

When do generics lead to social essentialism: developmental evidence from Iran

Telli Davoodi¹, Ghazale Shahbazi², Hossein Samani², Khatereh Borhani³, and Tara Mandalaywala⁴

¹Boston University

²Shahid Beheshti University

³Institute for Cognitive and Brain Sciences

⁴UMass Amherst

June 25, 2023

Abstract

Generic descriptions (e.g., “girls are emotional”) are argued to play a major role in the development of essentialist reasoning about social categories (Rhodes et al., 2018). However, studies have been conducted dominantly in English-speaking communities and among Western samples. This is a significant limitation given that a number of theories focus on the linguistic form of generic statements and distinguish between form and content in leading to essentialism. In this study, we plan to extend the research on generics and social essentialism beyond English-speaking, Western samples. We aim to explore how generic statements with different content (biological or cultural) about a novel social category may lead to essentialist beliefs among children and adults in Iran, a Persian-speaking community that is underrepresented in the literature. Using a design similar to Noyes & Keil (2020), we plan to expose 4 to 9-year-old children ($N = 104$) and adults ($N = 104$) to generic or specific statements (between subjects) ascribing biological or cultural features to a novel social category. We will measure the degree to which exposure to these statements leads to essentialist reasoning in terms of inheritability and “kindhood”. This work contributes to diversifying the field and informs theories of social essentialism.

When do generics lead to social essentialism: developmental evidence from Iran

Keywords : Generics, Social Essentialism, Generalizability, Iran, Replication

Abstract

Generic descriptions (e.g., “girls are emotional”) are argued to play a major role in the development of essentialist reasoning about social categories (Rhodes et al., 2018). However, studies have been conducted dominantly in English-speaking communities and among Western samples. This is a significant limitation given that a number of theories focus on the linguistic form of generic statements and distinguish between linguistic form and content in leading to essentialism. In this study, we plan to extend the research on generics and social essentialism beyond English-speaking, Western samples. We aim to explore how generic statements with different content (biological or cultural) about a novel social category may lead to essentialist beliefs among children and adults in Iran, a Persian-speaking community that is underrepresented in the literature. Using a design similar to Noyes & Keil (2020), we plan to expose 4 to 9-year-old children ($N = 104$) and adults ($N = 104$) to generic or specific statements (between subjects) ascribing biological or cultural features to a novel social category. We will measure the degree to which exposure to these statements leads to essentialist reasoning in terms of inheritability and “kindhood”. This work contributes to diversifying the field and critically informs theories of social essentialism.

When do generics lead to social essentialism: developmental evidence from Iran

“Men don’t do household chores.” (mrdh khri khnh njm nmydhnd). These types of expressions which refer to “kinds” of people, animals, or artifacts are known as generic statements (Carlson & Pelletier, 1995; Shipley, 1993; Gelman and Raman, 2003). Generic statements are common in English (Rhodes et al., 2012), and a growing body of research programs have documented a link between generic language and the tendency to reason about categories as “kinds” (Gelman et al., 2010; Cimpian & Markman, 2011; Rhodes et al., 2012). Despite the prevalence of generic statements across languages, the impact of generics has largely been studied in an exclusively English-speaking context and within Western cultures (but see Segall et al., 2015 for an exception).

The lack of linguistic and cultural variability in this literature is particularly problematic because 1. the research on generic language overwhelmingly conducted with English speakers draws general conclusions about the structure of generics in relation to categorization, without any qualifiers about the role of specific language grammar; this suggests that a link exists between reasoning about categories in terms of “kinds” and generic statements across a range of languages; yet this has not actually been tested. 2. Generic language has been hypothesized as a key linguistic feature that cues children into which social categories are most relevant and important in their specific cultural context. Given this purported function of generics, and the cross-cultural ubiquity of generics, generic language is a plausible factor by which children across the world acquire categories and beliefs about social categories. Yet again, beyond English-speaking children in Western countries, this assumption has rarely been tested.

In the current study, we draw on influential work on the role of generic language in social essentialism among English-speaking participants to design and carry out a replication-plus-extension study with Persian-speaking children and adults living in Iran. Specifically, we plan to replicate Noyes and Keil (2020) on the question of how generic statements with different content (i.e., biological versus cultural information) impact reasoning about social categories as “kinds” and as defined by inheritable features, dimensions of essentialist reasoning about social categories. In addition to implementing the same design and asking the same questions as in Noyes and Keil (2020), we plan to include a third condition in the current study, where category descriptions are provided in “specific” as opposed to generic statements. This will serve as a control condition in our study.

In what follows, we briefly review the literature on generic language in child-directed speech and its role in the development of social essentialism (one important type of social category belief: Gelman, 2003; Rhodes & Mandalaywala, 2017). We will then describe the value to be gained by extending this literature to research among children and adults in Iran, a non-Western, Persian-speaking sample underrepresented in psychological research. Lastly, we will detail the planned study.

Generic language and essentialism

Numerous studies with English-speaking children have documented the role of generic statements, as an important cultural factor, in the development of essentialism – the belief that categories have internal, natural causes for, and markers of, category membership (Gelman et al., 2010; Leshin et al., 2021; Rhodes et al., 2012; 2018). Children learn about categories, reason about the world, and explain patterns through a cognitive heuristic to represent categories as “kinds” (Keil, 1989; Markman; 1989). In fact, children develop this ability early on and are able to reason about and refer to more abstract groupings of objects, animals, or people (Sugarman, 1981; Mandler, 2004; Rakison & Oakes, 2003). It is argued that generic language is one of the main mechanisms through which this learning can occur (Gelman et al., 2010; Rhodes et al., 2018), although the precise mechanism by which generics early categorization is still up for debate, an idea that we will return to later.

In contrast to non-generic expressions that convey information about specific objects or individuals (“this squirrel sleeps a lot”), generics transmit information about the kind of objects or individuals as a group (“squirrels sleep a lot”). Furthermore, while a generic sentence attributes a common property to a category, in comparison with quantified expressions (“most squirrels sleep a lot”), generic statements are silent on how

prevalent the property is among members of the category. Generic language is prevalent in communications with children, and children understand generic statements by the preschool age (Gelman, Waxman, & Klienberg, 2008; Gelman, Taylor, & Nguyen, 2004; Cimpian & Markman, 2008).

Perhaps a side-effect of facilitating category representation, generic statements lead to essentialist beliefs about novel animal species (Cimpian et al., 2010; Gelman et al., 2010), as well as about familiar (Cimpian & Markman, 2011; Cimpian & Erickson, 2012) and novel social categories (Leshin et al., 2021; Rhodes et al., 2012). Psychological essentialism refers to a set of intuitive, interrelated beliefs about a category to represent the category as a natural kind and implies that its members share an underlying essence that causes common observable features (Gelman, 2003; Rhodes & Mandalaywala, 2017). Essentialist beliefs about social categories (i.e., social essentialism) have been observed among a wide age range including children as young as 4 years and adults across different cultures (Davoodi et al., 2019; del Rio & Strasser, 2011; Zhu, 2022). Across social category types, social essentialism is often associated with various kinds of stereotyping and prejudice among both children (race: Mandalaywala et al., 2019; ethnicity: Diesendruck & Menahem, 2015) and adults (Mandalaywala et al., 2017; Haslam & Whelan, 2008). While children readily develop essentialist beliefs about a number of social categories by early to middle childhood, only a subset of all possible social categories becomes the target of essentialist beliefs. That is, among infinite ways of categorizing people, both children and adults consider only some categories as informative, immutable, and/or inborn. This raises the question of what underlying mechanisms lead people to essentialize particular social categories.

Previous studies suggest that essentialist beliefs about a social category vary as a function of the social context, including the structural, cultural, and—of particular interest here— the *linguistic* features of the community a child grows up in (Segall et al., 2015; for a review see Gelman & Fine, 2020). Much of the research exploring the links between generic language and essentialism has been done in an experimental context, and with novel social groups, to ensure that pre-existing beliefs about the group do not interfere with essentialist beliefs. In seminal work, Rhodes et al. (2012) exposed children and adults to a novel social category called “Zarpies”. Sixteen descriptions about Zarpies were presented in a picture book and in different forms (generic vs. specific) in two within-subjects experimental conditions. In one condition, descriptions were generic (“Zarpies love to eat flowers”) and in the other, specific (“this Zarpie loves to eat flowers”). In the next step, participants answered questions commonly used to measure essentialist beliefs. Results showed that when children and adults hear generic, compared to specific descriptions, they tend to essentialize the category of “Zarpies” more often. In more recent work, Leshin et al. (2021) found that generic language (e.g., “Zarpies hop over the puddle”), in comparison to specific language, increased two critical aspects of essentialist reasoning. Generic statements lead children to infer that (a) category-related properties arise from intrinsic causal mechanisms (e.g., “Zarpies hate to get wet”, rather than “he needed to get to the other side”) and (b) These features are inflexible (e.g., “he wouldn’t sometimes choose to splash in it instead”). However, when it comes to *heritability* of these traits, they did not find any difference between generics and specific conditions.

Why (and when) do generics elicit essentialism? Why do generic sentences lead to social essentialist beliefs? To address this question, we need to have in mind that essentialism is a multi-faceted construct (Haslam, Rothschild, and Ernst, 2000). An essentialist view of ethnicity, such as Turks, for example, implies that (1) Turks are alike in fundamental and sometimes non-obvious ways (homogeneity), (2) similarities amongst Turks, and differences between Turks and non-Turks, are due to some internal reasons as opposed to external factors (inherence), (3) commonalities between Turks are inborn and often heritable (naturalness), and (4) being a Turk is immutable, objective, and discrete and there are no in-between cases – a person is either a Turk or not a Turk. Whereas these intuitive beliefs are usually interrelated, it is conceivable that an individual believes only some of them and not others; this is especially true for children (e.g., Gelman, Heyman, & Legare, 2007). For example, one can believe that Turks share many similarities (*homogenous*) but also believe that these similarities are due to some historical, cultural factors, and non-biological dispositions (and therefore, not *innate*). Additionally, generic statements can be about various types of properties. They might be about a (pseudo-)biological feature of a social category (e.g., Turks have strong hearts), or a cultural feature (e.g., Turks pray every day in the morning). Moreover, generic statements may

or may not be accompanied by explanations describing the origins of features (e.g., Turks have strong hearts because they live in the highlands).

Thus, understanding the role of generics in essentialism starts with a systematic decomposition of the kind of generic statements as they relate to the different components of essentialism. In the next sections, we briefly describe two proposed pathways from generics to different modes of essentialist thinking and summarize related studies aligned with each account. Note that these accounts are not mutually exclusive and may work simultaneously in many cases. The main difference between these two accounts lies in the following question: Does the linguistic *form* of generics (i.e., generalizations) in and of itself and regardless of *content* elicit essentialist beliefs about social categories?

Account 1: Explaining generic information through essentialism – When a property is ascribed to a category through a generic statement (e.g., Turks eat pastries), the property is viewed as a non-accidental feature related to this group, thus demanding a category-based explanation. Based on this account, the psychological processes that generate the category-based explanations function in a way that often result in essentialist thinking. For instance, Cimpian and Salomon (2014) suggest that the mental systems that generate explanations for observations tend to rely on inherent properties of objects, instead of structural and relational features (called *inherence heuristics*). As a result, to explain the perceived regularities in a category conveyed through generics, children are likely to assume that there is an inherent “essence” shared by members of the category which has caused the mentioned features. For example, Turks eat pastries because their stomachs were designed to like sweets. This account suggests that the connection between generics and social essentialism depends on the function and constraints of our mental explanation-generating system.

Of note, this account implies that there is no necessary connection between the linguistic form of generics and essentialization. It is rather, the content of generic statements that leads to essentialism, in instances where content conveys biological information. In fact, children are able to conceive non-essentialist, structural explanations for regularities in a category as a result of exposure to generic statements that emphasize the environment (Vasilyeva & Lombrozo, 2020). Based on this account, if information contained in or accompanied by generics signals that referenced regularities are due to factors external to the category, generics do not necessarily elicit essentialist beliefs (Noyes and Keil, 2020; Hoicka et al., 2021). For example, Noyes and Keil (2020) found that by hearing generic sentences about a novel social category (“Vawnsies”), children and adults expressed essentialist beliefs (specifically *inheritability*) *only* when generic sentences had biological content (“Vawnsies feel sick when they drink milk”) and not when they were cultural (“Vawnsies believe that fish talk to God”). Thus, the contextual information attached to the generics matter in whether or not generic language leads to essentialism (see also Hoicka et al., 2021).

Account 2: Confirming essences through generic information – On the second account, generics do not *lead* to essentialism, but only *confirm* essentialist reasoning. On this account, the pathway from generics to social essentialism is independent of the content of the generic statements and the consequent inherent explanations. According to this account, children learn to essentialize categories very early on and generic language signals to them which social categories are salient in their communities and prime “candidates” for essential reasoning (Benitez et al., 2022, Foster-Hanson et al., 2022). Consequently, regardless of the explicit information communicated in a generic sentence, using generic terms (e.g., “Turks”) signals to children that these categories are culturally relevant and appropriate targets for essentialization. In support of this hypothesis, researchers have found that generic sentences can elicit more essentialist beliefs than specifics, even when they get negated or get corrected by a knowledgeable character (Foster-Hanson et al., 2022; Foster-Hanson et al., 2016). Thus, on this account, one mechanism through which generics contribute to the development of essentialism is through the linguistic form of generic statements, which signals to children the relevant ways to categorize the social world.

To sum up, the second account suggests that generic sentences, regardless of their content, elicit generalization and internal explanations for the behaviors and preferences of category members. The first account, however, posits that only through additional biological information in their content, generic statements lead to essentialist reasoning, especially beliefs about heritability.

Generic language and essentialist beliefs in Iran

One remarkable limitation of previous studies on the generics-essentialism link is that they have been almost exclusively conducted in English-speaking and Western countries (but see Segall et al. (2015) for a correlational study). Replication failures in psychological science have ignited concern and controversy about the cultural appropriateness of common research methodologies developed by researchers from developed countries and tested among primarily English-speaking, Western samples (Open Science Collaboration, 2015). Many have warned that psychologists should avoid making broad, universal claims based on studies conducted in a single—often WEIRD—population (Western, Educated, Industrialized, Rich, and Democratic: Henrich et al., 2010). Within developmental psychology, fewer than 10% of participants in studies published in the top three developmental-psychology journals between 2006 and 2010, were from countries in Central or South America, Africa, Asia, or the Middle East (Nielsen et al., 2017). Research on the role of generics in the formation of social essentialism is not an exception. This is a significant limitation, especially given the assumed universal role that this specific linguistic form plays in the development of essentialism.

In the absence of research outside English-speaking Western samples, the role of generics, especially as a linguistic form, in the development of essentialist reasoning is not clear. Second, cross-cultural differences have been documented for a number of constructs related to the role of generic language in essential reasoning. Specifically, there are cross-cultural differences in intuitive biological thinking (Xu & Coley, 2022) and social explanation (Miller, 1984), as well as culture-specific patterns of social essentialism (e.g., Diesendruck & haLevi, 2006; Mahalingam, 2003); this raises two important questions about generics and essentialism: namely, do generic statements lead to essentialist reasoning in languages other than English at all? And if so, are the mechanisms similar to the mechanisms theorized and tested among English-speaking, Western samples? In the current study, we answer these two questions in a Persian-speaking sample of children and adults living in Iran.

Generics are prevalent in Persian. Particularly, generic language to describe differences in gender norms and social roles are very common and widespread. Children are especially exposed to generic language, particularly about gender, from a variety of sources, including school lessons, the media, and family members who might reinforce traditional gender norms in their everyday language. For example, though not a systematic study of generic language, Chanzanagh et al., (2011) review content of four educational books from the national 5th grade curriculum for all schools in Iran and report the overwhelming prevalence of descriptions of female characters in stereotypical “feminine” activities and roles (e.g., cooking, sewing) and male characters in stereotypical “masculine” roles (e.g., mathematician, firefighter). Children also commonly use generic language in their rhymes to describe differences between boys and girls (such as “Boys are like lions and swords! Girls are like mice and rabbits!” 11psr shynd, mthl shmshyrd. dkhtr mwshnd, mthl khrgwshnd.). The prevalence of generic language to describe social groups, in addition to recent work by our team documenting social essentialist patterns among children and adults in Iran (*anonymized for review*), makes the study of the role of generic language in social essentialism in an Iranian sample uniquely informative and impactful in extending the relevant literature to non-English speaking populations from understudied cultures.

Current study

In this study, our goal is to explore how generic statements (compared with specific statements) elicit different components of essentialist thinking about a novel social category, and to examine if content of generics (biologic vs. cultural) modulate this effect. By doing so, (1) we can test whether previous results are generalizable to a non-WEIRD society and to speakers of a language other than English and (2) we take a step to shed light on the underlying mechanisms explained above. Based on previous research, we predict that generic descriptions about a novel social category, compared to specific descriptions about a member of a social category, lead children to appeal to category-based, intrinsic explanations. Yet, we expect that only generics with biological predicates give rise to an inborn/inheritable view of the category.

Method

Participants

We aim to collect data from a sample of 20 children between the ages of 4 to 9 years for each experimental condition group. We plan on four experimental conditions: 2 linguistic forms [generic vs. specific] crossed with 2 kinds of content [biological vs. cultural]. Each group will be balanced in terms of gender and age. The total sample size for our child participants therefore will be 104, and we will recruit 104 adults as well. As this is a direct replication and extension, the sample size is informed by results from Noyes and Keil (2020)¹¹This sample size is based on calculating the effect size of the main t-test from Noyes and Keil (2020) comparing cultural and biological generic conditions. The effect size was 0.94. Power was set at 80% and alpha to 0.05.. All participants' first language is Persian. Children will be recruited from Hayat, an educational institution for children in Tehran.

We also plan to include adult participants, enabling us to investigate possible developmental changes in the generics-essentialism link. Adults will be recruited from users of university student groups on Telegram. This study is approved by the ethics review committee at the first authors' university, and all participants will be asked to provide informed consent.

Design and Procedure

The procedure of our study is largely adopted from Noyes and Keil (2020) with a few small changes. We plan to use a 2 (properties/content: cultural vs. biological) by 2 (language form: generic vs. specific), fully-crossed, between-subject design. In addition to the two generic statement conditions from Noyes & Keil (2020), we will also include specific language conditions for each property/content condition. In the absence of previous research on the role of generics in the development of essentialist beliefs in Iran, it is important to explore how generics as a linguistic form and independent of their content may elicit essentialist beliefs in this context. These additional specific conditions enable us to determine a baseline for essentialist beliefs about novel social categories through development, and help us rule out the role of repetition¹¹In Noyes and Keil (2020), the control and experimental trials differ with respect to how many times children have heard the relevant scenarios (they only hear the control trial once while they hear the experimental trial 16 times); in our design, we eliminate this difference between the control and experimental conditions..

All children will be tested in person and in Persian. At the start of the study, parents and children (and adult participants) will provide informed consent to participate. In a warm-up phase, they will first be introduced to and familiarized with a novel social category, the Foolies, and the island they live on. Then, in the teaching phase, they will be presented with one story book consisting of 16 sentences about the Foolies, based on the condition they were assigned to. In the specific conditions, the Foolies will be described in specific language and in the generic conditions, "Foolies" will be described in generic language (see stimuli below for more details). Two memory check questions will be included between the sentences in the teaching phase. For example, in the biological condition, participants hear the statement "Foolies have super strong finger nails." and after a couple of more statements, they are asked "Do Foolies have weak fingernails, or super strong finger nails?"

For adults, the design will be identical, but they will be tested online. We will use Porsline, an Iranian online survey service (<https://porsline.ir>) to program the study for adults.

Stimuli

The stimuli and the measurements will be adapted directly from Noyes and Keil (2020). As an exception, the novel category will be named "Foolies" instead of "Vawnsie", since the word "Fooly" is more structurally close to Persian nouns. The novel characters, Foolies, will represent a diverse range of unfamiliar features and the category will include members of difference genders with markers of different ethnicities and religious traditions. We will design and use stimuli that are culturally appropriate. The teaching phase differs across the four experimental conditions. For each condition, 16 generic or specific sentences (randomized between participants) are presented in a storybook. Each sentence describes a biological (e.g., "Foolies can hold their breath for a long time") or a cultural feature ("Foolies wear special crowns in the summer") varying between conditions. In addition to these two conditions, we also plan to include "specific" language conditions where the same biological or cultural descriptions will be provided using specific language ("this Fooly can hold its

breath for a long time”/ “this Fooly wears special crowns in the summer”).

After children (and adults) view the storybook, they answer questions measuring different aspects of essentialist reasoning¹¹We believe that both intrinsic causal mechanisms and heritability questions measure two components of essentialism (see also Benitez et.al, 2022). In contrast, Noyes and Keil (2020) considered the explanatory questions as the measurement of kindhood, not essentialism., one measure probing the assumed causal mechanism for category description, and another measuring reasoning about heritability of characteristic. The order of questions within each measurement is randomized across participants. The questions and measures are provided below in more details:

Intrinsic causal mechanisms (explanation)

After the teaching phase, participants will be asked three questions about why they think that an individual Fooly has a certain property included in the storybook. In the first step we will ask an open question (for example, “Look, this Fooly thinks stones can come alive! Why do you think she thinks so?”) – note that the open-ended manner in which we will ask this question is a deviation from Noyes and Keil (2020), who asked a yes/no question. This is to prevent a possibly leading question. Following Rhodes et al. (2018) and Cimpian & Markman (2011), open-ended responses will be coded along two dimensions: First, if the explanation is based on intrinsic, functional, or trait-based factors (e.g., “because Foolies are crazy”) it will be coded as “essentialist”. If responses refer to learning, problems, or extrinsic factors (e.g., “because there are many stones there”) they would be considered “non-essentialist”. Second, we will examine whether they refer to the category (e.g., “because Foolies are crazy”, score 1) or not (e.g., “because he is crazy”, score 0). Two coders, one of them ignorant of experimental condition, will examine the explanations. Disagreement in coding will be resolved through discussion.

After asking the open-ended question, we will follow it up with a yes/no question: “Is that because s/he is a Fooly?” “Yes” will be coded as an essentialist and “no” as a non-essentialist belief. Following Noyes and Keil (2020), a cross-condition question will be included among the test questions in this battery as well. For participants in the cultural content condition, they will be asked an explanatory question about a biological feature of a Zarpie, and for those in the biological content condition, they will be asked an explanatory question about a cultural feature of a Zarpie.

Heritability

We will use Switched-at-birth tasks to assess participants’ beliefs about the heritability of category-linked properties. Participants will be told a story about a child who is born to a Fooly mother but has been raised by an Iranian mother. Children in our sample know Iranians don’t exhibit Fooly characteristics, so Iran is selected as the contrasting culture. For instance, participants in the cultural condition will be told: “One day a Fooly had a baby named Sharlie. Sharlie came from her tummy. But right after Sharlie was born, Sharlie went to live with an Iranian. The Iranian took care of Sharlie. She played with Sharlie, fed Sharlie, and loved Sharlie. Sharlie grew up with the Iranian and never saw the Fooly again. Her Fooly mother spins in circles when the sun goes down. Iranians don’t.”

Participants will then be asked about whether Sharly will grow up to have Fooly characteristics (heritability) or not (the effect of the environment). For example, they will be asked, “when Sharly is older, does Sharly spins in circles when the sun goes down, like Foolies, or not, like Iranians?” Predicting that the child would grow up to poses a familiar Fooly feature (like her biological mother) will be coded as an essentialist answer. Two comprehension check questions will also be asked (“whose tummy did Sharly come out of? And who took care of Sharly?”).

In addition to questions used by Noyes and Keil (2020), we will also add one more question to each trial. We ask participants “Is Sharly a Zarpie or not?” (“yes” will be coded as an essentialist and “no” as a non-essentialist response). This is to check inferences about category membership beyond reasoning about shared category properties.

Data Analysis Plan

We intend to use general linear mixed models (GLMM) using the package lme4 in R to examine the effects of language forms and kinds of properties (i.e., content) on different aspects of essentialist beliefs (i.e., causal explanation and heritability). To analyze children’s data, we plan to run stepwise mixed-effect logistic regression models for each of the measure (Explanation and Heritability). We will start with a full model on each measure coded as a binomial variable (essentialist/non-essentialist) with language forms (generic, specific), kinds of properties (biological, cultural), age (continuous), and all two way and the three-way interactions as fixed effects, and ID and scenario as random effects. The non-significant interaction terms will then be dropped in subsequent models and the model will be reduced step-wise until we have the best fitting model. When applicable, we will transform coefficients to odd ratios as measures of effect size. Significant interactions will be examined using simple slope tests.

For the Explanation task, we also will compare children’s responses to test properties (mentioned in the storybook) and their responses to the control property (cross-condition properties) for each of the experimental conditions. This will be a logistic regression model with property (test, control), age, and the interaction terms as fixed effects and ID and scenario as random effects. In addition, responses to switched-at-birth questions will be compared with the chance rate using t tests.

A similar procedure will be used for the adult sample, except that these models would not include age. We also plan to analyze a full sample with a similar plan and include age group as a categorical factor. This enables us to explore any developmental shifts from childhood to adulthood in how generics lead to essentialism.

References

- Benitez, J., Leshin, R. A., & Rhodes, M. (2022). The influence of linguistic form and causal explanations on the development of social essentialism. *Cognition* , 229 , 105246.
<https://doi.org/10.1016/j.cognition.2022.105246>.
- Carlson, G. N., & Pelletier, F. J. (1995). *The Generic Book*. University of Chicago Press.
- Chanzanagh, H. E., Esmaeelzadeh, Z., & Zarsazkar, M. (2011). Gender in school subject: A case-study on Iran’s primary levels-school subjects. *Procedia-Social and Behavioral Sciences*, 15, 1832-1838.
<https://doi.org/10.1016/j.sbspro.2011.04.011>
- Cimpian, A., Brandone, A. C., & Gelman, S. A. (2010). Generic Statements Require Little Evidence for Acceptance but Have Powerful Implications. *Cognitive Science* , 34 (8), 1452–1482.
<https://doi.org/10.1111/j.1551-6709.2010.01126.x>.
- Cimpian, A., & Erickson, L. C. (2012). The effect of generic statements on children’s causal attributions: Questions of mechanism. *Developmental Psychology* , 48 (1), 159–170.
<https://doi.org/10.1037/a0025274>
- Cimpian, A., & Markman, E. M. (2011). The Generic/Nongeneric Distinction Influences How Children Interpret New Information About Social Others: Generic/Nongeneric Distinction. *Child Development* , 82 (2), 471–492.
<https://doi.org/10.1111/j.1467-8624.2010.01525.x>
- Cimpian, A., & Salomon, E. (2014). The inference heuristic: An intuitive means of making sense of the world, and a potential precursor to psychological essentialism. *Behavioral and Brain Sciences* , 37 (5), 461–480.
<https://doi.org/10.1017/S0140525X13002197>
- Davoodi, T., Soley, G., Harris, P. L., & Blake, P. R. (2020). Essentialization of Social Categories Across Development in Two Cultures. *Child Development* , 91 (1), 289–306.
<https://doi.org/10.1111/cdev.13209>
- del Río, M. F., & Strasser, K. (2011). Chilean children’s essentialist reasoning about poverty. *British Journal of Developmental Psychology* , 29 (4), 722–743.
- Diesendruck, G., & HaLevi, H. (2006). The Role of Language, Appearance, and Culture in Children’s

- Social Category-Based Induction. *Child Development* , 77 (3), 539–553.<https://doi.org/10.1111/j.1467-8624.2006.00889.x>
- Diesendruck, G., & Menahem, R. (2015). Essentialism promotes children’s inter-ethnic bias. *Frontiers in Psychology* , 6 .<https://doi.org/10.3389/fpsyg.2015.01180>
- Foster-Hanson, E., Leslie, S. J., & Rhodes, M. (2016). How does generic language elicit essentialist beliefs?. In Proceedings of the 38th annual conference of the Cognitive Science Society (pp. 1541-1546). Austin, TX: Cognitive Science Society.
- Foster-Hanson, E., Leslie, S.-J., & Rhodes, M. (2022). Speaking of Kinds: How Correcting Generic Statements can Shape Children’s Concepts. *Cognitive Science* , 46 (12), e13223.<https://doi.org/10.1111/cogs.13223>
- Gelman, S. A. (2003). *The Essential Child: Origins of Essentialism in Everyday Thought* . Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195154061.001.0001>
- Gelman, S. A., & Fine, R. D. (2020). The role of essentialism in children’s social judgments. In *The social brain: A developmental perspective* (pp. 305–325). The MIT Press.<https://doi.org/10.7551/mitpress/11970.001.0001>
- Gelman, S. A., Goetz, P. J., Sarnecka, B. W., & Flukes, J. (2008). Generic language in parent-child conversations. *Language Learning and Development* , 4 (1), 1-31. <https://doi.org/10.1080/15475440701542625>
- Gelman, S. A., & Tardif, T. (1998). A cross-linguistic comparison of generic noun phrases in English and Mandarin. *Cognition* , 66 (3), 215–248.[https://doi.org/10.1016/S0010-0277\(98\)00021-3](https://doi.org/10.1016/S0010-0277(98)00021-3)
- Gelman, S. A., Taylor, M. G., Nguyen, S. P., Leaper, C., & Bigler, R. S. (2004). Mother-Child Conversations about Gender: Understanding the Acquisition of Essentialist Beliefs. *Monographs of the Society for Research in Child Development* , 69 (1), i–142. <http://dx.doi.org/10.1111/j.1540-5834.2004.06901002.x>
- Gelman, S. A., Ware, E. A., & Kleinberg, F. (2010). Effects of generic language on category content and structure. *Cognitive Psychology* , 61 (3), 273–301.<https://doi.org/10.1016/j.cogpsych.2010.06.001>
- Gelman, S. A., Ware, E. A., Kleinberg, F., Manczak, E. M., & Stilwell, S. M. (2014a). Individual Differences in Children’s and Parents’ Generic Language. *Child Development* , 85 (3), 924–940. <https://psycnet.apa.org/doi/10.1111/cdev.12187>
- Gelman, S. A., Waxman, S. R., & Kleinberg, F. (2008). The role of representational status and item complexity in parent–child conversations about pictures and objects. *Cognitive Development* , 23 (2), 313–323.<https://doi.org/10.1016/j.cogdev.2008.03.001>
- Gil-White, F. J. (2001). Are ethnic groups’ biological “species” to the human brain? Essentialism in our cognition of some social categories. *Current Anthropology* , 42 , 515–554.<https://doi.org/10.1086/321802>
- Haslam, N., Rothschild, L., & Ernst, D. (2000). Essentialist beliefs about social categories. *British Journal of Social Psychology* , 39 , 113–127.<https://doi.org/10.1348/014466600164363>
- Haslam, N., & Whelan, J. (2008). Human natures: Psychological essentialism in thinking about differences between people. *Social and Personality Psychology Compass* , 2 (3), 1297-1312. <https://doi.org/10.1111/j.1751-9004.2008.00112.x>
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *The Behavioral and Brain Sciences* , 33 (2–3), 61–83; discussion 83-135.<https://doi.org/10.1017/S0140525X0999152X>
- Keil, F. C. (1992). *Concepts, kinds, and cognitive development* . mit Press.
- Leslie, Sarah-Jane and Adam Lerner, "Generic Generalizations", *The Stanford Encyclopedia of Philosophy* (Fall 2022 Edition), Edward N. Zalta & Uri Nodelman (eds.), <https://plato.stanford.edu/archives/fall2022/entries/generics>

- Mandalaywala, T. M. (2020). Does essentialism lead to racial prejudice? It is not so Black and White. In *Advances in Child Development and Behavior* (Vol. 59, pp. 195–245). Elsevier. <https://doi.org/10.1016/bs.acdb.2020.05.007>
- Mandalaywala, T. M., Ranger-Murdock, G., Amodio, D. M., & Rhodes, M. (2019). The Nature and Consequences of Essentialist Beliefs About Race in Early Childhood. *Child Development* , 90 (4), e437–e453. <https://doi.org/10.1111/cdev.13008>
- Mandler, J. M. (2004). A synopsis of the foundations of mind: Origins of conceptual thought (2004). New York: Oxford University Press. *Developmental Science* , 7 , 499–505. <https://doi.org/10.1111/j.1467-7687.2004.00369.x>
- Mari, M. A. (2022). How cues to social categorization impact children’s inferences about social categories. *Acta Psychologica* , 229 , 103707. <https://doi.org/10.1016/j.actpsy.2022.103707>
- Markman, E. M. (1989). *Categorization and naming in children: Problems of induction* . mit Press.
- Miller, J. G. (1984). Culture and the development of everyday social explanation. *Journal of Personality and social psychology* , 46(5), 961. <https://doi.org/10.1037/0022-3514.46.5.961>
- Open Science Collaboration. 2015. “Estimating the Reproducibility of Psychological Science.” *Science* 349:1422–25.
- Nielsen, M., Haun, D., Kärtner, J., & Legare, C. H. (2017a). The persistent sampling bias in developmental psychology: A call to action. *Journal of Experimental Child Psychology* , 162 , 31–38. <https://doi.org/10.1016/j.jecp.2017.04.017>
- Noyes, A., & Keil, F. C. (2020). There is no privileged link between kinds and essences early in development. *Proceedings of the National Academy of Sciences of the United States of America* , 117 (20), 10633–10635. <https://doi.org/10.1073/pnas.2003627117>
- Rakison, D. H., & Oakes, L. M. (Eds.). (2003). Early category and concept development: Making sense of the blooming, buzzing confusion (pp. xxi, 442). Oxford University Press.
- Rhodes, M., Leslie, S., Bianchi, L., & Chalikh, L. (2018). The Role of Generic Language in the Early Development of Social Categorization. *Child Development* , 89 (1), 148–155. <https://doi.org/10.1111/cdev.12714>
- Rhodes, M., Leslie, S., Saunders, K., Dunham, Y., & Cimpian, A. (2018). How does social essentialism affect the development of inter-group relations? *Developmental Science* , 21 (1). <https://doi.org/10.1111/desc.12509>
- Rhodes, M., Leslie, S.-J., & Tworek, C. M. (2012). Cultural transmission of social essentialism. *Proceedings of the National Academy of Sciences* , 109 (34), 13526–13531. <https://doi.org/10.1073/pnas.1208951109>
- Rhodes, M., & Mandalaywala, T. M. (2017). The development and developmental consequences of social essentialism. *Wiley Interdisciplinary Reviews. Cognitive Science* , 8 (4). <https://doi.org/10.1002/wcs.1437>
- Segall, G., Birnbaum, D., Deeb, I., & Diesendruck, G. (2015). The intergenerational transmission of ethnic essentialism: How parents talk counts the most. *Developmental Science* , 18 (4), 543–555. <https://doi.org/10.1111/desc.12235>
- Sugarman, S. (1981). The cognitive basis of classification in very young children: An analysis of object-ordering trends. *Child Development* , 52 , 1172–1178. <https://doi.org/10.2307/1129503>
- Vasilyeva, N., & Lombrozo, T. (2020). Structural thinking about social categories: Evidence from formal explanations, generics, and generalization. *Cognition* , 204 , 104383. <https://doi.org/10.1016/j.cognition.2020.104383>

Xu, Y., & Coley, J. D. (2022). Intuitive biological thinking in Chinese 8th graders. *Journal of Experimental Child Psychology* ,224 , 105511.<https://doi.org/10.1016/j.jecp.2022.105511>

Zhu, T. (2022). *Adults' Essentialism of Ethnicity and SES* . University of California, Merced.