Cultural snapshots: A method to explain cultural transmission of bias

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Abstract

Researchers have long postulated the role of culture in shaping and creating people's individual biases, but there is little evidence for the precise components of "culture" that transmit bias from culture to individual minds. In this chapter, we present cultural snapshots as a methodology that is uniquely suited to both (a) capture the cultural patterns typically encountered by individuals in their natural ecologies and (b) examine how perceiving those patterns—in their natural ecologies—influences individuals. We review research on the psychological origins of intergroup bias to showcase the way in which cultural snapshots can be adapted to examine pressing questions in social, developmental, and cultural psychology. Next, we present an explanation of the cultural snapshots method and its theoretical background, and summarize existing work that has used the cultural snapshots approach to examine the cultural transmission of bias. We conclude with a discussion of possible future directions utilizing the cultural snapshots approach.

Scientists have argued that psychological biases against certain social identities (heretofore, *biases* or *intergroup biases*) are responsible for a variety of societal maladies, ranging from inequalities in health care, employment, and judicial processes to hate crimes and interethnic wars. Indeed, racial, gender and other intergroup biases are historically persistent and remain pervasive throughout modern day societies (Nosek et al., 2007; Weisbuch & Pauker, 2011). The pervasiveness and historical persistence of these biases within large populations demand explanation, and social psychologists have typically assumed that specific forms of bias are not biologically inherited but rather, are socially constructed (for notable exceptions, see Pirlott & Cook, 2024; Schaller & Neuberg, 2012). Scientists have carefully documented how such biases shape perception, impression formation, decisions, memory, and behavior (e.g., Dovidio et al., 2010; Hugenberg et al., 2010; Macrae & Bodenhausen, 2000; Tajfel et al., 1971), and have unearthed cognitive and affective processes that drive these biases (see Dovidio et al., 2010; Hewstone et al., 2002). However, the assumption that intergroup biases are learned in response to cultural influence has proven challenging to empirically examine. How then do specific biases find their way from "culture" into the minds and behavior of children and adults? Ultimately, this is a question about cultural transmission: how are biases transmitted from the wider culture to individual minds?

Here, we articulate a methodology (*cultural snapshots*) that is uniquely suited to modeling how the biases in cultural structures find their way into individual minds. This method enables us to form strong inferences about how sociocultural environments give rise to individual biases, and is uncommon for its

ability to both (a) capture the cultural patterns typically encountered by individuals in their natural ecologies and (b) examine how perceiving those patterns—in their natural ecologies—influences individuals. The cultural snapshots methodology allows researchers to examine the physical substrates of culture (e.g., observable behavior, artifacts), and how perceptions of those substrates give rise to culturally-shared biases (Weisbuch et al., 2017). Put differently, we identify observable and concrete patterns that people within a population consistently observe and then examine how those patterns shape subjective and individual-level biases. Building on Adams and Markus (2004), we refer to physical substrates of culture as *cultural patterns*: perceptible configurations of information frequently encountered by a population or group. We detail this methodology and its theoretical grounding in Section 3, and our program of research that has used this methodology in Section 4.

This methodology not only enables scientists to test broad assumptions about the role of cultural processes in intergroup biases but also to test new questions not possible with existing methods. What are the precise components of "culture" that play a causal role in the transmission of intergroup biases? By focusing on the observable features of culture—cultural patterns—that influence individual-level biases, scientists can move beyond within-person factors (cognitive processes; affective processes; individual differences) to examine how intergroup biases are transmitted from culture to individual minds. In other words, cultural snapshots allows researchers to measure how bias is embedded within social environments. A second benefit is that the cultural-snapshots method models how cultural patterns cause bias, even when individuals are unable to verbalize or consciously identify the cultural pattern itself. The cultural snapshots method is not restricted to describing transmission of unintentional bias, but it is unique in its ability to explain how bias can spread without intention or awareness (Pauker et al., 2021; Weisbuch et al., 2017). Importantly, this methodology provides researchers with a tool to address pressing questions within social, cultural, and developmental psychology. This methodology can be used to answer to the following questions and much more:

1. What are the features in a cultural environment that lead children and adults to favor certain social categories over others?
2. How is implicit bias[1] spread within a culture?

[1] In line with recommendations for increasing conceptual clarity in the use of the term *implicit* in attitude research (Corneille & Hütter, 2020), when we use the term implicit bias in this chapter, we are referring to bias (including stereotypes and attitudes) that is automatic in some form, specifically focused on unintentionality.

3. How do societal level inequalities influence individual level biases?
4. What cultural products or practices are critical to intervene on to disrupt the transmission of bias?

We aim to illustrate the variety of ways cultural snapshots can be used to answer these and other pressing questions. We begin this chapter with a brief review of the psychological origins of intergroup bias and examples of cultural variation in the development of intergroup bias. Although cultural transmission can occur at any point in a person's life, the psychological structures underlying bias emerge early in life, such that understanding the role of culture in bias demands a first understanding of how those structures emerge. For example, there is substantial evidence for bias on the basis of skin tone but not ear size—how do human minds learn which social categories are socially-relevant and which are not? Evidence and theory in developmental psychology addresses such questions, and many more relevant to the culture-bias relationship. Next, we discuss theories of social learning as well as developmental and sociocultural theories of prejudice that inform cultural snapshots, describe the cultural snapshots methodology and its theoretical grounding in more detail, and review existing literature utilizing cultural snapshots. We conclude with a discussion of potential future applications of this methodology.

1. Psychological origins of intergroup bias

Newborn infants do not differentiate between faces of different genders or races, but over the course of their first year, infants start to categorize faces on those dimensions (Quinn et al., 2019; Rhodes & Baron, 2019). By preschool, children begin to add "meaning" to these social categories, displaying a host of explicit and implicit biases, such as status, race, gender, and language biases (Eason et al., 2024; Kinzler et al., 2007; Mandalaywala et al., 2020; Martin & Ruble, 2010; Qian et al., 2016; Raabe & Beelmann, 2011; Shutts, 2015). Negative stereotypes about gender and race also typically emerge by 5–7 years, including beliefs that boys are more likely to be brilliant than girls (Bian et al., 2017), boys are better at math than girls (Ambady et al., 2001), girls are less interested in computer science than boys (Master et al., 2021), and Black people are more aggressive than White or Asian people (Pauker et al., 2010). Importantly, though such prejudices and stereotypes

emerge in childhood, their emergence follows particular patterns that are most easily explained by considering the role of culture in these developing biases.

1.1 Evidence of cultural variation

While there is evidence that intergroup bias—in general—emerges early in life, specific forms of intergroup bias (race bias, religion bias, gender bias, etc.) vary across cultures as does the developmental timing of these different forms of bias. For example, research has found that gender-based bias is stronger and emerges earlier than race-based bias, that categorization by gender is more consistent and emerges earlier than categorization by race, and that gender-based biases are less variable than race-based biases (Hailey & Olson, 2013; Kinzler et al., 2010; Pauker et al., 2016; Shutts et al., 2010, 2013; Shutts, 2015). Why might gender categorization and bias be stronger than racial categorization and bias early in development? And why might we see greater variation in racial categorization and bias?

While some researchers argue that prioritization of gender over race could be explained by the evolutionary relevance of the category (e.g., gender is relevant for mate selection; Kenrick, 1994; Macrae et al., 2002) an equally plausible explanation is that children's social environments tune them to concentrate on certain social categories that are prevalently marked and used in their culture (Bigler & Liben, 2007). For example, gender is more readily labeled and used than race (e.g., women and men's bathrooms, division of labor in the home, everyday use of gendered language), and thus infants are likely to be exposed to these cultural patterns even during early infancy and such gender-based patterns are likely to be more similar across cultures than those surrounding race. Nonetheless, these gender-based patterns also vary by their ecology or environment and produce corresponding variance in bias: in environments that emphasize gender less (i.e., gender-neutral classrooms that de-emphasize gender as a grouping category), children score lower on measures of gender stereotyping and are more willing to engage with children outside of their own gender group (Bigler, 1995; Hilliard & Liben, 2010; Shutts et al., 2017). Furthermore, outside of the U.S., children in different cultures are more likely to form biases around different social categories than race, like ethnicity (Bar-Tal, 1996; Diesendruck et al., 2013).

One persistent theme in cross-cultural research on bias—especially racial bias—is that children and adults tend to direct their biases against lower-status social groups (Fiske & Cuddy, 2006; Heck et al., 2022; Pratto

et al., 2000; Raabe & Beelmann, 2011): social groups that have historically (and currently) been oppressed, ignored, or shut out. Given that cultures vary in which groups are higher or lower status and given that people learn the social status of different groups via what they perceive of the external world, it is likely that specific forms of bias are transmitted via cultural patterns (i.e., associations between group membership and status hierarchies). Indeed, cultural variation in implicit racial biases across development has been documented and such variation appears to depend on the environmental information encountered "within" a culture (Dunham et al., 2006; Newheiser et al., 2014; Qian et al., 2016; Steele et al., 2018). For example, Dunham et al. (2006) found that Japanese children exhibit an implicit pro-Japanese ingroup bias at 6 years, but with age that bias shifted based on the status of the outgroup comparison. Japanese children maintained a strong ingroup bias with age when the outgroup comparison was a lower-status group (Black), but when the outgroup comparison was a higher-status group (White) their implicit ingroup bias decreased with age. In other words, children and adults do not seem to develop "equal" amounts of bias toward all outgroups within the same domain—which groups are evaluated more negatively varies with that group's place within the hierarchy structured by an individual's local environment.

While such cultural variation points to the possible influence of culture, it does not provide evidence that culture causes these differences (i.e., culture is not manipulated). Moreover, it is not clear what aspect of culture specifically transmits these biases. Typically, researchers examine cultures that differ in theoretically important ways, but it is difficult to pinpoint the exact feature (or features) of culture responsible for such variation. This limitation may owe, in part, to definitions of culture typically used in cross-cultural studies. In such studies, culture is operationally defined by characteristics of people in a nation or region. For example, Japanese culture is measured as the psychological characteristics of Japanese people even as scientists rhetorically reference cultural practices (e.g., rituals) and products (e.g., mass media) in their theories. This definition of culture is problematic for studying the cultural practices and products that cause people to develop specific biases. Certainly, examining commonalities and differences in the emergence of intergroup biases across different cultures is an important first step. However, to examine the cultural transmission of bias, it is important to identify the observable components of "culture" that cause changes to individual-level biases. As detailed more fully in Section 3, we focus on cultural patterns as the causal mechanism in the cultural

transmission of bias. In this way, we sidestep the question of "what is culture" and instead focus on the more definable construct of cultural patterns.

Nonetheless, considerable research in the cross-cultural tradition has been conducted to examine the development of intergroup biases, especially—*social essentialism*—the intuitive belief that certain social categories have important underlying essences that define their nature and properties (Gelman, 2003). The enormous literature on the development of social essentialism has been motivated, in part, by the view that essentialist beliefs about race, gender, and other social identities underlie prejudicial thought and behavior (Allport, 1954; Bigler & Liben, 2006, 2007; Prentice & Miller, 2007). As detailed in what follows, cross-cultural research on the topic has focused on similarities and differences between cultures in the development of social essentialism. The key point for our purposes is that these cross-cultural findings often assume but do not test the causal role of "culture" on individual's essentialist beliefs.

1.2 The case of social essentialism

Studies on essentialist beliefs have provided one example of scientists connecting culture to social cognition. Psychological essentialism is considered a crucial ingredient that contributes to the development of stereotyping and prejudice, though the evidence is mixed on whether essentialism causes intergroup bias (e.g., Bailey & Knobe, 2024). People who view a category in an essentialist manner are more likely to view that category as stable, natural, inductively powerful, and defined by discrete boundaries (Gelman, 2003; Haslam et al., 2000). Children have been shown to essentialize a number of social categories, including gender, ethnicity, race, social status, and language (Rhodes & Mandalaywala, 2017).

As more evidence has accumulated around the development of social essentialism, it has become clear that while social essentialism is found consistently across cultures, some social categories are essentialized more consistently and earlier in development than others (Rhodes & Mandalaywala, 2017). For example, akin to the pattern described above surrounding prejudice, children show consistent and strong essentialist beliefs about gender early in development (at 3–4 years) across multiple different measures of essentialism. Yet for other social categories, such as race, there is considerable variability in when and the extent to which children essentialize race within the same culture (Rhodes & Mandalaywala, 2017) and across different cultures (e.g., Diesendruck et al., 2013). While children clearly have capacities to

form essentialist thought more broadly, cultural cues appear to shape which social categories are most essentialized and when (Pauker et al., 2020; Rhodes & Moty, 2020). Yet, the question again is: what are the observable features of culture that both reflect essentialism and cause individuals to develop essentialist beliefs about some social categories more than others?

Where cross-cultural research on social essentialism has documented regional or national differences (and similarities), research has also begun to explore the communicative processes through which essentialism may emerge. In particular, language plays a crucial role in the cultural transmission of social essentialism. Specifically, people use labels (i.e., names for categories; "woman") and generics (i.e., generalizations about named categories that refer to an abstract category "women are gentle" rather than a specific member "this woman is gentle") to point to categories that have cultural significance and signal that these categories refer to kinds of things (Gelman & Roberts, 2017). Experimental research has shown that both labels and generics contribute to social essentialism (Rhodes & Moty, 2020). Indeed, children are more likely to judge characteristics as stable over time and context when the characteristic was referred to by a noun (e.g., carrot eater) than when it was referred to as an action (e.g., she eats carrots; Gelman & Heyman, 1999). This effect has been shown for social categories, as well (Birnbaum et al., 2010; Diesendruck & HaLevi, 2006; Waxman, 2010). Waxman (2010) revealed that for both gender and race, when children heard social category labels, they were more likely to extend a novel property to within-race and within-gender group members, compared to when they were not given any labels. Thus, children use category labels as an indicator of which categories they should use to form broader inferences. Although not tested in existing work, the implication is that social category labels vary in their usage across regions and that frequent and consensual exposure to such differential labels causes widespread endorsement of particular forms of essentialism. The cultural snapshots approach allows for such causal tests and can be used to both document the prevalence of such labels in a given region, and to examine the causal impact of natural encounters with those labels.

Indeed, experimental research has similarly shown that use of generics powerfully shape the extent to which children essentialize social categories (Gelman et al., 2010; Leshin et al., 2021; Rhodes et al., 2012). When children hear generic language describing a new property of a familiar category, they assume that there is a kind-based, causal explanation of why members of that category possess the property. Importantly, both social

category labels and generics are commonplace patterns in all languages that have been studied to date (Gelman & Roberts, 2017), and thus provide a viable cultural pattern that could direct which social categories should be essentialized within a culture. The cultural pattern in such cases is the co-occurrence of linguistic markers with specific social category identities. Parents frequently produce generic statements about social categories they themselves essentialize (Rhodes et al., 2012; Segall et al., 2015) and children develop essentialist beliefs about social categories that adults frequently reference with generics (Gelman et al., 2004; Rhodes et al., 2012; Segall et al., 2015). Moreover, parents spontaneously mark social categories with labels and generics in communication with their children in naturalistic conversations, and this subtle linguistic pattern produced by parents is a stronger predictor of their children's social essentialism than the explicit category-related content (e.g., negative beliefs, stereotypes) in their speech (Segall et al., 2015). In sum, evidence from experimental studies suggests that children's essentialism is influenced by exposure to labels and generics, evidence from observational studies suggests that the use of such language to mark social categories is commonplace, and correlational evidence suggests that greater exposure to these linguistic patterns relates to higher essentialism. The body of evidence thus suggests that linguistic markers for social categories are encountered frequently by children and that such encounters may increase their essentialism. Put differently, cultural patterns of language may account in part for the cultural transmission of social essentialism.

This example illustrates how culture may transmit essentialist beliefs to individual children. The literature has identified an observable feature (linguistic cues), documented its frequency among parents, and used experimental methods to document its influence on children. The missing piece, which can be addressed by cultural snapshots, is to examine how these processes might play out in natural ecologies. As detailed in Section 3, the use of experimenter generated materials often limits or eliminates the natural complexity of the environments that those materials are intended to simulate, and may thus overestimate the impact a linguistic pattern has on children (who must extract the linguistic signal from contextual "noise"). Additionally, extant work has not examined a key component of cultural transmission: that the materials which influence children are consensually observed by those children (see Wang et al., 2022 for a recent exception). Cultural snapshots enable scientists to capture the expression of these linguistic markers in the contexts in which they are naturally encountered by

populations of children and then examine if these consensually perceived linguistic patterns cause children to adopt essentialist beliefs.

Linguistic markers and patterns have been the primary focus of research on intergenerational transmission of social essentialism but it is unlikely that any single cue or pattern accounts in full for the transmission of such bias. Cultural snapshots enables scientists to look beyond language for patterns that may transmit essentialist beliefs. Any meaningful feature that consistently co-occurs with social categories may qualify as such a pattern (see Section 3.1 for a more formal definition of cultural patterns). For example, it may be the case that American children are exposed (perhaps through media) to same-race interactions in which both parties appear to behave similarly and also to cross-race interactions in which the two parties behave quite differently. If this pattern is prevalent in American media, at public parks, or in classrooms, the population of children who perceive this pattern may develop the essentialist belief that people of different races are fundamentally and biologically different. Beyond this pattern, simply perceiving segregation on TV programs, in cafeterias, and/or in classrooms may transmit social essentialism to the population of children who encounters it. These are just two of many patterns that may be examined using the cultural snapshots methodology and that may facilitate cultural transmission of intergroup bias and social essentialism. As noted, however, for individuals to learn essentialist beliefs from cultural patterns, they must both perceive those patterns and encode them in long-term memory. Is this something that people do?

1.3 Ability to pick up environmental contingencies

As illustrated in social essentialism, children may infer that specific social categories are important in their culture because they frequently and consensually encounter those labels or generics in their natural ecologies. This example illustrates two interesting points. First, cultural transmission of bias need not happen through explicit communication of the bias itself. In the example of social essentialism, children are not taught essentialism through parents explicitly saying certain groups are biologically based, mark different kinds of people, or that group membership tells us they possess certain traits (i.e., stereotyping). Instead, children infer meaning and form essentialist beliefs from subtle language cues that parents (and others) use when talking about social categories. Second, to create meaning and learn from these cultural patterns, children need to be able to process and pick up on fairly complicated environmental contingencies. Luckily, even infants

are equipped with domain-general learning tools (e.g., statistical learning; Saffran et al., 1996) needed to support this type of pattern detection.

Critically, an account of cultural bias transmission needs to explain how biases could be transmitted at multiple levels (macro to micro). Biases can be transmitted interpersonally (from person to person, including from parents to children or teachers to students), and such *interpersonal transmission* need not rely on explicit/direct communication. Biases can also be transmitted through a host of other means in a person's wider culture, including through the media or through patterns of associations prevalent in one's social environment (e.g., segregation; social norms related to different social groups; social hierarchies; social roles). It is this latter process of *cultural transmission* that cultural snapshots was generated to model.

We believe the method is especially important for documenting how biases may be culturally transmitted through more subtle means than explicit language. Indeed, research over the last two decades has highlighted the potent role of nonverbal patterns of behavior in the interpersonal transmission of bias. For example, Castelli et al. (2008) had children view interactions in which a White adult made positive or neutral verbal statements while directing either friendly or unfriendly nonverbal behaviors toward a Black adult. Children expressed more negative attitudes toward the Black adult in the video—as well as a new Black adult that they had not seen before—after seeing the Black adult receive unfriendly nonverbal behavior than after seeing the Black adult receive friendly nonverbal behavior. Importantly, the nonverbal behavior, not the verbal statements, influenced children's attitudes. Studies with novel groups have also shown that children can form new biases by observing positive or negative nonverbal behavior directed toward one group compared to the other (Skinner et al., 2017, 2020). Studies using variants of the minimal-group paradigm have also revealed that children can form negative academic stereotypes about a group after observing a teacher direct negative compared to positive nonverbal behaviors toward them (Brey & Pauker, 2019).

Such lab-based experimental manipulations of nonverbal behavior can establish causality but may not represent what children encounter in their natural ecologies. In order to establish that patterns of nonverbal bias transmit bias, a crucial first step would be to determine whether these cultural patterns exist in children's social environments. Children's social ecologies involve complex, higher-order patterns and considerable noise, and this complexity may prevent children from encoding the "signal" (nonverbal bias) and thus displaying the predicted response. Thus, a second

important step in testing cultural transmission is to determine whether children are influenced by these cultural patterns within contexts that maintain their natural complexity. Yet, overall, a focus on cultural patterns allows for a means through which bias can be transmitted without relying on direct explicit communication.

If cultural patterns transmit biases, we would expect that cultures or shared social environments (i.e., regional cultures) would have cultural patterns that relate to individual's aggregate biases. Recent work on regional bias has shown exactly that (Calanchini et al., 2022). Black students are disciplined more and perform worse on tests than White students in counties where teachers are more racially biased (Chin et al., 2020). Middle school-aged girls lag behind boys of the same age in science achievement in countries with stronger career-related gender stereotypes (Nosek et al., 2009). Girls who live in countries with greater national gender disparities in math and science, exhibit higher implicit stereotyping linking boys with math (Cvencek et al., 2024). While these studies connect culture-level inequalities to aggregate bias, what is missing from these studies is an understanding of what children are perceiving in their everyday social environments that reflect and communicate societal inequalities.

2. Cultural transmission of bias: Relation to existing theories

Cultural snapshots is fundamentally grounded in theories of social learning and socialization. Social learning and socialization perspectives suggest that attitudes are learned through the observation and imitation of significant social referents, such as parents and peers (Allport, 1954; Bandura, 1977). Yet in line with recent socialization perspectives (Hughes et al., 2023; Perry et al., 2024; Rogers et al., 2021), cultural snapshots broadens the range of possible material involved in social learning to patterns children observe in their everyday life (e.g., in schools, neighborhoods, the media; see Pauker et al., 2019). In line with both Developmental Intergroup Theory (DIT) and sociocultural theories of prejudice and stereotyping, cultural snapshots assumes intergroup bias is embedded within social contexts.

2.1 Developmental Intergroup Theory

Developmental Intergroup Theory (DIT) proposes a number of factors in a child's social context will determine whether children will recognize

certain characteristics of people, such as skin color, as psychologically salient and thus important and meaningful (Bigler & Liben, 2006, 2007). These factors are perceptual discriminability (how easy a category is to pick out perceptually), proportional group size (the extent of the majority/minority balance between groups), explicit labeling (verbal category labeling), explicit and implicit use (how cultural elders speak about and act in relation to specific social categories, including how they directly or indirectly signal differential social status), and group-attribute covariation. DIT emphasizes that only after a category has attained salience in a child's mind will the child begin to develop more elaborate representations of that category. According to DIT, it is at this point that stereotyping and prejudice will begin to emerge, as children attempt to understand the categories that have risen to prominence. DIT thus offers a framework for understanding why certain types of bias emerge earlier and more consistently. Importantly, DIT points out theoretically important aspects of the social environment (i.e., directly stated and implied patterns of associations) that can be studied as mechanisms through which bias is transmitted.

2.2 Sociocultural theories

Sociocultural theories of prejudice have long argued for the need to carefully consider cultural contexts in the transmission of bias. These theories suggest that bias is embedded within cultural contexts—in ideas, practices, and materials—and that people perpetuate these biases through their everyday actions, creating a dynamic and interconnected cycle (Plaut, 2010; Salter et al., 2018). Instead of focusing solely on prejudice as an individual trait, these perspectives, like the "prejudice-in-places" model (Murphy et al., 2018), highlight how prejudice exists within places. Prejudiced places are contexts with patterns of inequalities in experience and outcomes based on people's social group memberships—advantaging people from some social groups, while disadvantaging others. This shifts the study of prejudice from traits and attitudes that people possess to prejudice as something that people and places do (Markus & Moya, 2010).

A view of prejudice in places highlights the need to examine ideas, practices, and materials that are systematically embedded in social environments common to a large collective, and how these settings support (or do not support) bias. Put differently, social biases reflect the informational structure present in any given culture (Salter et al., 2018)—they are not merely something in people's minds, but are reflected and perpetuated by features (e.g., practices, artifacts, discourse, educational systems, laws) of

people's collective social environment. These features should be quantifiable through coding of the physical environments that are frequently encountered by a human collective.

Locating bias in physical environments also helps to explain why many interventions that target alleviating particular intergroup biases often fail. These interventions, in both children and adults, most often target changing an individual's bias and thus are short-lived (Aboud et al., 2012; Lai et al., 2016). It is hard for an individual to change their bias, if their workplaces, neighborhoods, schools, and the media they consume are filled with cultural patterns of bias that activate and reinforce those biases. In line with these arguments, a recently developed theoretical model of implicit bias, the Bias of Crowds model, argues that implicit biases reflect a person's culture and the situation more so than a person's individual bias (Payne et al., 2017). As they argue, bias is like a wave that passes through a crowd rather than a property that each crowd member carries with them. The Bias of Crowds model connects individual level implicit bias to macro-level biases in a culture, and makes a strong case that perceptible information within a situation, culture, or system, such as inequalities in a person's local context, facilitates implicitly biased cognitions within those situations, cultures, and systems (Payne & Vuletich, 2018). Yet, an open question is how do we measure these features—this perceptible information within a culture that transmits bias—and how do we do so in a systematic manner?

2.3 Cultural snapshots: An integrative approach

Cultural snapshots integrates theoretical approaches from developmental, social, cultural, and ecological perspectives, providing a method through which the cultural transmission of intergroup bias can be modeled. Cultural snapshots thus enable scientists to capture the features associated with social groups in collective social environments. We assume that cultural influence on individuals is mediated by patterns that occur in the material world. In line with arguments by Markus and Moya (2010), Plaut (2010), and Murphy et al. (2018), we argue for considering how bias may be facilitated by the objective contents of a given context or culture. Humans are unable to communicate telepathically, such that the transmission of bias must occur through the things we see, the sounds we hear, and so on. When many people perceive the same sights and sounds on a recurring basis, they are likely to develop similar cognitions, and this process may explain the prevalence and persistence of specific biases within a population (Weisbuch & Pauker, 2011). This general process is implied in many theories of

stereotyping, where it is often assumed that biases and stereotypes are socially constructed: through various cultural processes (media, institutional processes, word-of-mouth, etc.), individuals in a population may come to share the same cognitions about specific social groups. Consistent with this view, bias varies across regions of the U.S. (Calanchini et al., 2022; Payne et al., 2017) and the world (Fiske, 2017; Jackson et al., 2019). Yet despite scientific consensus for the social-construction approach to intergroup bias, little is known about how culture shapes individuals' psychological biases.

The cultural snapshots methodology enables scientists to examine how such influence occurs. Specifically, cultural snapshots can be used to identify the material (perceptible) features of shared environments that cause culturally-shared biases and stereotypes. We suggest that bias can be located in cultural patterns and that these patterns can be perceived over time by humans in quantifiable ways. Cultural snapshots aim to capture these patterns, and offers an experimental approach that can examine the mechanism through which biases are communicated from culture to the individual. We argue that cultural snapshots enable scientists to empirically test many (otherwise) vague assumptions about how "culture" informs stereotyping, prejudice, and discrimination. However, to understand this argument, and the advantages of the cultural snapshots approach, it is necessary to first understand what culture is.

3. Cultural snapshots: A method to examine the cultural transmission of bias

3.1 What is culture?

In what sense could people literally perceive culture and thus develop culturally-informed biases? Building on the work of Adams & Markus (2004, see below), we propose that culture can be understood as observable behaviors, artifacts, and utterances that unfold over time. These *cultural patterns* may then influence individuals' cognitions, including biases against social groups. Critically, cultural patterns are necessarily embedded in the sensory chaos of everyday experience, making culture perceptually-rich and difficult to describe conceptually. For example, Americans of the same race may tend to behave more positively toward each other than Americans who do not share the same race but this statement is only a conceptual description of a cultural pattern. In reality, such cultural patterns manifest in specific interactions involving people of various races, ethnicities, and

genders, in different locations, wearing different clothing, against various background colors, sounds, and other sensory details.

Cultural patterns are thus observed across multiple individual events, where each event is saturated with perceptible characteristics among which the cultural pattern is embedded. These events include information that defines a given cultural pattern but also rich information irrelevant to any one cultural pattern, much as participants' responses in an experiment reflect both the experimental manipulation and individual differences irrelevant to that manipulation. Just as scientists extract the impact of a manipulation by treating individual differences as "noise," we assume that perceivers extract the cultural meaning of patterns by treating event differences as noise. Put differently, cultural patterns subtly saturate the social environments that individuals encounter and generate shared beliefs among those individuals.

This approach is based on a definition of culture described by Adams and Markus (2004),

"Culture consists of explicit and implicit *patterns* of historically derived and selected ideas, and their embodiment in institutions, practices, and artifacts; culture patterns may, on one hand, be considered as products of action, and on the other as conditioning elements of further action." (p. 341; italics in original; definition refines that of Kroeber & Kluckhohn, 1952).

Adams and Markus's influential definition stands out because it emerged from reviewing the myriad existing definitions of culture and their associated criticisms. The focus on cultural patterns departs from the heavily criticized practice among social scientists of treating cultures as fixed, unchanging entities, or of equating culture with social identity (e.g., "Japanese people"; Hannerz, 1992; Hermans & Kempen, 1998; Hong et al., 2000; Strauss & Quinn, 1992). Consistency in cultural patterns would then be equivalent to cultural stability whereas change to those patterns is equivalent to cultural change. We embrace the emphasis on pattern*s* (rather than identities) in defining culture, though our terminology departs slightly from that of Adams and Markus: consistent with our goal of examining how people perceive and develop knowledge of culture, we use the phrase cultural patterns to refer to patterns that can be observed via human senses (Adams and Markus' "embodiment").

3.2 Where is culture?

The content of cultural patterns can be found in "public representations," as described in influential work on culture and its representation.

Specifically, Sperber (1996) defines a representation as "something that represents something for someone" (p. 78), arguing that public representations (e.g., spoken words, behaviors, artifacts) exist outside individual minds, are derivative of the human minds that generate them, and represent something to the people who perceive them. Thus, like cultural patterns, public representations are tangible, human-created, and influence humans. The connection between the two should now be clear: we propose that cultural patterns are comprised of collections of public representations found in public environments. As typically defined, "patterns" are recurring, meaning a cultural pattern cannot be found in a single public representation. For instance, contemporary American institutions include men more frequently than women in leadership positions (e.g., Carroll, 2004; Center for Women in Government & Civil Society, 2011; Hegewisch et al., 2012). This is a cultural pattern that cannot be observed at any one moment in time. A single instance of a man leading a board meeting, while a public representation of this gendered hierarchy, does not itself constitute a cultural pattern, even if observers recognize the man's position of authority. Rather, it is the repeated occurrence of such representations across various contexts and over time that establishes the cultural pattern.

3.3 What are cultural snapshots?

To characterize cultural patterns and examine their influence, we use the cultural snapshots methodology. Cultural snapshots are recorded samples of public environments commonly encountered by many people. These may be samples from mass media (e.g., TV, webpages, magazines; de Vreese et al., 2011; Han & Shavitt, 1994; Kim & Markus, 1999; Lamer & Weisbuch, 2019; Tsai et al., 2007; Weisbuch & Ambady, 2009; Weisbuch, Pauker, & Ambady, 2009), social media (e.g., blogs or social media postings; Huang & Park, 2013; Lee et al., 2024; Schwab & Greitemeyer, 2015; Weisbuch, Ivcevic, & Ambady, 2009), or personal recordings, such as cell phone video, images, or written descriptions of commonly encountered public spaces or situations (i.e., physical space sampling or situation sampling; e.g., Camp et al., 2021; Dietrich & Sands, 2023; Kitayama et al., 1997; Miyamoto et al., 2006; Savani et al., 2011).

A major strength of the cultural snapshots methodology lies in its ability to experimentally manipulate cultural patterns within their perceptually-rich contexts. Specifically, the approach involves two key steps: (1) a content analysis to create a numerical index of one or more cultural

patterns present in these snapshots, and (2) a true experiment where participants are randomly-assigned to observe sets of snapshots (from the content analysis) that either contain or lack the specified cultural pattern. While the resulting data can yield conclusions regarding the influence of cultural patterns on intergroup biases, the veracity of those conclusions hinges on the sampling process used to collect cultural snapshots.

3.3.1 Identify the public environment

Guidelines for cultural snapshots are informed by extant definitions of culture and approaches to achieving a representative sample. A fundamental element in almost all definitions of culture is the idea of something "shared" among people (Schaller et al., 2003). Therefore, cultural snapshots should capture commonly-encountered public environments that individuals encounter regularly. This requires identifying public environments frequently encountered by a broad range of people—prime-time TV, neighborhoods, classrooms, sports websites, and social media are a few examples of many such environments.

3.3.2 Criteria for a representative sample

A representative sample of recordings must be collected within that frequently-encountered environment to ensure (a) that cultural patterns can be identified across events (b) that any cultural patterns identified in the sample characterize the broader public environment (i.e., the "population"), and (c) that the sample is not biased by researcher's interests. This is an especially critical component of cultural snapshots studies—researchers do not simply collect public recordings "willy-nilly" (by virtue of practical concerns) but rather they collect a large and representative sample of recordings from the environment. To do so, scientists must set a priori criteria for selecting recordings as cultural snapshots.

First, scientists must set criteria that ensure a representative sample. For example, if the public environment of interest is "Denver neighborhoods," scientists should set criteria for which neighborhoods they will sample to ensure that the sample represents the broader context of Denver neighborhoods. In this case, scientists would take care to sample recordings from low-, medium-, and high-SES neighborhoods and to sample from neighborhoods that differ in their racial or ethnic makeup. In our work, we often use prime-time TV as a public environment, and to ensure representation of that environment, we sample recordings from multiple genres, multiple TV platforms, and multiple audiences (the audience to whom a show is "pitched").

Once criteria for public environments have been set, the recordings should be representative. For example, if scientists have set 12 locations in Denver to collect cultural snapshots, scientists must collect numerous recordings from each location. Thus, scientists must set a priori criteria for selecting individual recordings for the sample of snapshots. For example, in our work examining popular periodicals (Lamer & Weisbuch, 2019), we set our public environment to 12 popular magazines from the top 100 in the U.S. spanning multiple genres and intended audiences. We selected 12 magazines (similar to 12 locations in Denver in the above example) but then had to set criteria for selecting magazine pages to include in a cultural snapshots database. Specifically, we set criteria for (a) which issues (month) we'd sample from each magazine, (b) which pages would be sampled from each magazine issue (sample from beginning, middle, and end), and (c) how much of the page to sample. Without careful sampling processes, scientists put themselves at risk of examining a cultural pattern that does not actually exist and would thus draw inappropriate generalizations and conclusions about "culture."

3.3.3 Cultural patterns and cultural influence

Once the criteria for selecting recordings has been defined and the recordings have been collected, cultural patterns must be identified. Cultural patterns are identified by coding or measuring each cultural snapshot for the pattern(s) of interest. These patterns can be coded at a level of abstraction consistent with the researchers' theory but could range from more reductionist cues like human movement speed or visual brightness to more emergent behavioral cues such as leadership style or emotion.

Finally, and most importantly, sets of cultural snapshots used in experimental manipulations should be selected from the sample of snapshots collected for the content analysis, so that (at least) one set of snapshots contains the cultural pattern of interest and (at least) one set does not, but both sets include behavior patterns embedded in the perceptually-rich contexts that people typically encounter. These sets can be created simply by selecting appropriate snapshots or by editing of individual snapshots. Participants can then be randomly-assigned to view a set of cultural snapshots that does or does not include the cultural pattern. Differences in outcomes between these conditions thus reflects the influence of cultural patterns on cognition, or by our definition, the influence of culture on cognition.

In summary, a key component of the cultural snapshots methodology is the usage and analysis of a large and representative database of recordings from a public environment. These recordings are not only used to characterize cultural patterns (typically, "Study 1") but to examine the causal influence of those patterns on perceivers' own biases.

3.4 Cultural snapshots and ecological principles

The cultural snapshots approach to examining how culture transmits intergroup bias is grounded in ecological theories of perception (Brunswik, 1956; Gibson, 1979) and development (Bronfenbrenner, 1977). Broadly, these ecological theories share the assumption that people adapt to their surroundings or ecology, as a species (evolution) and as individuals (learning), and that characterizing these ecologies is critical to understanding how people adapt to them.

We are obviously not the first scientists to embrace ecological principles in social psychology, as this approach was spearheaded over 40 years ago by Leslie Zebrowitz and Robert Baron (McArthur & Baron, 1983). They argued that extant research on impression formation had closely examined how people process information without consideration of how that information is structured in the world. McArthur and Baron—drawing from Gibson (1979) as we do—further argued that this limitation prevented psychologists from understanding how perceivers process the structured information that exists in any ecology. Put differently, psychologists had learned little about how people perceive the information they actually encounter in the world. In a similar approach, but applied to decision-making, Gigerenzer (e.g., Todd & Gigerenzer, 2000) and others (e.g., Simon, 1991) contend that so-called cognitive biases often reflect the environments in which those biases develop. That is, because human environments typically demand rapid and cognitively efficient decisions from individuals with limited knowledge, learned or inherited cognitive biases can actually optimize decisions in those typical human environments. While McArthur and Baron's critique drew upon Gibson's (1979) ecological approach to perception, Gigerezer and colleagues based their critique—in part—on Brunswik's (1956) ecological approach. Whereas the Cultural Snapshots methodology was inspired in part by the work of Zebrowitz and Gigerenzer, the method itself draws from principles elaborated by Brunswik (1955, 1956), Bronfenbrenner (1977), and the Gibsons (Gibson & Pick, 2000; Gibson, 1979), as described below. We believe that the result is a methodology that can address critiques of social cognition research on intergroup bias and its transmission.

3.4.1 Statistically-correlated environments

Both Brunswik (1955) and Gibson (1979) argue that each public environment includes a wide variety of naturally confounded elements, and that human perception and cognition operate (and adjust) to identify specific patterns in those complex and confounded environments. Cultural snapshots provide an experimental method for retaining most aspects of those confounded environments while also permitting scientists to isolate the processes mediating those environments and human beliefs.

Brunswik (1955) argued that the perception of any stimulus (e.g., a line) fundamentally depends on other visible stimuli in the environment (e.g., a second line). He argued that natural covariation exists between various environmental stimuli, and perceptual systems "learn" these typical patterns of covariation to produce functional responses to an ecology in which elements naturally co-occur. For example, Segall et al. (1963) observed that the Müller-Lyer illusion was not experienced by people in regions of the world that contain relatively few right-angles in their buildings and rooms (e.g., regions in which people live in "huts" or absent carpentry; see Fig. 1). One popular explanation for the Müller-Lyer illusion is that people learn to treat inward pointing right-angles on opposite sides of a line as a depth cue: when the "fins" are pointing inward, the line looks further away and thus smaller. By naturally and frequently observing a covariation between right angles and distance, people learn to *use* those right angles to infer distance and thus size. Thus, visual illusions—often regarded as vivid examples of fundamental visual processes—depend, to some degree, on the statistically-correlated ecology encountered by perceivers.

Later research provided strong support for the view that information is meaningfully structured in social ecologies. Even low-level features (e.g., size

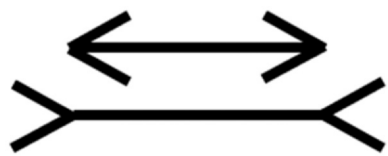

Fig. 1 *Müller-Lyer Illusion. Note.* Example of a visual illusion that was originally thought to be "universal", but was later determined to be culturally variable and informed by people's exposure to different types of human-constructed environments (e.g., environments with right angles compared to those without right angles). This serves as an example of how even basic visual perception is tied to the statistically-correlated ecologies of the visual environments that humans commonly encounter within their culture.

and location) are correlated in natural scenes (Geisler, 2008; Graham & Field, 2007; Long et al., 2006; Ruderman & Bialek, 1994; Simoncelli & Olshausen, 2001; Srivastava et al., 2002; Torralba & Oliva, 2003), word pairs vary in how often they co-occur in natural texts (Lund & Burgess, 1996; Spence & Owens, 1990), and specific ethnicities, genders, and ages are more likely to be seen in some places than others (Adukia et al., 2023; Coltrane & Messineo, 2000; Dill et al., 2005; Mastro & Stern, 2003; Smith & Granados, 2009; Taylor & Stern, 1997; Wilkes & Valencia, 1989). These examples illustrate just a fraction of the statistical confounds that exist within real-world social environments, and psychological processing may be oriented to those confounds. With cultural snapshots, we aim to reconcile the importance of eliminating confounds for causal conclusions with the importance of preserving confounds to examine typical social-cognitive processing.

Brunswik (1955) uses these sorts of effects to argue against typical elements of experimental design. Scientists typically go to great lengths to ensure that any effects in an experiment can be attributed to the manipulated variable of interest. Specifically, we experimentalists do our best to ensure that experimental conditions only differ on the basis of the manipulated variable(s). Often this means a reductive approach in which faces, for example, are presented absent other visual stimuli, words are presented absent a sentence, and so on. This kind of approach surely meets many ideals for scientific methods in psychology, given the precision of conclusions that can be drawn, but for Brunswik, this sort of experiment poorly represents the patterns of covariation that people encounter: the "classic" experiment poorly models perception as it occurs in natural ecologies.

For example, in social-cognitive research that aims to examine participants' intergroup biases, researchers may present a "face prime" or a "name prime" to participants and measure their reaction time to identifying a word (e.g., "aggressive") that follows (e.g., Wheeler & Fiske, 2005). The face primes are presented absent other faces, any bodies or voices, and any scene information, all of which are typically perceived any time you see a face. Some or all of that (absent) information is likely to naturally covary with the variable of interest (e.g., face race), such that classic experiments measure biases in the mind when most aspects of the natural environment (covariations) are removed. Of course, this approach precludes understanding of how those biases operate in natural environments. Brunswik (1955) argued that by eliminating natural confounds and "noise", traditional experiments are limited in the conclusions that can be drawn about the typical operation of human psychological processes.

We are not simply arguing that external validity is important but instead suggest that psychological processing is, in a basic sense, oriented toward complex environments. For Brunswik, human minds adapt to functionally-relevant information that is embedded within naturally confounded and noisy environments (Brunswik, 1955; Gibson & Pick, 2000; Gibson, 1979; McArthur & Baron, 1983). Brunswik argued that by eliminating natural confounds and "noise", traditional experiments are limited in the conclusions that can be drawn about the typical operation of human psychological processes. However, he also acknowledged that adjusting experimental methods to meet the structure of ecologies is a challenging task, and advocated for the use of "classic" (reductionist) experiments that move closer to ecological patterns: multi-factor designs that include complex stimuli. Indeed, increased use of multi-factor experimental designs and complex stimuli in social cognition research have enabled closer approximations of real, complex environments without sacrificing control. Classic experimental methods have thus been essential to advances in scientific understanding of conformity, priming, and many other phenomena that describe the causal influence of public environments on individual cognitions (e.g., Bargh, 2006; Cialdini & Goldstein, 2004; Hofmann et al., 2011; Petty et al., 2010; Zebrowitz, 2011).

More broadly, critiques that simply note the absence of "external validity" are not persuasive in explaining why external validity is problematic for any specific experiment. Following Mook (1983), we believe that the role of external validity should depend on the goals of the scientist. That is, scientists often go to the lab to test theories rather than to test the generalizability of a specific effect. However, with respect to the cultural transmission of bias, theories describe the relationship between information outside of one's body (Sperber's *public representations*) and information in one's mind (*private representations*). Cultural transmission occurs in response to frequently and commonly encountered information that exists in public environments. Accordingly, it is necessary for scientists to characterize the structure of environmental information—without doing so, it makes little sense to study cultural transmission. Thus, although classical experimental approaches are often appropriate and necessary to test psychological theories, any theory that describes the relationship between culture and the individual demands that scientists empirically-characterize cultural patterns and demonstrate those patterns exert a causal influence on what people perceive, think, and feel.

In full, we draw from Brunswik (1955) to motivate the cultural snapshots methodology. As described above, we first collect a representative sample of recordings from a public environment and code these recordings for variables of interest. Specifically, we characterize natural covariation among stimuli as suggested by Brunswik. For example, and as described later, we have observed that nonverbal behaviors presented on TV (a public environment) tend to covary with character race (Weisbuch, Pauker, & Ambady, 2009). We then use these recordings to present the covariation pattern to participants and observe whether their intergroup biases change as a result. Thus, the cultural snapshots methodology presents patterns of perceptually-rich covariation that have been empirically demonstrated to be present in typical ecologies, as desired by Brunswik, enabling conclusions about how culturally-prevalent patterns of covariation shape the intergroup biases of a common group of perceivers.

3.5 Levels of analysis

The second ecological approach we draw from is Bronfenbrenner's (1977) ecological model of development. Specifically, cultural snapshots enable scientists to describe how macro-level information (e.g., mass media) shapes micro-level (i.e., the perceiver) cognitions and behavior. Indeed, Bronfenbrenner argues that behavior is situated within different types of ecologies. At the broadest level (*macro-level*), ecologies regard one's society and include variables such as social norms, mass media, and government institutions (e.g., laws). At one level closer to the individual, parents, friends, and local governments are elements of *exosystem* ecologies. The *micro-level* describes work, school, and home ecologies, with a placeholder (*meso-ecology*) in between the micro ecology and the exosystem. In our cultural snapshots work, the independent variable represents the macrosystem and the dependent variable represents individual participants' beliefs about one or more of Bronfenbrenner's levels. For example, we have measured beliefs about the most micro-level (oneself; Weisbuch & Ambady, 2009) and the exosystem (beliefs about the values of parents and friends; Lamer et al., 2022). Thus, the cultural snapshots approach can be used to examine cultural transmission in different types of ecologies.

Critically, researchers in social, cultural, and developmental psychology have called for a need to examine the macrosystem as a driver of intergroup bias (Payne et al., 2017; Richeson & Sommers, 2016; Rogers et al., 2021; Salter et al., 2018). The cultural snapshots approach offers a way to "center the macrosystem" instead of primarily focusing on what scientists believe

are the most proximal levels of influence on human development (i.e., microsystems; Rogers et al., 2021). In other words, the cultural snapshots approach allows for ways to measure and quantify cultural patterns in the macrosystem, including the extant inequalities that exist in most all cultures, and examine how these cultural patterns shape and reverberate through multiple ecologies, including their influence on individuals. The cultural snapshots approach also recenters interventions aimed to mitigate intergroup bias on changing aspects of the macrosystem—specifically addressing cultural patterns—rather than focusing on interventions targeting individuals.

Beyond the different types of ecologies described by Bronfenbrenner, cultural patterns can themselves be empirically-derived at different levels of analysis. That is, our conceptual framework flexibly accommodates many different theories of culture by allowing public representations to vary in levels of abstraction, just as different approaches to examining culture can be identified along a continuum of abstraction. For example, an especially reductive approach to culture might describe a public representation as "large right hand with fingers and thumb clenched into palm with moderate force, quickly moving forward in space with a leftward trajectory ultimately making contact with the left lower-quarter of a human face, which moves rapidly to the right and turns red." This example can be compared with more abstract descriptions of the same action, such as "punched someone in the face", "behaved aggressively", or even "threatened the status quo." Each of these construals could be considered a public representation. Public representations, therefore, can be characterized by their more concrete physical (perceptual) features or their more abstract features. We assume that concrete and abstract represent opposite ends of a spectrum along which public representations, and thus cultural patterns, can be identified and examined.

The benefits of this approach can be illustrated via cultural dynamics research, which explores cultural stability and change. Specifically, this burgeoning research area is divided into macro-level versus micro-level research traditions (Kashima, 2016), which produce two different literatures. Macro-level approaches in cultural dynamics aim to characterize the distribution of cultural information within a population. Cultural snapshots are directly applicable to this approach, as they can be (and have been) used to map the prevalence of cultural patterns. In contrast, the causal influence of culture on cognition has traditionally relied on micro-level approaches that examine how public representations are interpreted, grounded (i.e.,

the meaning is agreed-upon), remembered, and reproduced. Consequently, macro-level and micro-level approaches have typically been methodologically segregated. Cultural snapshots offers a novel way to bridge this gap and link macro-level to micro-level approaches, by allowing researchers to examine how distributions of cultural patterns exert widespread influences on individual human minds. In other words, the method can be used to examine how population-wide intergroup biases are formed, maintained, or changed via cultural patterns.

3.6 Ecology in perception and culture

The work of Gibson (1979) represents the third ecological approach that informs the cultural snapshots methodology. Specifically, Gibson argued that the self-relevant meaning (*affordance*) of any stimulus is derived in a manner similar to that argued by Brunswik (1956): perceivers are sensitive to complex configurations of dynamic information and for Gibson, it is the configuration and not a single feature that present affordances. Thus, Gibson argues that visual perception is about seeing affordances and these affordances are most reliably signaled when all elements of the configuration can be observed. For example, he argues that dynamic stimuli more reliably signal affordances than do static stimuli. Moreover, affordances are signaled by the configuration and not any one element, so that face + body stimuli (for example) should more reliably signal affordances than do face-only stimuli.

Practically speaking, the Platonic ideal of the Gibsonian approach is hard to pull off. For example, vision scientists under the Gibsonian tradition sometimes study phenomena such as depth perception by taking participants out of the lab and onto a college campus green, a library, and so on, and reverse-engineering the configurations used by the participant to draw their perceptual judgment (e.g., distance; Brunswik, 1944; Proffitt, 2006). This approach requires careful coding of visible things in the natural environment (e.g., library), long experimental sessions, and a reduction in experimental control. For these reasons, social psychologists who take the Gibsonian approach typically focus on a type of stimulus that has been studied for decades: faces. Instead of presenting facial configurations amidst their broader ecology, however, face perception scientists focus on how certain configurations in a face give rise to certain judgments and how precise configural differences in faces signal specific affordances. In this respect, the ecology of the face has been closely examined by social psychologists but in our view, this method limits the application of such

ecological approaches to understanding intergroup bias, where affordances are likely to derive not only from a facial configuration but from the vast plethora of information visible to a perceiver when they see a face.

The cultural snapshots approach neither embraces conventional ecological approaches focused on disembodied faces nor does it resolve the problem noted above. Cultural snapshots studies are conducted in a laboratory, where participants don't have opportunity to discuss what they see with peers, the "snapshot" element prevents them from seeing the full temporal context of a given pattern (e.g., what comes before a given public representation), and the room in which they complete an experiment is pretty unusual—a small cubicle with four blank walls and a computer. These are all limitations to external validity. Thus, the cultural snapshots approach does not meet the ideal for an ecological approach to cultural transmission. However, the cultural snapshots approach improves upon extant methods by identifying and manipulating perceptible patterns in dynamic social events that include faces, bodies, other people, and a vast amount of scene information. In this respect, cultural snapshots can advance theoretical conclusions and provide a more reliable means for testing how cultural transmission of intergroup bias operates in the natural world.

3.7 Why cultural snapshots?

The cultural snapshots methodology presents multiple benefits for the study of intergroup bias and its transmission. First, many theories of consensual intergroup bias, race bias, and gender bias imply that these biases are learned and that they are learned via "culture." Although this broad assumption receives indirect support from evidence that biases change in response to experimental manipulations (e.g., Blair, 2002; Forscher et al., 2019; Gawronski & Bodenhausen, 2006), those experimental manipulations fail to characterize the environmental information that individuals in a population typically encounter (see above). Cultural snapshots, in contrast, enable scientists to characterize the information patterns that many people recurrently encounter (cultural patterns) and to experimentally manipulate those patterns. Importantly, experimental manipulations of cultural patterns retain the perceptible richness of the events people see in natural ecologies, and thus simulates extended exposure to those ecologies (or "cultures"). Thus, whereas experimental designs in the classic tradition cannot draw strong conclusions about how culture shapes intergroup bias, the cultural snapshots methodology enables scientists to directly test the assumption in many theories of intergroup bias: that such biases are learned via cultural

patterns. In our view, this is perhaps the most important benefit of cultural snapshots: they enable causal tests for how engagement with a social ecology or culture causes consensual biases.

A second benefit of cultural snapshots is that the paradigm provides a bridge across micro-level and macro-level approaches to studying intergroup bias. Where proponents of micro level approaches emphasize precision in identifying individual-level psychological processes and causality, macro-level approaches emphasize group-level processes and epidemiological analyses. The cultural snapshots approach combines the strengths of both approaches, enabling scientists to draw strong conclusions about how macro-level processes impact micro-level processes.

All told, cultural snapshots enable scientists to examine how culture shapes intergroup bias. By using representative samples of public environments, by carefully coding cultural patterns across hundreds of recordings, and by experimentally manipulating those recordings, the cultural snapshots methodology allows scientists to draw strong conclusions about the cultural transmission of bias.

4. Evidence for bias transmission via cultural patterns

We have argued that intergroup bias can be transmitted via cultural patterns that reach large populations on a consistent basis, and that cultural snapshots represent a valuable methodology for examining such cultural influence. In this section, we review extant evidence for cultural patterns and their influence, with a special emphasis on how cultural snapshots have been used to examine such phenomena. We then discuss some of the work exploring moderators of social learning that could shape whether cultural transmission of bias occurs.

4.1 Cultural snapshots: Evidence for cultural transmission

Cultural patterns can take a variety of forms and produce consensual biases in a population. Our research with cultural snapshots has been theory-driven, drawing from extant literature to hypothesize specific cultural patterns that may facilitate the cultural transmission of specific forms of bias. We have examined the transmission of biased attitudes, essentialism, stereotypes, (subjective) norms, and intergroup behavior. We review this work in the sections that follow before describing other approaches to examining cultural patterns.

4.1.1 Cultural transmission of biased attitudes

Bias may be observed in attitudes, stereotyping, memory, and so on but the most closely examined topic in this area is biased attitudes (or biased affective associations). Many scientists have pointed to cultural input as the cause of such biases, and there is even evidence that such biases are best observed in a population of minds rather than in isolated minds (Payne et al., 2017). Based on evidence that people with privileged identities (e.g., White person, man) exhibit emotionally negative nonverbal behavior toward people with marginalized identities (e.g., Black person, woman) in laboratory settings and that such laboratory behavior is correlated with participants' attitudinal bias (Dovidio et al., 1997, 2002), we suspected that Americans may be consistently and consensually exposed to such patterns of "nonverbal bias."

In our initial work, we analyzed primetime TV shows for evidence of nonverbal race bias (Weisbuch, Pauker, & Ambady, 2009; see Table 1). Specifically, following our cultural snapshots approach, we identified popular, currently airing shows in the U.S. that featured a White and a Black character matched on age, gender, status, and frequency of appearance within the show. We then systematically sampled clips of each character (30 matched characters across 11 popular TV shows) interacting with co-characters and removed the audio track so that the clips were silent. Participant judges then rated how positively the co-characters were acting in each interaction. Critically, the Black or White target character was cropped out of the clip so that their identity could not influence the ratings. Across these 11 shows, the White characters were treated more positively than the Black characters. Thus, by systematically selecting clips of interactions featuring Black or White main characters from popular U.S. TV shows, we quantified a pattern of nonverbal bias favoring White characters in adult TV.

This initial content analysis not only provided evidence for a cultural pattern of nonverbal race bias but also provided materials for evaluating the causal influence of this pattern. Thus, from the initial sample of clips in the content analysis, we selected two or more clips from each target character: the clip(s) in which they were treated most positively and the clip(s) in which they were treated most negatively. We then generated two experimental conditions. In the "traditional bias" (pro-White) condition, participants viewed clips in which White targets were treated positively and Black target characters were treated negatively—this is the cultural pattern that existed on TV (at the time). The "reverse bias" (pro-Black) condition depicted the

Table 1 Application of the cultural snapshots methodology.

Step		Description	Applied to the current work (Weisbuch, Pauker, & Ambady, 2009)
Part 1: Content Analysis	Identify cultural pattern of interest	Identify a pattern that the researcher hypothesizes to be present in shared environments	More positive nonverbal behavior towards White than Black people
	Identify human population	Identify the population exposed to this hypothesized pattern	U.S. Americans
	Identify environment	Identify an environment that is commonly and frequently encountered by the population of interest	Scripted televised shows on media on major networks
	Identify exemplars	Identify the population of exemplars that define the environment	Popular scripted TV programs that feature recurring Black and White characters with similar status
	Identify time and location	Identify a representative sample of times and locations to ensure that snapshots collected of each exemplar can be used to estimate perceived culture	3 10-second silent video samples from each of 3 episodes for each of 30 characters
	Identify and code variables of interest	The variable(s) of interest are defined by the research question and should be coded with an eye toward potential confounding variables	Nonverbal behavior direction toward Black and White characters

Part 2: Experiment	Generate experimental conditions	Select (or edit) snapshots such that there is one conditioning containing snapshots consistent with the culturally-prevalent pattern and another set without that pattern or with a reverse pattern	Pro-White condition (clips containing positive treatment of White characters and clips containing negative treatment of Black characters) Pro-Black condition (clips containing negative treatment of White characters and clips containing positive treatment of Black characters) Control condition (this condition contained a subset of clips from the other conditions so that Black and White characters were treated similarly when averaged across the clips)
	Test exposure to pattern on outcome variables of interest	Identify variables of interest and test after exposure to experimental condition	Race Bias IAT (Greenwald et al., 1998) Affective Priming Measure (assessed the degree to which subliminal images of Black, White, or Asian faces sped responses to positive versus negative target images; Fazio et al., 1995) Attitudes Towards Black people Scale (Brigham, 1993) Liking of Black and White Characters (assessed how much they liked White more than Black characters)

Adapted from Weisbuch et al. (2017).

opposite pattern. After exposure to the traditional cultural pattern of nonverbal bias, participants had higher (more pro-White) scores on a race-valence IAT. These results were replicated in subsequent experiments with affective-priming measures and explicit self-report measures (the "Attitudes toward Blacks" scale; Brigham, 1993). Notably, these effects were race-specific: we observed no effect on participants' implicit bias toward Asian people using an affective-priming measure. Finally, such cultural transmission was later replicated in a sample of Asian American and Pacific Islander participants, suggesting that perceivers need not share a racial identity with the TV characters in order for those perceivers to "catch" attitudinal bias from cultural patterns (Meyers et al., 2023).

This work on attitudinal biases illustrates several benefits of the cultural snapshots method for understanding cultural transmission. First, we identified a pattern of biased *nonverbal behavior* that Americans frequently and consensually perceived across TV (at least in 2006). Given that the large population of American adults each streams or watches 4.5 h of TV programming daily (on average, Nielsen, 2024), a cultural pattern of nonverbal race bias may cause a large population of viewers to strengthen their own race biases. Thus, the second benefit is especially critical: participants in experimental studies are shown the same materials that millions of Americans saw in the comfort of their living rooms. We did not remove visual elements of public environments that may covary with the cultural pattern or simply be considered "noise" to traditional experimentalists. Combined, these two strengths of cultural snapshots allow us to conclude that attitudinal bias was culturally transmitted to viewers through a cultural pattern of nonverbal bias.

4.1.2 Cultural transmission of essentialism

Individuals are likely to differ in the "diet" of cultural patterns they perceive, such that children and adults may encounter different patterns even if they reside in the same location. Moreover, cultural patterns are likely to change over time so that the pattern of nonverbal race bias on TV (observed for TV shows airing in 2006) may no longer exist—such a change could reflect changes to private representation in the population or simply that TV producers were made aware of our 2009 article. For these reasons, we examined cultural patterns of nonverbal race bias in children's TV programs 10 years later (shows from 2016). Using similar coding procedures as in Weisbuch, Pauker, and Ambady (2009), we did not find nonverbal race bias but instead found a pattern that did not emerge 10 years

earlier on adult TV. Across 11 popular programs, we observed a pattern of *affective divergence*—substantially greater emotional similarity in same-race than cross-race interactions (Lamer, Pauker, et al., 2025; see Fig. 2). Specifically, we sampled clips of 22 Black and White target characters in interactions with other characters on popular children's TV shows. From the 11 shows, we sampled 388 dyadic interactions featuring the target characters. The interaction partner was always White. Therefore, when White target characters were interacting with White partners, their emotional expressions were more similar to each other than when Black target characters were interacting with White partners. Thus, children's TV shows contain a pattern of emotion sharing within, but not between race, a pattern we refer to as affective divergence (Weisbuch & Ambady, 2008).

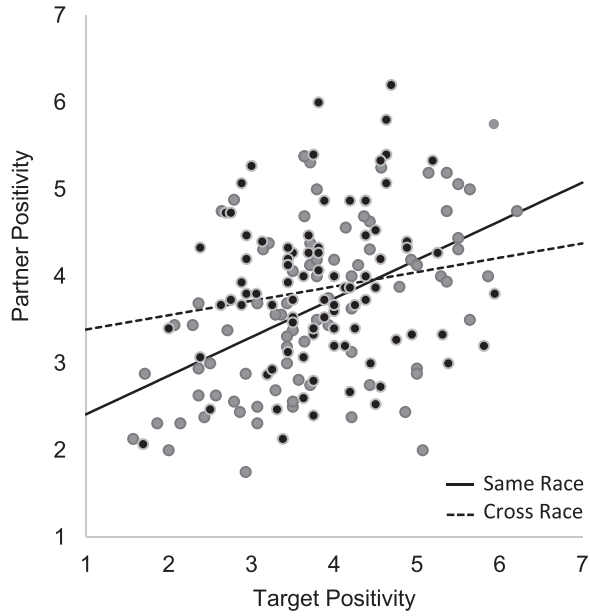

Fig. 2 *Patterns of emotion sharing in children's TV. Note.* In popular children's shows, we measured the emotion of characters in same-race and cross-race dyadic interactions. Target characters were White or Black and their emotion is plotted on the X axis. Partner characters were always White and their emotion is shown on the Y axis. Emotions of the interaction partners were more closely matched in same-race than cross-race interactions. Partner emotion significantly predicted target emotion in same-race interactions ($b = .58$, $se = .09$, $t(187.75) = 6.16$, $p = .001$; $r = .50$, $p < .001$) but not in cross-race interactions ($b = .12$, $se = .10$, $t(190.22) = 1.20$, $p = .230$; $r = .14$, $p = .188$). *Data from Lamer, S. A., Pauker, K., Babbitt, B., & Weisbuch, M. (unpublished manuscript). Patterns of emotion in televised interracial interactions.*

Although not yet published, we have used the cultural snapshots methodology to examine how seeing a cultural pattern of affective divergence might shape children's racial cognitions. Whereas nonverbal race bias is defined by a person's emotional (nonverbal) response to another person, affective divergence is defined by emotional similarity or dissimilarity between two people's expressive behavior. Affective divergence is thus a more complex pattern that references two people's emotional displays (versus one person's display in nonverbal bias) and the differences between those displays. Because emotion similarity depends on race (i.e., affective divergence) we reasoned that perceivers would learn about similarities and differences between races by virtue of exposure to a cultural pattern of affective divergence. Accordingly, we predicted and found (in a small study) that 6–10 year old children were more likely to endorse race essentialism after seeing a cultural pattern of affective divergence (vs. convergence) on TV clips. Through grant-funded support, we are currently examining downstream effects on children's behavior, social categorization, and interest in interracial interaction.

Having observed this cultural pattern of affective divergence on children's TV we examined whether adults might encounter this same pattern. In this work (Lamer et al., 2018), we focused on a different modality (Instagram) and examined images of groups that varied in racial diversity. We hypothesized a pattern of affective divergence in which facial emotion would be similar to the degree that members of the group shared racial identities. We selected 25 American colleges and universities varying in size, geographical region, status as private or public, acceptance rate, and the proportion of Black students in attendance (to ensure racial diversity in the images we sampled several HBCUs), and downloaded the institutions' Instagram feed. From these feeds, we sampled all of the available group images posted during our selected sampling period (January-April 2016), yielding 238 group images, 114 of which were racially diverse groups. We cropped each individual face out of the images and had all 1243 faces rated for emotional valence. Analyses revealed a pattern of affective divergence such that people's emotional expressions were more similar to that of same-race than other-race individuals.

Where one key benefits of our cultural snapshots work is the use of ecologically-valid materials in experiments, we used reductive methods in this case to examine how seeing affective divergence in crowds might shape adult participants' race essentialism. Thus, we can draw conclusions about the existence of the cultural pattern but cannot be certain that results from

the experiment would generalize to far more (visually) complex ecologies, for reasons stated earlier. Nonetheless, this kind of work is not without merit as it provides an intermediate step to understanding cultural transmission. In particular, in the experimental study, participants observed crowds comprised of four Black and four White men's faces on each of over 200 trials. Participants in the affective divergence condition saw crowds (for 500 ms each) with little variability in facial expression within race but considerable variability between races (e.g., Black men as very happy and White men as only mildly happy). Participants in the control condition saw crowds in which variability in facial expression was not correlated with variability in race (e.g., Black and White men very happy). Those in the affective divergence condition later reported more race essentialism (as measured by the Race Conceptions Scale; Williams & Eberhardt, 2008) and were more likely to categorize faces as monoracial than biracial (using faces from Pauker et al., 2013), as compared to the control condition.

The careful experimental control in this study allowed us to isolate visual perceptual processes because we could control both the mean and distribution of emotion in each racial subgroup. Thus, we prioritized internal validity over representative design to be able to test visual mechanisms by which crowd emotion shapes racial cognition. This emphasis on internal validity was important for the conclusions we wanted to make about visual perception, but this work is a good case study of understanding what is gained from a cultural snapshots approach in experimental work. Specifically, we can conclude that when people see emotionally segregated crowds, it causes them to think about racial groups as more essentialized and distinct from each other. Yet, we do not know how people evaluate emotional segregation in the context where emotional segregation appears, given that – as we argue earlier – human perception is adapted to complex environments. In full, these studies with both children and adults suggest that race essentialism can be transmitted via cultural patterns of affective divergence.

4.1.3 Cultural transmission of stereotypes

The relationship between culture and stereotypes depends largely on how stereotypes are defined. Classic definitions require stereotypes to be consensual—common to a population. By this definition, stereotypes are defined at the group-level and require some degree of consensus in that group. In contrast to classic definitions, modern social cognition does not

require a consensual component to define stereotypes. In this literature, stereotypes are defined simply as an individual's belief about a social group, or a cognitive association regarding that group. By this definition, stereotypes need not be (though often are) consensual and may therefore be considered individual-level phenomena.

Our work on the cultural transmission of stereotypes permits inferences relevant to both conceptualizations of "stereotyping." Cultural patterns are the public counterpart for classic definitions of stereotypes (which refer to consensual private representations): cultural transmission of stereotypes occurs if consensual private representations come to reflect the content of cultural patterns. Alternatively, modern social cognition definitions of stereotypes focus on the individual rather than the collective. Yet, they assume that these individual-level stereotypes are shaped by social environments, with shared social environments contributing to stereotypes that achieve some degree of consensus. Accordingly, to the degree that cultural patterns are components of a widely-shared environment, they may influence individual-level stereotypes in a manner that generates greater consensus.

Our work thus far on the cultural transmission of stereotypes has focused on spatial patterns in social ecologies. Every social setting in the physical world has a spatial (and temporal) arrangement, and some such arrangements may be encountered frequently. For example, bathrooms in American homes tend to have a toilet and a sink somewhat near each other in the same room. A bathroom in Knoxville may differ from a bathroom in New York in terms of colors, quality, size, and so on but it is likely that both would include a toilet and a nearby sink. Likewise, when you see people, you see them organized in space and where they appear in space may both differ by social identity and have important implications for intergroup biases. Indeed, Conceptual Metaphor Theory suggests that people use basic components of their physical environment to simplify more complex concepts (Landau et al., 2010). For example, evidence from several studies suggests that people possess cognitive associations between vertical location and power such that they associate higher vertical locations with more powerful targets (Schubert, 2005). Building on this finding, we predicted that cultural patterns involving vertical space would elevate men over women, reflecting the stereotype that men are more powerful than women (Eagly et al., 2020). We (Lamer & Weisbuch, 2019) hypothesized that in print media, images of men would be placed higher on the page than would images of women. Indeed, across 12 of the most popular

magazines in the U.S., women appeared lower on the pages than men (i.e., centered at 48 % from the top of the page compared to 44 %).

The next—and critical—step in cultural snapshots paradigms is to experimentally manipulate cultural patterns using the same materials as the content analysis. This step tests cultural transmission—to the degree that the same magazine pages seen by millions of people have a causal impact in an experiment, it may be said that cultural patterns have shaped psychological processes. Indeed, in seven experimental studies, participants saw about 80 real magazine pages (from the content analysis) in which men were high and women were low - mimicking the cultural pattern - or the reverse. An internal meta-analysis of these results revealed that participants who saw men higher on the pages reported that men were more powerful and dominant than women, independent of their own gender (see Fig. 3).

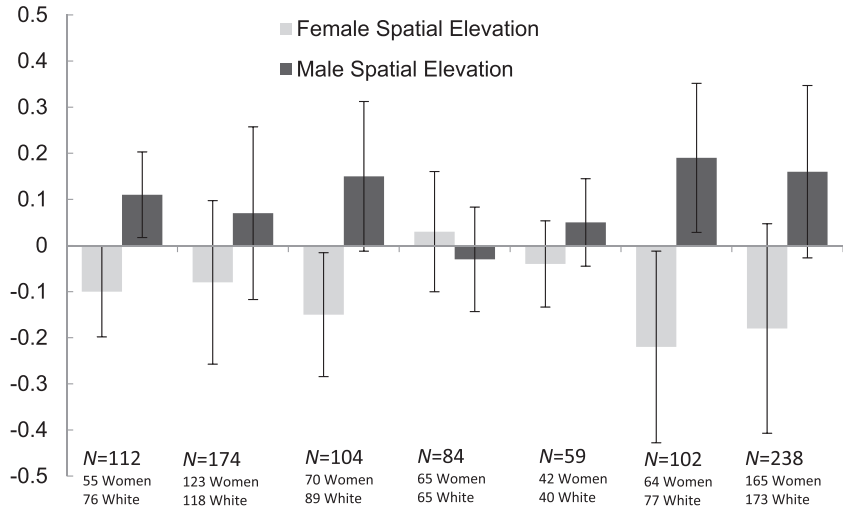

Fig. 3 *Gender stereotype endorsement after exposure to male (*vs. *female) spatial elevation. Note.* In seven experimental studies, participants saw a set of magazine pages showing men high and women low (Male Spatial Elevation Condition) or a set of magazine pages showing women high and men low (Female Spatial Elevation Condition). Participants then rated women and men in general on dominance and power. The results for each study are depicted with standard error bars 1 *SE* on either side of the *M*. Positive values indicate that people rated men as more dominant and powerful than women. There was quite a bit of variation in the size of the effect, but across these seven samples, the meta-analyzed effect was significant (d = .20, t (6) = 3.59, p = .012). *Data from Lamer, S. A., & Weisbuch, M. (2019). Men over women: The social transmission of gender stereotypes through spatial elevation. Journal of Experimental Social Psychology, 84, 103828.*

This project may be understood from both perspectives we highlighted earlier. For classic (macro) approaches, the cultural pattern we observed may itself be understood as public stereotypes, or consensual expressions of private representations. The experimental evidence may be understood as public representations of stereotypes shaping private representations of stereotypes. From this approach, public stereotypes shaped private stereotypes, but it is not clear that this should be labeled as "cultural transmission" if the predictor (public stereotypes) and the outcome (private stereotypes) both refer to cultural patterns. Conversely, the cultural transmission of stereotypes is a more appropriate label when considered from modern social cognitive approaches to stereotyping: encounters with cultural patterns increased individuals' gender stereotypes, supporting belief consensus among the population.

More generally, this project highlights the utility of the cultural snapshots for understanding stereotypes. Where social and developmental psychologists have closely mapped the cognitive and affective processes involved in how an individual generates, maintains, and changes their stereotypes (e.g., Bigler & Liben, 2007; Dasgupta & Asgari, 2004; Maass & Schaller, 1991; Sherman et al., 2000; Sherman et al., 2013), less is known about how the observable features of "culture" or social environments both reflect and facilitate stereotypes. Even less is known about how those observable patterns might shape stereotypes (understood as private representations). With cultural snapshots, scientists can begin to answer questions about how the observable contents of culture (cultural patterns) both reflect and engender stereotypes.

4.1.4 Cultural transmission of (subjective) norms

Norms are typically understood as a component of culture but norms may be more local, regarding group settings and particular contexts as well. In social psychology, norms are often measured subjectively, where study participants report typical behavior in the population (*descriptive norms*), desirable and undesirable behavior in the population (*injunctive norms*), and the beliefs and preferences of people in the population (*intersubjective norms*). Cultural patterns are quite likely to shape these different types of "subjective" norms. In fact, it would be odd if the patterns of behavior that a person sees consistently in their environment bore no relationship to the behavior they believe is consistent (or typical) in their environment.

In fact, the cultural transmission of subjective norms may be essential to understanding how cultural patterns shape intergroup biases in behavior

(i.e., discrimination). Indeed, subjective norms have been shown to impact behavior above and beyond the effects of personal beliefs. For example, men's descriptive norms about others' lack of concern for women's representation in STEM predicted their allyship intentions above and beyond their personal concerns about this issue (De Souza & Schmader, 2022). Similarly, people adjust how they react to prejudiced jokes based on what they consider normatively acceptable among their current group (Crandall et al., 2002). Such intersubjective norms (beliefs about others' beliefs) are especially predictive of behavior when people think they will be evaluated by peers or when they have a high need for closure (Gelfand & Harrington, 2015). Even cross-cultural differences in decisions and behavior appear to be located more in intersubjective norms than in personal preferences (Zou et al., 2009). Cultural patterns can impact a person's (inter)subjective norms for various reasons. Not only are cultural patterns viewed frequently by that person, but cultural patterns are frequently consumed by many others in that culture. Thus, intersubjective norms may be reflected in cultural patterns that cause individual perceivers of that pattern to privately adopt those norms in their subjective evaluations. In other words, by using cultural snapshots we can examine the cultural transmission of subjective norms. For example, we examined whether intersubjective norms regarding gendered behavior were depicted in a cultural pattern on children's TV and whether this pattern subsequently altered girls' intersubjective norms. Specifically, we tested children's TV shows for a pattern of nonverbal bias favoring gender stereotypicality (Lamer et al., 2022). In a content analysis utilizing cultural snapshots, we found that gender-stereotypical target characters, like Daphne and Fred from Scooby Doo, received more positive nonverbal behavior from co-characters (i.e., expressers) than more gender-counterstereotypical target characters, like Velma or Shaggy (Fig. 4). This pattern was measured across 12 popular TV shows that were currently airing in the U.S. (see clip selection in Fig. 5). It is noteworthy that such nonverbal bias may be considered a public representation of intersubjective norms in so far as aggregated positive or negative nonverbal responses to a given person or behavior may be regarded as information about what people or behaviors are desirable or not. We subsequently set out to examine if such public information shaped girls' intersubjective norms and behavior: are intersubjective norms transmitted via cultural patterns?

In two experimental studies, 159 girls aged 5–11 first watched a set of clips containing this pattern or its reverse. To select these clips, we used the

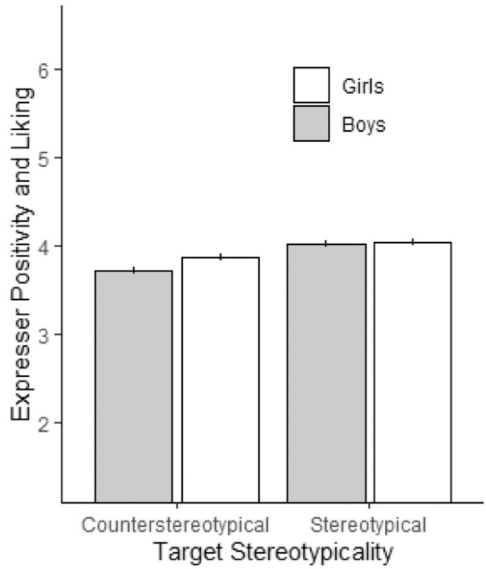

Fig. 4 *Nonverbal pattern of pro-gender stereotypicality in children's TV. Note.* A cultural snapshots study revealed that characters across 12 popular U.S. children's TV programs exhibited a small, but consistent nonverbal bias favoring gender-stereotypical TV characters. Ratings of how positively expressers interacted with targets based on targets' gender stereotypicality and gender. Gender-stereotypical target characters elicited more positive nonverbal behavior and liking than counterstereotypical target characters. Error bars depict 1 *SE* on either side of the *M*. *Data from Lamer, S. A., Dvorak, P., Biddle, A. M., Pauker, K., & Weisbuch, M. (2022). The transmission of gender stereotypes through televised patterns of nonverbal bias. Journal of Personality and Social Psychology, 123(6), 1315.*

ratings collected from the initial content analysis. We selected two clips of each character: the clip in which they were treated most positively and the clip in which they were treated most negatively. We then distributed these clips into their respective conditions. The pro-gender-stereotypical pattern contained clips of gender-stereotypical characters being treated positively and clips of gender-counterstereotypical characters being treated negatively: this is the pattern observed in the content analysis. The pro gender-counter-stereotypical pattern contained the opposite: clips of gender-stereotypical characters being treated negatively and clips of gender-counterstereotypical characters being treated positively. After watching these silent clips and rating how much they liked each one, girls reported their intersubjective norms via the Felt Pressure for Conformity scale (Pauletti et al., 2014), which identifies the degree to which girls feel pressure from peers and parents to behave in

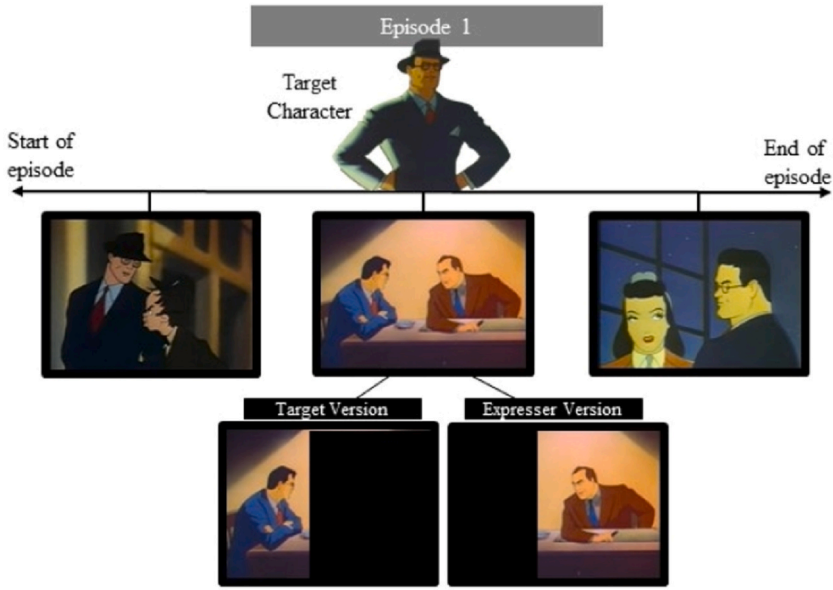

Fig. 5 *Cultural snapshots clip selection and editing process. Note.* Example of how clips are systematically sampled for a target character in a show. For copyright reasons, we use Clark Kent from Fleischer and Fleischer (1941) as an example, since this show is in the public domain. However, we have not used this show in any of our studies as it has been outside of our sampling timeframe/scope. The figure depicts the sampling process used in Lamer et al. (2022). See Table 1 in Lamer et al. (2022) for the full list of children's shows used. For each show, we selected three episodes from the season and three clips from each episode, yielding nine clips per character, four characters per show, and 12 shows for 432 clips total. We then edited each clip so that only the target was visible (i.e., Target Version) or only the expresser was visible (i.e., Expresser Version). *Figure from Lamer, S. A., Dvorak, P., Biddle, A. M., Pauker, K., & Weisbuch, M. (2022). The transmission of gender stereotypes through televised patterns of nonverbal bias. Journal of Personality and Social Psychology, 123(6), 1315.*

feminine ways. Girls who watched gender-stereotypical characters being treated more positively than gender-counterstereotypical characters then reported that their own peers and parents wanted them to behave in more feminine ways (e.g., not playing with "boy toys"). This effect was strongest for girls who were good at reading subtle emotion (see section below on moderators). Critically, we also measured girls verbal and nonverbal behavior and examined the degree to which intersubjective norms versus personal stereotypes (e.g., which activities they liked, and which careers girls and boys can have) gave rise to stereotypically feminine behavior among girl participants. While girls' intersubjective norms correlated with how stereotypically

they acted, their personal stereotypes did not. Accordingly, we concluded that intersubjective norms can be culturally transmitted via patterns of nonverbal bias and that such effects may help to explain biased behavior in children, over and above any effects on personal attitudes or stereotypes.

In a similar study but with adults, we tested adult TV for a pattern of nonverbal bias favoring slim women (over average-weight women; Weisbuch & Ambady, 2009). Specifically, we sampled 18 scripted TV shows that were consistently noted by pilot study participants ($N = 34$ women) as among their favorite shows. To quantify how positively each female character was treated in the show, we recorded two episodes of each show that aired during a two-week period. We then selected the first and last social interaction that each female character had in the episode, yielding 186 10-second clips of interactions featuring 76 female characters. A set of predetermined rules for clip selection is critical to collect a representative sample of interactions. In this study, we set the following rules for clip selection: Clips were only selected if there were 10 s of uninterrupted social interaction, included both characters in the frame for at least one second, and occurred in the first or last 10 min of each episode. We then removed the sound from the clip to isolate nonverbal behavior (as in our other studies) and we removed target female character from each clip so that coders could evaluate how positively the expressers were behaving without being influenced by anything about the target character (e.g., her gender, size, emotion expression). If the coder had seen that specific episode, it is possible they would know who the target character was, even if she was blocked out of the clip. Thus, we also removed coders who said they had seen a given episode. We had an additional set of coders rate the body size of the target character from each show using still images taken from the 10-second clips. We found that a woman's body size correlated with how positively she was treated by co-characters, controlling for other aspects of her behavior, like how kind, intelligent, or sociable she was (as evaluated by TV "experts").

To examine cultural transmission of subjective norms, we asked adult women participants to evaluate what size most women wanted to be and what size most men wanted women to be. Woman participants who saw a pro-slim set of clips reported that the ideal body size for a woman was slimmer than that reported by women who saw the set of clips favoring average-weight women. Supporting the theory that descriptive norms are proximally situated to cultural patterns and important mechanisms of downstream change, the effects of nonverbal bias on women's own desired

body size were mediated by changes to this cultural ideal (see Fig. 6). Therefore, cultural patterns may directly influence normative beliefs, a kind of belief that may be more proximally situated to cultural patterns relative to personal attitudes or stereotypes. Effects on personal attitudes, stereotypes, or essentialism may indeed be downstream of effects on subjective norms.

4.1.5 Cultural transmission of intergroup behavior

Behavioral outcomes are especially meaningful as they could directly support the idea of *bias contagion*. If people behave differently as a function of the cultural patterns they observe, then others may observe this behavior and shift their own beliefs accordingly. In other words, a key assumption behind cultural transmission of bias is that the particular form of bias

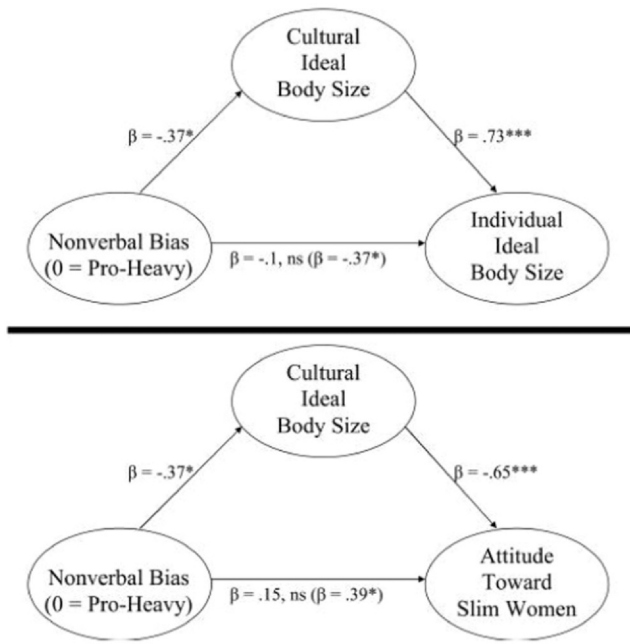

Fig. 6 *Indirect effect of nonverbal pro-slim bias on body ideals. Note.* In this study, women saw nonverbal bias favoring slim or average-weight characters. Viewing nonverbal bias favoring slim characters led women to hold a slimmer cultural ideal for women's bodies, which mediated effects on women's personal ideal body size goals and attitudes toward slim women. *Data from Weisbuch, M., & Ambady, N. (2009). Unspoken cultural influence: Exposure to and influence of nonverbal bias. Journal of Personality and Social Psychology, 96(6), 1104.*

represented in a cultural pattern will spread to others in a person's culture through recreating biased patterns of behavior. The evidence for behavioral shifts due to cultural pattern exposure has been limited thus far. In our recent work, however, we tested how nonverbal race bias would impact people's behavior in interracial interactions (Meyers et al., 2023). In this study, participants watched a set of 54 TV show clips containing nonverbal race bias or not. In the Nonverbal Race Bias condition, participants watched 27 clips of White characters interacting positively with other White characters and 27 clips of White characters interacting negatively with Black characters. In the No Bias condition, participants watched the same 27 clips of White characters interacting positively with other White characters and 27 clips of White characters interacting positively with Black characters. Then, Asian and Pacific Islander participants engaged in an interracial interaction with a Black or White confederate. In this interaction, they were assigned to discuss a race-relevant topic (i.e., reverse discrimination) and a race-irrelevant topic (i.e., legal drinking age) in random order. We sampled thin slices of the interaction, totaling 15 s, and had these coded for nonverbal friendliness and smiling. Watching the clips containing nonverbal race bias led the participants to behave more negatively towards their interaction partner when discussing a race-relevant topic, regardless of whether that interaction partner was Black or White. We theorized that nonverbal race bias heightened Asian and Pacific Islander participants' unease with interracial interactions generally, leading them to behave more negatively in these interactions.

More broadly, studies on intergroup behavior contribute to the body of work on how cultural patterns influence people. Effects on behavior are observable, not only by scientists conducting the research but also by other people in the world. Thus, effects on behavior can be especially meaningful in the bias contagion loop.

4.2 Moderation

We have documented evidence for the cultural transmission of various intergroup biases but such effects may be moderated by (a) higher-order patterns of covariation, (b) perceiver differences in how they respond to specific cultural patterns, and (c) any one of numerous moderators observed in research on intergroup bias (Hausmann & Ryan, 2004; Patterson, 2012; Pettigrew, 1997).

4.2.1 Higher-order cultural patterns

One example of higher-order patterns of covariation comes from recent work in our labs. Recall that Gibson argued that meaningful stimulus configurations are comprised of many interacting features, and that perceivers are most sensitive to configurations that represent an "affordance" with all its interacting features. In our work on cultural patterns of nonverbal bias, we have recently begun to explore if these patterns (and their cultural influence) are contextualized by their broader setting. In this work, we examined cultural patterns of nonverbal bias towards leaders as a function of leader gender. One simple hypothesis could be of a cultural pattern in which female leaders are the target of negative nonverbal behavior more often than are male leaders. This cultural pattern would reflect covariation between two variables: leader gender and the nonverbal behavior directed at them. However, it is possible that cultural patterns of nonverbal bias toward female and male leaders further depend upon the type of interaction those leaders engage in. In particular, it is possible that a nonverbal gender bias toward leaders only emerges as a cultural pattern in hierarchical rather than horizontal relations, especially given that circumplex models of interpersonal behavior often model hierarchical and horizontal relations as orthogonal axes (e.g., Horowitz et al., 2006). To test this idea, we examined how female and male leaders are represented in TV, as people commonly encounter this cultural environment (Lamer, Beck, et al., 2025). The literature on gender biases in leader evaluation is extensive (e.g., Bongiorno et al., 2014; Eagly & Karau, 2002; Morgenroth et al., 2020; Rudman & Glick, 1999; Williams & Tiedens, 2016) and, informed by this literature, we were interested in whether there were nonverbal differences in how female and male leaders acted and were treated in popular media. We selected 18 popular TV shows that featured female or male leaders with recently airing seasons. From these shows, we sampled about 200 interactions between the leaders and other characters. These interactions varied in terms of whether they featured leaders interacting with people who worked under them or not, so we also coded whether the interaction was hierarchical. We discovered that interactions featuring female leaders were more negative than interactions featuring male leaders, but only when female leaders were interacting with people who worked for them. This suggests that in the popular TV depictions we sampled, female leaders were generally liked as much as male leaders, except when they were actually being leaders. For each leader, we also selected a gender-matched subordinate from the show (i.e., a character

who was not a leader) who appeared with equal frequency. The same pattern of interactions was not true of those featuring subordinates, suggesting that this cultural pattern was specific to how female leaders are depicted, not just how women are depicted (see Fig. 7).

In two subsequent experimental studies, participants viewed either a Pro-Male Leader Condition (featuring positive hierarchal interactions with

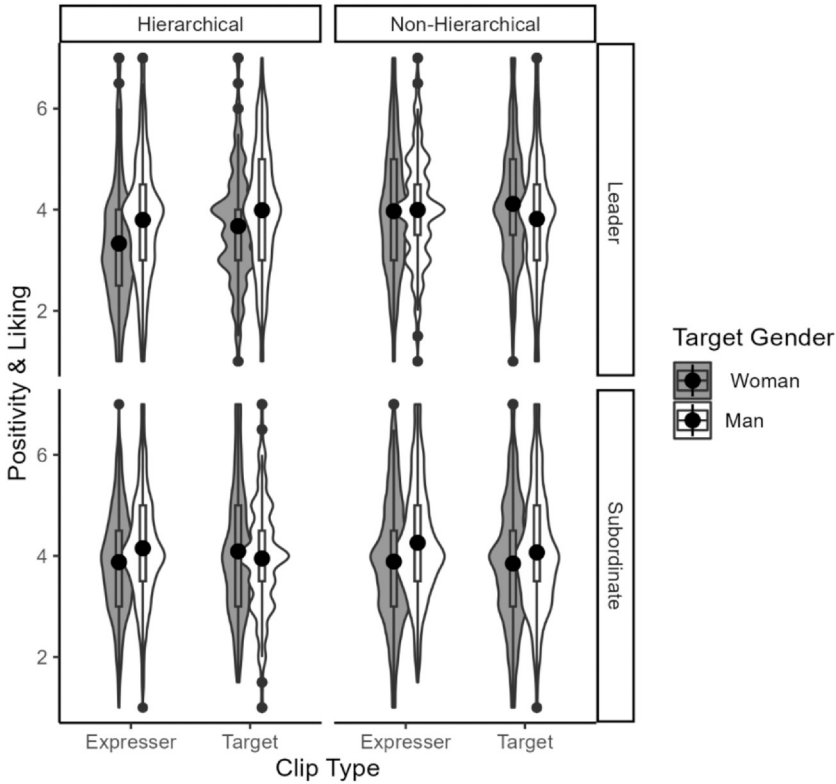

Fig. 7 *Nonverbal pattern favoring men leaders in TV. Note.* Nonverbal positivity based on the target character's identity (gender and status), which version of the clip was being rated (target or expresser), and who the target was interacting with (hierarchical or non-hierarchical expressers). No significant interactions emerged among non-hierarchical clips or among clips featuring subordinates. The key comparisons appear in the upper, left-hand panel of the figure. In hierarchical interactions, women leaders behaved and were treated more negatively than men leaders. Means are shown atop box plots and violin plots to display data distributions in each condition. *Data from Lamer, S. A., Beck, H., ten Brinke, L., & Preston, G. (2025). How culturally prevalent patterns of nonverbal emotion towards women and men leaders can influence preference for leader gender. Psychology of Women Quarterly.*

male leaders and negative hierarchical interactions with female leaders) or a Pro-Female Leader Condition (featuring the opposite kinds of interactions). They were then asked which of four people they'd like to work for (two women, two men). Participants who viewed the Pro-Male (vs. Pro-Female) Leader interactions were more likely to want to work under a White man than a White woman, regardless of their own gender.

This work illustrates that the cultural transmission of intergroup bias is likely to depend on the higher-order configurations involved in perceiving nonverbal bias. Specifically, nonverbal gender bias appeared to be specific to leadership as we observed no evidence for a simple gender bias with respect to subordinate-subordinate interactions. Second, the cultural pattern of nonverbal gender bias was only observed in leader-subordinate interactions, suggesting that patterns of nonverbal bias are likely to be moderated by higher-order patterns of covariation. These findings are thus consistent with Gibson's (1979) view that perception is adapted to higher-order configurations in the environment, pointing to the importance of identifying these configurations (perhaps via cultural snapshots). The studies illustrate how cultural patterns are often more complex than simple two-way interactions, but do not suggest that investigations of cultural patterns must first account for all moderators—many of our studies simply test for covariation between only two features (e.g., character race and the nonverbal behavior received) and these studies are meaningful as they depict broad cultural patterns that influence those who encounter it. However, it is also likely that these cultural patterns are moderated by factors that make a given pattern more or less prevalent in certain settings. The current findings suggest that perceivers are indeed sensitive to these complex cultural patterns in a manner that can be predicted by existing theory.

4.2.2 Perceiver differences

Learning from subtle patterns is a complex and nuanced process and some of our work has hinted at key moderators that may explain why some people are more (or less) influenced by cultural patterns. For example, our cultural snapshots studies with child samples have been geared towards identifying critical cognitive skills necessary for social learning to take place. Recall our study on patterns of nonverbal bias favoring gender-stereotypical characters in children's TV (Lamer et al., 2022). In the two experimental studies, children either saw clips featuring gender-stereotypical characters being treated positively and gender-counterstereotypical

characters being treated negatively or the reverse. We expected girls to adjust their own subjective norms in accordance with the clips they saw, but only among girls who could process such complex social information. We reasoned that the ability to understand subtle emotional expressions was critical because the emotion in the clips tended to be quite subtle. The emotional variance among clips was limited (SD = 1.04) and centered around the midpoint (M = 3.91) of a 1 = extremely negative to 7 = extremely positive scale. Thus, most nonverbal behavior displays varied from slightly negative (Q1 = 3.13) to slightly positive (Q4 = 4.64). We reasoned that because of the subtlety of the manipulation, only girls who were good at reading subtle emotions would be influenced by the complex nonverbal emotion patterns depicted on TV. This is consistent with the results we saw across both studies (see Fig. 8). Girls who were adept at identifying subtle emotional expressions showed the expected effect, but girls who were not yet skilled at reading subtle emotion were unaffected by the cultural pattern embedded in the clips. Being able to read subtle emotion increases with age, so it is possible that emotion detection ability moderated the effect because it co-occurred with some other cognitive

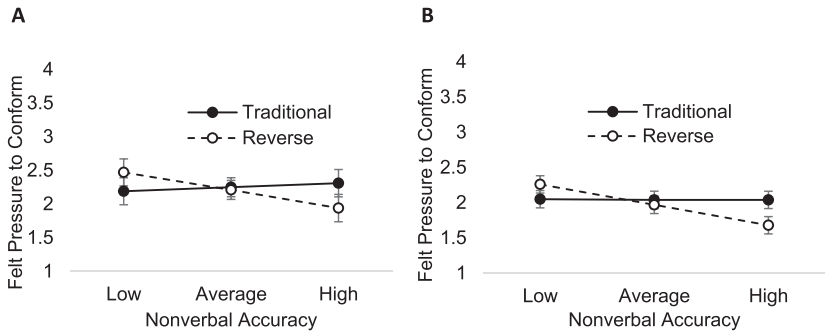

Fig. 8 *Felt pressure to conform after exposure to nonverbal gender bias. Note.* Girls watched a set of clips depicting the traditional pro gender-stereotypical bias or the reverse. Girls who saw the traditional clips then felt more pressure to be feminine than girls who saw the reverse clips, but only if they were good at reading subtle facial expressions of emotion. The interactions of condition and nonverbal accuracy were significant in Study 2 (N = 68 girls; Panel A, $F(1, 64) = 5.01$, $p = .029$, $d = .60$) and Study 3 (N = 84 girls; Panel B, $F(1, 87) = 5.78$, $p = .018$, $d = .52$), though the simple effect of condition for girls high in nonverbal accuracy were only significant in Study 3 ($t(87) = 2.15$, $p = .034$, $d = .46$), not Study 2 ($t(64) = 1.79$, $p = .078$, $d = .45$). Error bars depict 1 *SE* on either side of the *M*. *Data from Lamer, S. A., Dvorak, P., Biddle, A. M., Pauker, K., & Weisbuch, M. (2022). The transmission of gender stereotypes through televised patterns of nonverbal bias. Journal of Personality and Social Psychology, 123(6), 1315.*

ability that develops with age. However, emotion detection ability was more predictive in the statistical model than was age, suggesting that reading subtle emotions is a prerequisite skill for people to learn from patterns of nonverbal bias, regardless of age. Clearly, more work is needed to identify other individual-difference moderators of cultural transmission.

4.3 Quasi-snapshots

Several labs beyond our own have taken approaches that nearly approximate our cultural snapshots methodology, and we refer to these projects as "quasi-snapshots" in that they typically employ most but not all of the cultural snapshots methodology.

4.3.1 Content analyses

Virtually any content analysis that uses representative sampling can be understood as the first step in a cultural snapshots project. For example, Dietrich and Sands (2023) examined the amount of space that New York city pedestrians gave to Black and White individuals while walking. They found that pedestrians ($N = 3552$; 93 % not phenotypically Black) kept more distance from Black than White individuals, providing evidence for a cultural pattern that may (or may not) be specific to New York city. In this case, the cultural pattern can be found in public representations of spatial dynamics, at least in the public environment of New York. Similarly, Voigt and colleagues (2017) used vocal recordings from police traffic stops to quantify race bias. Specifically, they sampled snapshots from 981 traffic stops, analyzing the verbal content of what police officers said to the driver they had stopped. Based on both human coders and a linguistic analysis program, police officers spoke more respectfully to White than Black drivers, even after controlling for other aspects of the stops, such as how severe the infraction was, where the driver was pulled over, or the outcome of the interaction (e.g., ticket, arrest). However, we would not regard these two studies as cultural snapshots studies per se because—and as in most content analyses—they do not measure how observing the cultural pattern influences observers. Nonetheless, many content analyses provide evidence for patterns of covariation prominent in a given setting and therefore constitute cultural patterns.

4.3.2 Externally-valid materials

Other work, which we will not review at length (because of how often it is used) uses real images from the internet, TV clips, or other "natural"

recordings in their experiments. For example, one recent experiment examined how low, moderate, and high exposure to news headlines containing anti-Arab stereotypes shaped subsequent engagement with the news (Kroon et al., 2021). High exposure had no effect and was hypothesized to have elicited reactance because it was too blatant. However, moderate exposure to stereotypical news primes led people to choose to read news stories that contained threatening information about that group, as mediated by anti-Arab implicit bias. As in most studies using this approach, however, there is little effort made to ensure that the recordings used as stimuli are representative of the sorts of things people typically encounter in their ecologies. Instead, scientists often point to the external validity of those images and draw far broader conclusions than warranted—these sorts of experiments rarely include a content analysis to confirm that whatever they manipulate in images or recordings is actually prevalent in a given region, setting, or medium. Thus, whereas these sorts of experiments provide clear evidence for causality (e.g., news headlines influence anti-Arab prejudice), they cannot provide clear evidence for cultural influence or transmission.

Related work has creatively explored verbal patterns that can shape children's interest in and engagement with science. Scientists have found that children's exposure to identity-focused language around science (e.g., statements encouraging children to "be" scientists) can demotivate children and foster gender-science stereotypes, as compared to behavior-focused language around science, such as statements encouraging children to "do" science (Rhodes et al., 2020; Wang et al., 2024). Analyses of children's media on PBS and prekindergarten teachers' science lessons revealed that identity-focused language around science was highly prevalent in both media and teachers' lessons (Wang et al., 2022), thus identifying a cultural pattern. Encounters with this cultural pattern are likely to be influential. Children in classrooms where teachers used more identity-focused language were less interested in science over time as assessed by their choice of a book about science versus art (Wang et al., 2022). Taken together, these studies test an important question and suggest that this linguistic tendency represents a cultural pattern that shapes children's motivation. Note, however, that these studies do not use the same materials to measure and manipulate the cultural pattern of interest. Thus, it remains possible that the cultural patterns identified by Wang and colleagues (2022) differed in critical ways from the materials that Rhodes and colleagues (2020) or Wang and colleagues (2024) used to manipulate those linguistic biases—these

differences may regard the broader linguistic context or the presence or absence of "irrelevant" information, the perceptible features of speech (paraverbal behavior) or writing. The body of work on language used in science is compelling, insightful, and consistent with a cultural pattern of gender bias, but it will be critical to use the same materials to measure and manipulate a cultural pattern to draw conclusions about how this bias might shape perceivers in their own ecologies.

Finally, in another study similar to the cultural snapshots approach, the researchers hypothesized that reading articles in which a dark-skinned person commits a crime can heighten negative implicit biases against dark-skinned people (Arendt et al., 2015). Working under the assumption that a cultural pattern exists in the frequency of crimes written about with a dark-skinned vs. light-skinned perpetrator, the researchers exposed participants to one of three sets of articles with increasing levels of exposure to this pattern. Those exposed to stories featuring criminals from places like Nigeria and India had a lower threshold for identifying hostility in a Black person's face. This approach is notable for using externally valid news articles but again does not include a content analysis to confirm that the cultural pattern is prevalent, nor what form it takes or moderators of the pattern.

4.3.3 Close approximations of cultural snapshots

Whereas each of the studies reviewed above deviates from the cultural snapshots method on various metrics, other work has more closely followed cultural snapshots, allowing for conclusions about cultural transmission of intergroup bias. Specifically, Camp and colleagues (2021) quantified racialized patterns in the prosody of police officer interactions during traffic stops in northern California. As in Voigt et al. (2017), they sampled audio from traffic stops in which police officers pulled over drivers who were Black or White men. However, they were focused on prosody, or the tone of vocal behavior rather than the content. They edited out the drivers' voices so that raters would be blinded to the driver's race in each clip. Then, they filtered the officers' speech so that the content was not discernible, but the vocal tone, rhythm, and quality remained. Across two samples of clips, ratings revealed that officers were friendlier, more respectful, and more at ease with the White men than the Black men they pulled over. Thus, Camp and colleagues identified a cultural pattern of nonverbal race bias (prosodic race bias) that appears to be prevalent in Northern California (at least during police stops).

Camp and colleagues next conducted experiments to determine how this prosodic cultural pattern might cause perceivers to alter their trust for, and impressions of, police officers in general. Specifically, exposure to clips featuring officer interactions with Black (vs. White) men led participants to trust the police less (e.g., the level of trust they would have in the department's officers to treat them fairly).

In full, this project meets most or all of the cultural snapshots standards: the same materials were used in the content analysis and the experiments, the authors aimed to obtain and characterize a representative sample of Northern California traffic stops, and the materials were obtained from real (not remembered) public representations. The only limitation to the study is attempts at generalization from Northern California to all communities: this pattern and its influence may be replicated when police interactions are sampled from multiple and quite different locales in the U.S. (as when scientists interested in cultural universality sample from quite different societies, such as Japan and the U.S.) but it is premature to assume that patterns that are present in a single local population are necessarily encountered in the broader population of Americans. Otherwise, we believe that this study represents a prototype for other labs to follow when conducting cultural snapshots studies.

A less close approximation of cultural snapshots can be found in our own work and in the work of others. As noted earlier, we observed a cultural pattern in Instagram feeds in which group images featuring multiple-races contained more within-race race than between-race similarity in facial emotion (Lamer et al., 2018). However, the experiments that followed did not use the same materials as in the content-analysis and instead used experimenter generated materials. Thus, we could not draw conclusions about how people respond to a cultural pattern when it includes higher-order information. Similarly, Vaes et al. (2019) examined how exposure to linguistic patterns in news articles shapes crime-related stereotypes about ethnic outgroups. Specifically, the authors measured how criminals were written about in Italian news articles. They selected 73 articles from news sources that varied in their reach (local, regional) and political skew. These 73 articles reported a crime committed by an immigrant or an Italian. The researchers then quantified how often nationality was mentioned, whether it was used as a noun, and the kinds of adjectives used in the article (i.e., aggravating adjectives that heighten the perceived intensity of the perpetrator's crime, like illegal or armed and attenuating adjectives that heighten the perceived weakness of the victim,

like defenseless or very young). From this content analysis, they observed a cultural pattern in which news stories about a crime committed by an immigrant (vs. a non-immigrant) featured the perpetrator's nationality more often, especially as a noun (e.g., The Nigerian), were more likely to use aggravating adjectives to refer to the perpetrator, and were more likely to use attenuating adjectives to refer to the victim.

Vaes and colleagues took an experimental approach similar to our own: instead of using the same materials for their experiment as for the content analysis, the authors created articles that mirrored the cultural pattern. Participants who read an article about an immigrant committing a crime that contained these biased cultural patterns scored higher on a weapons-identification task. They were better at identifying weapons (vs. tools) after being presented with a Black than a White face. As with Lamer and colleagues (2018), conclusions regarding how people respond to this cultural pattern in their natural environments can only be speculative.

People encounter various cultural patterns in the world, such as patterns of interpersonal distance, nonverbal behavior, or language structure. As reviewed here, evidence indicates that these kinds of patterns can significantly influence people's beliefs and behaviors. For example, cultural patterns can affect implicit associations (Weisbuch, Pauker, & Ambady, 2009), explicit beliefs (Weisbuch & Ambady, 2009; Weisbuch, Pauker, & Ambady, 2009), biased behaviors (Lamer, Beck, et al., 2025; Meyers et al., 2023), and descriptive norms (Lamer et al., 2022; Weisbuch & Ambady, 2009). These effects may prove to be moderated by higher-order patterns of covariation or by individual differences, as reviewed above, but these cultural transmission effects stand on their own: we have documented cultural patterns that appear to shape individuals' intergroup bias in a variety of ways. Further characterizations of cultural patterns are likely to lead to new insights about the observable structure of social ecologies, including the possibility that these patterns are far more complex than we've examined to date.

5. Future directions

Work employing the cultural snapshots method has provided evidence of how various social ecologies can transmit intergroup bias, such as the nonverbal behavior found in televised media (e.g., Weisbuch, Pauker, & Ambady, 2009), the vertical positioning of images found in magazines

(Lamer & Weisbuch, 2019), and the vocal prosody police use during traffic stops (Camp et al., 2021). Patterns found in these ecologies have shaped an array of outcomes, ranging from implicit pro-White bias and gender stereotypes to institutional trust. This existing work points to important future directions. Specifically, this work points to questions about what additional cultural patterns exist, how broadly the same cultural patterns are distributed across different social ecologies, and longitudinal effects of cultural pattern exposure.

5.1 Various cultural patterns

Our existing work has assessed cultural patterns focused on nonverbal behavior and spatial positioning. However, many cues could serve as meaningful variables in cultural patterns. For example, cultural patterns may involve the content of speech directed at members of certain groups or used to talk about certain groups (as in Wang et al., 2022). Our existing work has also focused primarily on U.S. American media, such as prime-time TV or periodicals. Yet, there are a range of ecologies where meaningful patterns likely occur. For example, people are exposed to cultural information on social media. Social media may contain different patterns of information depending on the kinds of content that the user consumes and the application's algorithm (e.g., based on political ideology). Additionally, social media creates a space where people can observe interactions between people of different social groups and where people's posts about their experiences (e.g., discrimination) could be validated or denied and also observed by a wide range of other people (e.g., Sanchez et al., 2024). The cultural snapshots approach is well-suited to cross cultural comparisons, allowing cultural patterns to be measured in different locations, including in public spaces, and used to explain cross cultural variation in intergroup beliefs and behaviors (as in Miyamoto et al., 2006).

5.2 Various social ecologies

In our existing work, we have identified a single social ecology, such as popular TV shows in the U.S. One question that has emerged and has yet to be tested is how extensively these patterns permeate other social ecologies. For example, at the time of sampling, popular TV shows in the U.S. tended to feature more negative interactions between female leaders and their subordinates than between male leaders and their subordinates (Lamer et al., 2025). Does this cultural pattern extend to other forms of media (e.g., news images, books, memes)? Or, does the medium moderate the kind of

cultural pattern that exists? Some media are limited in their ability to contain certain cues. For example, books are typically more limited in their descriptions of character nonverbal behavior than what is available in a visually rich medium, like TV. Does nonverbal bias extend to this kind of medium? Perhaps. For example, the Harry Potter series has often been criticized for its anti-fat bias (e.g., Hill, 2021). Biases found in literature may be communicated in subtle ways, such as the valence of descriptors used for the characters or how positively interactions with characters go. Weisbuch and Ambady (2009) observed a similar anti-fat bias in televised interactions: the slimmer a woman character was, the more positive the nonverbal behavior she elicited from co-characters. Group-based biases are also likely to be communicated in more explicit ways in text, such as by assigning a character as an antagonist or protagonist. Comparing across social ecologies is likely to be time consuming as sampling and coding for cultural patterns can be a time intensive process, but as use of computational tools and AI increases, such endeavors will be increasingly feasible (e.g., see Lee et al., 2024 for an example of how such tools can be used in sampling and coding). These are important questions for understanding the reasons why cultural patterns exist and how extensively cultural patterns permeate a population's social ecology.

5.3 Longitudinal effects

Consistent with prevalent approaches in the field of social psychology, our existing work has tested the effect cultural patterns have on beliefs, norms, and behaviors immediately after exposure. This then points to an important set of questions about how these effects occur as people encounter them in the world. For example, in Lamer and Weisbuch (2019), participants were exposed to a set of magazine pages featuring men high and women low, consistent with the prevalent pattern in popular magazines at the time of sampling. These experiments were necessarily limited in their ability to approximate long term exposure to magazine images and each participant saw no more than 84 pages. At the time, the average American was likely exposed to several print magazine issues in a given month, ensuring that they saw hundreds or thousands of images. Now, this same spatial information may be encountered in other environments, such as online news stories, film posters (Memon, 2024) or social media posts. Thus, a statistically small effect in a laboratory study may reflect a larger effect as people accumulate exposure in their social ecologies. This remains to be tested.

It is also possible that cultural pattern exposure builds on itself by shifting the way people perceive neutral cues in their environment. For example, viewing a televised pattern of nonverbal bias favoring White (over Black) characters may lead people to thereafter perceive nonverbal behavior directed towards Black individuals more negatively and White individuals more positively, even if the nonverbal behavior does not contain a bias. This would be consistent with past work by Hill et al. (1990). In their studies, participants were exposed to stimuli covarying facial features with personality traits. Once exposed to this pattern, participants then used it to interpret subsequent stimuli, predicting personality traits based on facial features. This is not inconsistent with stereotype application, but what is especially interesting about this work is that the authors found that the opportunity to apply the newly acquired rule to neutral faces amplified the strength of the association. In this way, when people are exposed to cultural patterns, the patterns may have ways of reinforcing themselves.

6. Conclusion

Cultural snapshots provide a flexible approach to quantify cultural patterns in our environment and model how the biases in cultural structures find their way into individual minds. Importantly, it takes the focus away from individual drivers of bias and provides a way to examine how bias spreads through engagement with our everyday environments. It provides ways to bridge approaches that typically focus only on macrosystems to approaches that focus on microsystems. Additionally, the cultural snapshots approach provides a method through which to examine cultural socialization of biases in development (e.g., Pauker et al., 2019). Specifically, few studies have examined socialization as broad cultural patterns (where there is no particular socialization agent or no explicit intention of socialization). Research using cultural snapshots has helped to articulate cultural patterns that exist across multiple ecologies and to understand how biases can be transmitted across large groups of people (as opposed to between individuals), including how bias can be transmitted unintentionally (Pauker et al., 2021; Weisbuch, Pauker, & Ambady, 2009). Overall, the cultural snapshots approach has the ability to test existing theories and contribute to an understanding of the concrete features in our environment that transmit bias from culture to individual minds.

Author contributions

K.P., M.W., and S.L developed the ideas and wrote the manuscript. S.L. created the figures.

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