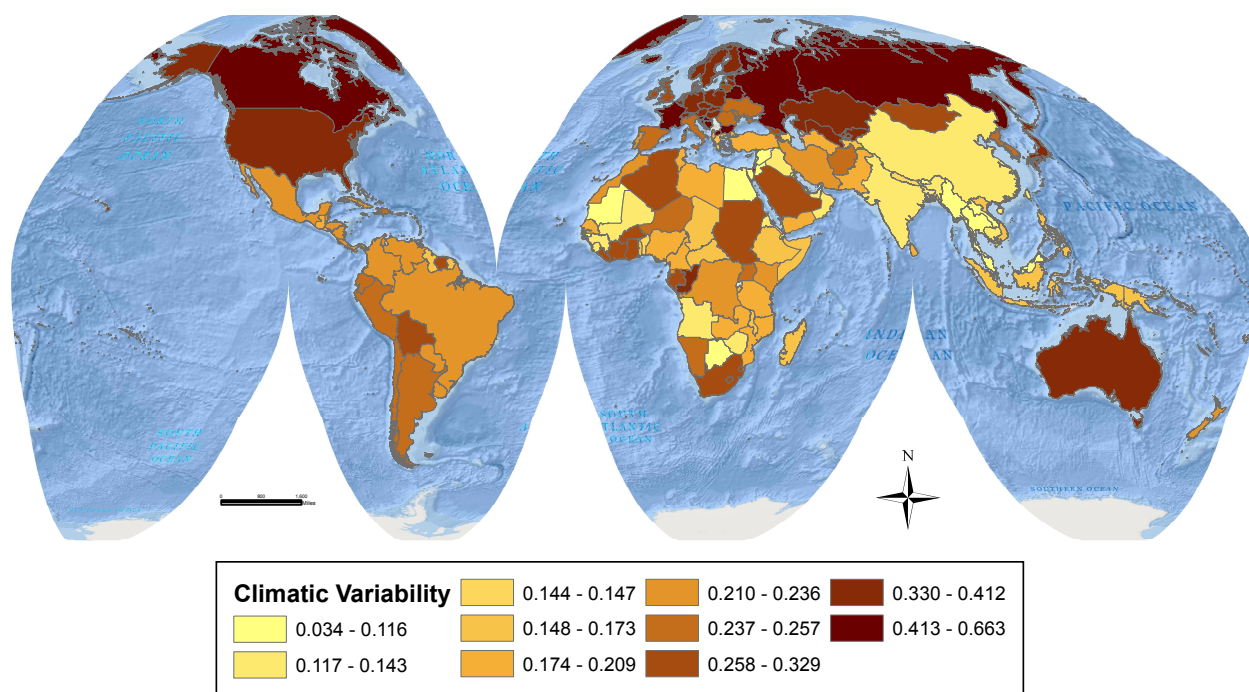


Figure 7: Country level averages in ancestral environmental instability, 500–1900. *Source:* Giuliano and Nunn (2021).

critical junctures in history, such as the Neolithic Revolution, Columbian Exchange, Industrial Revolution, etc.

Recent events – namely, the global COVID-19 pandemic and rapidly accelerating climate change – raise the natural question of whether we are currently experiencing a critical juncture in history and whether the future state of the world will be different from that of the past. There are reasons to believe that the answer to this question is yes.

Many of the most pressing issues facing the world today – such as climate change and global health crises – are fundamentally different from the dominant challenges of the past. Unlike past challenges, many of the challenges the world faces today requires cooperation with individuals who do not yet exist; namely, cooperating with future generations (Hauser, Rand, Peysakhovich and Nowak, 2014). Thus, unlike problems of the past, in this case, those with whom we need to cooperate with are not able to communicate, reciprocate actions, or enter into formal agreements, all of which are common mechanisms that generate cooperative outcomes. This is true not only for climate change but also for any other issue related to natural resource management. In addition, while the challenges of the past typically involved conflict with or outcompeting other nations, whether it be the building of colonial empires, interstate conflicts, or economic

competition, many of our current issues require cooperation with other nations.

This then raises the question of whether the successful cultural traits of the past will also be successful in the future. In other words, is there the possibility of mismatch? To help think about this question, it is important to consider the nature of the cultural traits that have been successful in the past. At this point in human history, individualistic cultural traits, or what Henrich, Heine and Norenzayan (2010) have called WEIRD (Western, educated, individualistic, rich and democratic) psychology, have been the most successful in terms of material wellbeing. As documented by Gorodnichenko and Roland (2011, 2017), although collectivist and individualistic cultural traits were similarly successful prior to 1500, after this time period, individualistic cultural traits have generated higher levels of innovation and economic growth. Individualism is synonymous with weaker kinship ties, which also exhibits the same pattern in the data (Enke, 2019). The existing evidence indicates that the origins of individualistic psychology lie in the Medieval policies of the Western Church, which banned cousin marriage, resulting in a weakening of extended kinship ties (Schulz, 2017, Schulz, Bahrami-Rad, Beauchamp and Henrich, 2019, Henrich, 2020).

Individualistic WEIRD psychology provided the foundations for the industrial revolution. It aided Western Europe's economic ascension and enabled the colonization of much of the rest of the world (Henrich, 2020). Thus, it is clear that this bundle of cultural traits has been beneficial for the societies that have adopted them. Today, these traits, although exceptional when compared to the full range of cross-cultural psychological variation across the world (Henrich et al., 2010), have come to dominate the world both in terms of which countries are the most economically and politically powerful, but also in terms of which cultural values tend to dominate international organizations, policy, and even academia.

On the face of it, there are a number of reasons to be concerned about the possibility of mismatch. WEIRD psychology is characterized by individualistic and independent thinking and analytic, rather than holistic, thinking. That is, there is greater concern for the individual rather than the whole and also less ability to recognize how the individual affects and fits into the larger environment. The other key characteristics for WEIRD psychology are that it features less in-group loyalty and weaker kinship ties, which are typically the key in-group. In other words, there is less loyalty to one's lineage, which is comprised of past and future generations. Loyalty to the future generations of one's lineage may be an important trait that helps curb activities today that, through climate change, harm the environment and the generations of the future.

Consistent with this, recent evidence suggests that various aspects of WEIRD psychology are associated with less concern for the environment and/or less willingness to tackle environmental issues when doing so comes at a cost. Bazzi et al. (2020) find that, within the United States, rugged individualism due to a history of frontier settlement is associated with less support for fighting climate change and less support for government intervention today. Eom, Kim, Sherman and Ishii (2016) study individuals from 47 countries and find that concern for the environment is less likely to be associated with support for environmental action in countries that are more individualistic.

The other primary problem facing our world today is global health crises. Such crises require significant amounts of coordination. This is made more difficult in individualistic societies where the rights and freedoms of the individual take priority over the wellbeing of society as a whole. A number of studies have also found that efficacy in combating public health challenges like COVID is lower in more individualistic societies. Studies find that during the COVID-19 pandemic, individualism was associated with less mask-wearing (Lu, Jin and English, 2021), more cases, and more deaths (Maaravi, Levy, Gur, Confino and Segal, 2021). Along similar lines, Gelfand, Jackson, Pan, Nau, Pieper, Denison, Dagher, Van Lange, Chiu and Wang (2021) find that countries with stronger adherence to cultural norms experienced fewer cases and fewer deaths.

As an illustration of the importance and differences between WEIRD and non-WEIRD perspectives, consider the case of property rights and the implications this has for sustainable resource management. During Lord Hailey's *Colonial Land Tenure Panel*, this difference was studied extensively. As one report during the panel explains: "Land to the African is not what it is to the European: a possession, a source of wealth, an economic asset or an object of investment. . . land to the African is the very source and basis of the life and existence of his family or tribe, and is something more personal and fundamental to him, and of almost literally mystical significance." (Home, 2013, p. 405). The roots of this difference lie in the view about who owns land. In many non-WEIRD cultures, the land is not owned by the individual or sets of individuals who happen to be alive today. These are merely the current custodians of the land. Instead, the land is owned by the full lineage, including past and future members. This perspective is nicely summarized by a statement made by Nigerian Chief Elesi of Odogbolu to the West African Lands Committee in 1917: "I conceive that land belongs to a vast family of which many are dead, few are living and countless others unborn." (West African Lands Committee, 1917, p. 1048).

There are a number of reasons that this alternative view about natural resource ownership might be better suited for tackling the environmental problems that we face today. First, future generations have equal ownership rights. Second, this, plus the meaning placed in the resource itself, means that there will inherently be more altruism or consideration paid towards the wellbeing of future generations. This can be contrast with the WEIRD perspective, where only those alive today have ownership rights, resources are viewed as a possession that can be bought and sold, and thus there is the tricky problem of how individuals are incentivized to internalize the wellbeing of future generations.

There is some evidence from experimental games that are meant to replicate the issue. In these games, participants play a multi-generational common resource game where earlier generations must forgo extraction, which is costly, in order to preserve the resource for future generations. If a maximum level of total extraction is surpassed by individuals in one generation, then the resource is depleted and not available for future generations. While many mechanisms have failed to deliver sustained resource management in such a setting, some have worked. One is if earlier generations have some probability of obtaining the resource in later rounds (Chang, Kristensen, Nghiem, Tan and Carrasco, 2021). While this is possible in the game, it is not possible in reality. However, genuine altruism and concern for future generations could help to deliver such an outcome.

Our changing world and the potential for mismatch highlight the importance of diversity and inclusion in government, international organizations, policy, and academia. Although one way of thinking may have been optimal in the past, this may not be the case in the future. Thus, it is important that we have a diversity of voices at the table. A recognition of the importance of a variety of moral frameworks and an openness to new modes of thinking will help to avoid the trap of mismatch that arises due to persistence in traditional modes of thought.

5. Concluding thoughts

In this article, I have tried to shed light on the dynamics of human behavior. To do this, I have focused on determinants of decision-making that, while clearly important in the real world, have not received sufficient attention within economics. This is the importance of culture (i.e., socially-learned information stored in people's minds) and tradition (i.e., the transmission of culture

across generations). Since these can be elusive concepts, I provided a conceptual framework that was intended to help provide precision and structure to our thinking.

The first insight that emerges from the framework is a better understanding of why decision-making that relies on culture and tradition, rather than a purely rational calculus, would emerge. The model shows that making decisions based on the values, beliefs, and traditions passed on from previous generations can be an efficient strategy. By simply following tradition, individuals can make decisions without bearing the costs required for rational calculation, such as information acquisition and processing. Thus, by relying on tradition individuals in society do not need to ‘reinvent the wheel’, re-learning what has already been learned by previous generations. Of course, the strategy is only effective if the environment of the previous generation is similar to the current environment so that the cultural traditions of the past are also beneficial today. Thus, a reliance on culture and tradition trades off cost saving against its imperfection in a changing world.

While under general conditions, some reliance on culture and tradition is dynamically optimal, a consequence of this is that mismatch is possible. Following a change in the state of the world, because of a reliance on tradition, behavior does not change immediately, but converges over time to the behavior that is best suited for the new environment. During the transition, the cultural traits and resulting behavior are not perfectly suited to the environment. In addition, during the transition, there will also be disagreement between members in society. Some will have adopted the new beliefs and actions, while others will continue to hold on to the traditional ones.

This dynamic, which is rooted in cultural evolution, provides a way of helping to make sense of the world around us. It raises the natural question: How much of the variation in values, beliefs, and behaviors – and societal disagreements about these – are due to mismatch? In the article, I provided a review of the existing evidence for mismatch and raised the question of whether many of the most contentious disagreements within the United States today are due to mismatch; e.g., views about gun regulations, policies around race, etc.

A world with mismatch presents a special challenge (but also opportunity) for policies. Policies that can eliminate mismatch will have benefits. However, policies that presume mismatch is present when it is not can be highly detrimental. Thus, designing smart policies that can identify mismatch, maximize expected benefits, and minimize expected costs is crucial.

Lastly, the notion of mismatch provides important lessons for our future as a human species.

Mismatch occurs when the world changes and the cultural traits that were beneficial in the past are no longer beneficial today. This raises the obvious question of whether the twin crises we face today – the global health pandemic and global warming – comprise a critical juncture in our history and a change in the state of the world. I discussed how these current challenges appear to be fundamentally different from those of the past. In addition, it is also likely that the cultural traits (i.e., individualism / WEIRD psychology) that were successful at tackling the challenges of the past (e.g., empire-building and industrial development) may not be particularly well-suited for the challenges of our future. Consistent with this, preliminary evidence indicates that individualism is associated with worse performance in tackling the challenges of the COVID-19 pandemic and of climate change.

This final lesson that the notion of mismatch offers is related to diversity. Mismatch, our changing world, and the need for adaptation moving forward highlight the importance of diversity in values, beliefs, and cultural backgrounds of those ‘at the table’ who are making the key decisions as we move forward. Understandably, governments, international organizations, leadership positions, and those in academia are dominated by individuals with cultural backgrounds that have been successful in the past; namely, people with individualistic traits and WEIRD psychology. However, the logic of mismatch suggests that the beneficial traits of the future will be different from those of the past and that the successful values, beliefs, and behaviors of the future may be very different than those of the past.

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