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Children and Adults Selectively Attribute Shared Cultural Knowledge to Speakers of the Same Language

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Children's and adults' attributions of shared knowledge of and shared preference for songs were investigated across two prominent social categories: language and gender. Both attributions indicate similarity among individuals but shared cultural knowledge can be more informative about common social history than shared preference, as it is mainly transferred through social interactions within cultures, while preferences can have various sources. Both 5- to 6-year-old children (N = 60) and adults (N = 160) generalized knowledge of songs across individuals who speak the same-language rather than same-gender individuals. In contrast, preference for songs was not systematically generalized across either category. Thus, individuals selectively infer shared cultural knowledge among same-language speakers, suggesting an early emerging link between shared knowledge and cultural boundaries.

From early in life, humans are adaptable in the ways in which they divide the social world into categories. Social categories serve as the basis for rapid inferences about socially relevant traits of members of a given category and, when faced with a member of a category, adaptive behavior is contingent on these inferences. For example, when we encounter individuals speaking a foreign language, we can make a variety of inferences that differ in their scope. We might make inferences ranging from concluding that these individuals will not understand us, that it will be difficult to cooperate with them, that they are dissimilar to us in various ways, or that they are members of a different cultural group. Furthermore, although people's languages may provide a basis for making predictions about their cultural practices, their genders are less likely to do so. Understanding the exclusive nature of socially relevant behaviors and attributes, therefore, is an important aspect of forming appropriate group representations. While numerous studies show that attention to social categories such as age, race, gender, or language emerges and drives social preferences (i.e., preferences for individuals) starting early in life (e.g., French, 1987; Kinzler, Dupoux, & Spelke, 2007; Kowalski & Lo, 2001; Martin, 1989), the inferences these categories license, are not entirely known.

Early Sensitivity to Social Categories: Language and Gender

Language and gender are two of the prominent markers of social divisions. Adults use others' gender and accent as a basis for social categorization (Kurzban, Tooby, & Cosmides, 2001; Pietraszewski & Schwartz, 2014a; Taylor, Fiske, Etcoff, & Ruderman, 1978), and both cues continue to be dimensions of social categorization, even in the presence of contrasting coalitional cues, where accent or gender no longer mark membership in cooperative groups (Kurzban et al., 2001; Pietraszewski, Cosmides, & Tooby, 2014; Pietraszewski & Schwartz, 2014b). Attention to language and gender is evident in infancy (Kinzler et al., 2007; Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002) and both cues elicit robust preferences for same category members (e.g., Kinzler et al., 2007; Martin, 1989). In addition to showing social and evaluative preferences, starting in the preschool years, children also make gender- and language-based predictions about physical, behavioral, and psychological attributes of novel individuals (e.g., Diesendruck & HaLevi, 2006; Gelman, Collman, & Maccoby, 1986; Hirschfeld & Gelman,

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1997; Martin & Little, 1990; Shutts, Pemberton-Roben, & Spelke, 2013; Weatherhead, White, & Friedman, 2016). Even though language is a socially constructed category as opposed to being a natural category like gender, young children tend to make essentialist inferences based on language as well as gender (Hirschfeld & Gelman, 1997; Kinzler & Dautel, 2012; Taylor, Rhodes, & Gelman, 2009).

The present research focuses on these two categories, because previous theoretical and empirical work suggests differences regarding the social inferences these two categories might license. Cultural groups have been distinguished by their languages or accents throughout history, making language and accent markers of cultural divisions (Baker, 2001; Henrich & Henrich, 2007; Moya & Henrich, 2016). For adults, language marks individuals' social history (i.e., past social experiences) and cultural group membership (e.g., Giles & Billings, 2004; Pietraszewski & Schwartz, 2014b; Porter, Rhineschmidt-Same, & Richeson, 2016). Given that native language draws infants' attention (e.g., Moon, Cooper, & Fifer, 1993), guides social biases and learning (e.g., Buttelmann, Zmyj, Daum, & Carpenter, 2013; Kinzler et al., 2007), and is used as a cue to affiliative inferences starting remarkably early in life (Liberman, Woodward, & Kinzler, 2016), it has been proposed that children may be predisposed to view language as a source of information regarding one's cultural group membership (Esseily, Somogyi, & Guellai, 2016; Kinzler, Shutts, DeJesus, & Spelke, 2009). Indeed, children use language and accent to infer people's place of origin and where they currently live (Kinzler & DeJesus, 2013; Weatherhead et al., 2016), and map language onto other culturally relevant dimensions such as race and nationality (Hirschfeld & Gelman, 1997; Kinzler & DeJesus, 2013).

While gender is also an inductively rich social category, sensitivity to which emerges quite early (Quinn et al., 2002), gender-based social groups tend to crosscut cultural boundaries. Although some social groups are segregated by gender (e.g., some sports teams), the majority of social groups, including enduring cultural groups such as tribes usually contain both genders for the purposes of reproduction. Hirschfeld (1996, p. 198) made a parallel distinction between social groups that are "self-reproducing," such as race or nationality and social groups that are not, such as age and gender, and argued that these two kinds of groups might license different inferences. For instance, Hirschfeld and Gelman (1997) showed that children attribute language differences more to race differences than age differences, while they attribute preferences more to age than race.

Thus, both language and gender mark social group membership, nevertheless, the members of such groups are likely to differ in what kinds of attributes they share, particularly with regard to attributions about one's social history and cultural group membership (Moya & Henrich, 2016; Pietraszewski & Schwartz, 2014b; Pietraszewski et al., 2014). Even though previous research suggests that, from early in life, individuals infer that the category of language is closely related to culture, it is not clear whether such an inference would be made selectively based on this category. Here, we contrast attributions of shared cultural knowledge and shared preference across the categories of language and gender and ask whether individuals selectively infer cultural knowledge to be shared among same language speakers.

Shared Knowledge and Cultural Groups

Research from diverse disciplines documents that human cultures invent their own arbitrary knowledge, such as knowledge of norms, rituals, tales, or songs and this shared cultural knowledge is used to define the boundaries of cultural groups within larger societies (e.g., Legare & Watson-Jones, 2015; Shepherd, 1977; Stokes, 1994). Furthermore, for most of our species' existence, cultural knowledge was transmitted exclusively through direct social contact, making it a reliable marker of one's social history and affiliation. Research, mainly focusing on social norms (i.e., behavioral conventions that are defined and enforced by a cultural group), suggests that from early on, children have some understanding about the exclusivity of culture (for a review, see Diesendruck & Markson, 2011). For instance, infants and young children selectively endorse conventions introduced by native speakers (Buttelmann et al., 2013; Kinzler, Corriveau, & Harris, 2011), children as young as 2 years of age associate native speakers with conventional actions and norms (Liberman, Howard, Vasquez, & Woodward, 2018; Oláh, Elekes, Bródy, & Király, 2014), preschool age children and adults expect norms to be shared by same group members (Kalish, 2012) and conventional norms are selectively enforced to ingroup members by young children (Schmidt, Rakoczy, & Tomasello, 2012). Because social norms, as a form of cultural knowledge, tend to vary between cultural groups, leading to diverse practices and behaviors (Henrich & Boyd, 1998), children's differential expectations regarding others' behaviors

based on their group membership, suggest that group membership and cultural knowledge might be linked from early on.

In addition to shared knowledge, cultural groups can be associated with other attributes as well. Shared preference (i.e., having similar evaluative responses for stimuli) is a case in point (e.g., Bourdieu, 1984). However, even though preferences are linked to one's social history and culture, they may not be as exclusive in nature as knowledge. After all, preferences are influenced by many factors such as intrinsic factors or individual traits as well as one's social history or cultural background (e.g., Little, Apicella, & Marlowe, 2007; Masataka, 2006; Rentfrow & Gosling, 2003; Soley & Hannon, 2010). Moreover, while knowledge tends to be enduring, preferences tend to change throughout the course of the lifespan (e.g., LeBlanc, Sims, Siivola, & Obert, 1996). As a result, even though preferences might be influenced by one's social history, they are not necessarily shared by the members of a given cultural group, and might well be shared by members of different groups. Indeed, children and adults are more likely to generalize norms than preferences based on group membership (Kalish, 2012) and even infants generalize conventions (i.e., object labels), but not preferences across individuals (Henderson & Woodward, 2012).

Nevertheless, attention to the relation between preference and group membership is also evident from very early on. For instance, infants endorse preferences of their linguistic ingroups (Kinzler et al., 2007; Shutts, Kinzler, McKee, & Spelke, 2009; Soley & Sebastián-Gallés, 2015), they expect individuals who share preferences to be positively affiliated (Liberman, Kinzler, & Woodward, 2014), and they expect same group members to have similar preferences (Liberman, Woodward, Sullivan, & Kinzler, 2016). Group membership status marked by cues including race, ethnicity, gender, social status, or minimal group cues are used to make inferences about others' preferences by children (e.g., Birnbaum, Deeb, Segal, Ben-Eliyahu, & Diesendruck, 2010; Diesendruck & HaLevi, 2006; Plötner, Over, Carpenter, & Tomasello, 2016; see also Kalish & Lawson, 2008; Weatherhead et al., 2016), and adolescents and adults also infer social group membership based on others' preferences (North & Hargreaves, 1999; Rentfrow, McDonald, & Oldmeadow, 2009). Furthermore, shared preferences elicit robust social choices across lifespan (e.g., Billig & Tajfel, 1973; Boer et al., 2011; Fawcett & Markson, 2010; North & Hargreaves, 1999).

Crucially, preference and knowledge are habitually confounded in most research on shared preferences as they are in our daily experiences. As an example, Diesendruck and HaLevi (2006) showed that when an Arab child was presented as liking a game called "zigo" and a Jewish child was presented as liking a game called "zaber," 5-year-old children inferred that another Arab child would prefer playing zigo, rather than zaber. Children's reasoning in this scenario, however, might be driven by their inferences of shared knowledge and/or their inferences of preference. Because, when an individual is presented as liking a game, an inevitable assumption is that this individual is familiar with the game, has prior knowledge about its rules and so on. We tend to acquire knowledge of things because we have an initial interest in them, or as we become more familiar with certain stimuli, we tend to like them more (Zajonc, 1968). Nevertheless, knowledge and preference do not always co-vary. Individuals do not necessarily like everything they are familiar with (e.g., Szpunar, Schellenberg, & Pliner, 2004), and they can also exhibit instant evaluative responses to novel objects and events (e.g., Duckworth, Bargh, Garcia, & Chaiken, 2002). For instance, one can imagine a traditional song that is very well known in a particular culture, yet might be disliked by many of the individuals belonging to that culture. Regardless, hearing someone playing or singing this particular song, will presumably lead another individual who also knows that particular folksong to the inference that the two are related to the same culture. Accordingly, when knowledge and preference are dissociated from one another, shared knowledge may exert greater effect on individuals' social inferences and preferences. In line with this argument, recent evidence suggests that adults are more likely to infer affiliation among those individuals who share rare preferences rather than those individuals whose preferences are widely shared, presumably because rare preference matches are more indicative of a shared social history that made the transmission of that knowledge to both parties possible (Vélez, Bridgers, & Gweon, 2016). Furthermore, sharing scarce knowledge elicits stronger effects than sharing a preference without prior knowledge on adults' social choices (Vélez et al., 2016). Consequently, while being an important cue to perceived similarity, compared to shared cultural knowledge, shared preference appears to be less conducive for inferring information about individuals' social history. Remarkably, children also privilege shared cultural knowledge over shared preference when making social choices

(Soley & Spelke, 2016). Specifically, when 4- to 5-year-old children have to choose a friend among two children who differ in terms of their favorite songs, children tend to choose those kids whose favorite songs are familiar. However, when knowledge of and preference for songs are disentangled from one another, children prefer others who know songs they themselves know, and avoid others who know songs they do not know, irrespective of the target children's preferences for the songs. Thus, children's friendship choices are selectively driven by a shared state of cultural knowledge and this might reflect children's sensitivity to the diagnostic relation between shared cultural knowledge and common social history (Soley & Spelke, 2016).

The Present Research

Using music as a tool and contrasting inferences of shared song knowledge and shared song preference based on gender and language, the present research examines the link between social categories and culture in children and adults.

Music provides an ideal tool for investigating social-category based inferences for a number of reasons. Music, has been part of diverse cultures (Brown, 1991) and cultural groups have been distinguished by their music throughout history (Cross, 2001). Thus, music, and in particular songs, constitute an important element of culture, as they have been transmitted across generations mostly by direct social contact. Second, a great body of evidence suggests that shared music experiences elicit social preferences and inferences in childhood and in adulthood (e.g., Boer et al., 2011; North & Hargreaves, 1999; Rentfrow et al., 2009; Soley & Spelke, 2016). Finally, music allows us to test predictions about the relative usefulness of abstract attributes such as shared knowledge and shared preference in signaling one's social history and cultural group membership.

The present research aims to answer three main questions: First, we ask whether children infer that individuals of the same gender or individuals who speak the same language share cultural knowledge. While previous research suggests that the link between culture and language individuals speak is evident from very early on, it is not clear whether this connection is specific to language, a potent marker of cultural divisions, or whether children would be equally likely to attribute shared cultural knowledge across language and gender categories.

Second, we ask whether children are sensitive to the exclusive relation between knowledge and cultural groups by contrasting inferences of shared knowledge with inferences of shared preference across language and gender. For instance, if children privilege language over gender when making social attributes, because they infer that individuals who speak the same language are more likely to have similar attributes than same-gender individuals, they might also generalize other attributes such as shared preference that indicate similarity among individuals, yet are less diagnostic about one's social history, across language. However, if children are sensitive to the more exclusive relation between shared knowledge and cultural groups, they are expected to generalize preferences across same-language speakers to a lesser degree.

Third, we aim to explore whether generalizations of shared knowledge and preference across gender and language would differ in childhood and in adulthood. Young children rely mainly on their social interactions with others when acquiring knowledge (Gelman, 2009; Harper & Sanders, 1975; Kuhn & Pease, 2006; Schillaci & Kelemen, 2014) and they may not be very skilled at using other means, such as the Internet, for accessing knowledge (e.g., Schachter, Chung, & Dorr, 1998). Adult learning, on the other hand, is considered as more self-directed (Knowles, 1980), and adults also make more selective decisions about their preferences compared to children (e.g., Hargreaves, Comber, & Colley, 1995). Hence, in adulthood, knowledge might become less diagnostic, as it is more widely transmitted through a variety of nonsocial means; and preferences might become more potent in marking one's social history, as individuals are more selective.

To investigate children's and adults' social attributions based on gender and language, participants were presented with triads of photographs and listened to short sound clips that were identified as the voices of children or adults on the photographs. The target individual whose photograph appeared at the top of the screen matched the other two individuals either in terms of gender (male vs. female) or language (Turkish vs. Spanish). Participants were then asked which of the latter individuals would *know* or *like* same songs as the target.

Study 1

Study 1 investigated 5- and 6-year-old children's attributions of shared cultural knowledge and shared preference based on gender and language. While children's gender-based social preferences are

apparent around the age of 3 (e.g., Martin, 1989; Shutts et al., 2013), previous studies demonstrated language-based explicit social choices in children, who are 5 years and older (e.g., Kinzler et al., 2007, 2009). Accordingly, an age group, where preferences for both categories are established by previous research, was preferred.

Method

Participants

Sixty 5- to 6-year-old children participated in Study 1. Thirty children were randomly assigned to shared knowledge condition (14 females, M_{age} = 73 months, range = 61 –84 months) and 30 children were randomly assigned to shared preference condition (18 females, M_{age} = 72 months, range = 60 –84 months). Ten additional children were eliminated from the final sample due to failure to finish the study (N = 5), giving ambiguous answers on one or more trials (N = 3) or being distracted (N = 2). All children's native language was Turkish. None of the children were familiar with Spanish, but they were all exposed to English at school. Six children were also occasionally exposed to English (4), Russian (1), or Kurdish (1) at home. Data collection took place between March 2015 and May 2017. Children were recruited from schools, known to have students from middle-to-high socioeconomic backgrounds. No specific information about parental ethnicity or socioeconomic status was collected. Children were tested individually in their schools by a female, Turkish experimenter. Ethics approval was obtained from the Institutional Review Board at Bogazici University.

Stimuli

Visual displays consisted of eight triads of photographs (12 male, 12 female) of children. Photos on each triad were chosen from a pool of Caucasian children's photos that were previously rated by adults (N = 49) and were matched based on ratings on attractiveness, positiveness, friendliness, and estimations of age. Accompanying these photo triads were voice clips of 4- to 7-year-old children from Istanbul and Barcelona. The voice clips were ~3 s in length, neutral in content (e.g., *Butterflies have colorful wings*, *Children play together in the park*) and recorded by children, who were native speakers of Spanish or Turkish. Spanish was chosen mainly because it is not commonly taught in schools as a second language, and because Spanish and Turkish individuals look similar enough to allow us to counterbalance language-photo pairings.

The target child whose photo appeared at the top of the screen matched the other two children either in terms of gender or language. For instance, if the target child was a Turkish-speaking girl, then one of the children below was a Turkish-speaking boy and the other child below was a Spanish-speaking girl.

Design and Procedure

Children were presented with three photographs at once on a computer screen and the photos remained visible during the entire trial. In order to match the voice clips and the photographs, a red square appeared around the corresponding photo, suggesting that the voice belonged to the child on that photo. Children received two familiarization trials to make sure that they understood this rule before proceeding to the test phase.

Familiarization phase. Children were presented with two familiarization trials, one with female and one with male photos. During each familiarization trial, two photographs of children of the same gender were presented on the computer screen side by side and the experimenter gave the following instruction: "Let us now listen to what each child will say. As we hear each child's voice, a red square will appear around that child's photo." The experimenter then played a voice clip and a red square appeared around the corresponding photo. Following this, the experimenter asked the child which of the two children on the screen the voice clip belonged to. Once the child pointed to the right photo, the experimenter repeated the same procedure with the second photograph pair. All children passed the familiarization phase, pointing to the right photograph on each trial.

Test phase. On each of the eight trials, children were shown triads of photographs on the computer screen and listened to the voice clips of children on the photographs. In the shared knowledge condition, after listening to each child's voice clip, the experimenter (pointing to the target child) said: "I played a song to this child, and she/he said she/he knew it. Which one of the below children do you think also knows it?". In shared preference condition, after listening to each child's voice clip, the experimenter (pointing to the target child) said: "I played a song to this child, and she/he said she/he liked it. Which one of the below children do you think also likes it?" Each child received eight trials

with different sets of photographs and voice recordings.

The gender and the language of the target child as well as the lateral positions of the same-gender test photographs were counterbalanced across trials. The order of the target child's gender and language were also counterbalanced across children.

Results and Discussion

Percentage of choices associated with children who speak the same language as the target child was calculated for each participant (Figure 1). These percentages were submitted to a two-way analysis of variance with condition (shared knowledge vs. shared preference) and participant gender (male vs. female) as between-subjects factors. The results revealed a significant main effect of condition, $F(1, 56) = 5.33$, $p = .025$, $\eta_p^2 = .087$, suggesting that children's same-language choices were higher in the shared knowledge condition ($M = 61.3\%$, $SD = 23\%$), compared to the shared preference condition ($M = 47.5\%$, $SD = 19.5\%$). No other significant main effects or interactions were found (the smallest $p = .367$).

Comparisons of children's same-language choices against the chance level of 50%, using one-sample, two-tailed *t*-tests revealed that, in the shared knowledge condition, participants tended to choose children, who spoke the same language as the target child more than expected by chance, $t(29) = 2.67$, $p = .012$, $d = .48$. A nonparametric Wilcoxon signed-ranks test yielded a similar result: Eighteen of 30 participants mostly (at least on 5 of 8 trials) chose the child who spoke the same language as the target child, seven participants mostly chose the same-gender child as the target, and five participants were equally likely to choose same-gender children or children who spoke the same language ($Z = 2.5$, $p = .013$, $r = .46$). In the shared preference condition, participants did not systematically choose either category, $t(29) = -0.7$, $p = .489$. Ten of 30 participants mostly chose the child who spoke the same language as the target child, 11 participants mostly chose the same-gender child as the target, and the remaining nine participants were equally likely to choose same-gender children or children who spoke the same language, ($Z = 0.77$, $p = .442$).

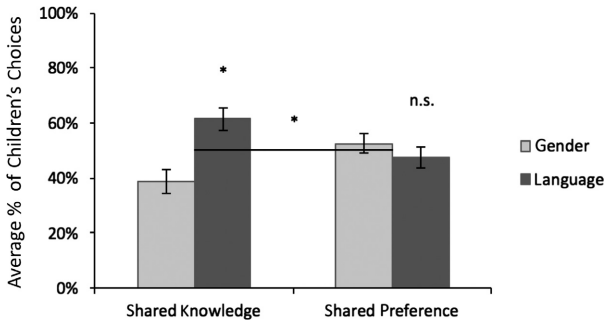

Figure 1. Results of Study 1. Average percentage choices of children for same language speaking and same gender individuals as the target in shared knowledge and shared preference conditions *$p < .05$ (error bars represent standard errors).

The different patterns of generalizing knowledge and preference suggest that children did not choose same-language speaking individuals, simply because the languages children spoke were more salient than their genders. Children also did not consistently infer that same-language speaking individuals share similar attributes. Instead, children made selective inferences based on gender and language and they generalized knowledge of songs across individuals who speak the same language rather than same-gender individuals. In contrast, children were equally likely to attribute shared preference across language and gender.

Adults' social inferences might differ from children's inferences for at least two reasons. First, children acquire knowledge mainly through direct social interactions (Gelman, 2009; Harris & Koenig, 2006), and even though they become increasingly familiar with other mediums of information such as books or the Internet, young children may not be very skilled at using such mediums for knowledge access (Schachter et al., 1998). Furthermore, younger children are more susceptible to endorse information coming through social means compared to older children and adults (Harper & Sanders, 1975; Kuhn & Pease, 2006; Schillaci & Kelemen, 2014). Accordingly, shared knowledge might be less diagnostic of social history and cultural group membership for adults compared to children. Second, children tend to have less control over the stimuli that they are exposed to compared to adults. Thus, because adults make more conscious and selective choices about the music they listen to (Hargreaves et al., 1995), music preferences might also become more informative about social history in adulthood. Indeed, adults make a variety of social inferences about others based on their preferences (e.g., North & Hargreaves, 1999; Rentfrow et al., 2009). Therefore, it is possible that the importance of shared knowledge and shared preferences in marking one's social history changes as individuals become more independent and selective. Alternatively, still in adulthood, shared

knowledge might be more strongly associated with social categories that mark social and cultural history of individuals, particularly when shared preference is dissociated from prior knowledge. The next study explored these alternatives by testing adults' inferences of shared knowledge of and shared preference for songs based on language and gender.

Study 2

Method

Participants

One hundred and sixty adults (92 females, M_{age} = 22.02 years, range = 18–38 years) participated in Study 2. Data of two additional participants were eliminated from the final sample due to missing demographic information. Seventy-eight participants were randomly assigned to shared knowledge condition (46 females, M_{age} = 22.01 years) and 82 were randomly assigned to shared preference condition (46 females, M_{age} = 21.16 years). Participants were recruited from a public, English-medium university campus, on a voluntary basis. All participants were native speakers of Turkish and all participants reported to speak at least one additional language. Data collection took place in October–November, 2017.

Stimuli

Visual displays consisted of four photographs (two males and two females) of Caucasian adults selected from a face database (http://pics.stir.ac.uk). These photographs were selected based on similar ratings of another group of adults (N = 12), on attractiveness, positiveness, and estimations of age. Accompanying these photographs were four voice clips recorded by native speakers (one male and one female) of Turkish and Spanish. Each voice clip was 6 s long and had neutral content (e.g., *As I was walking today, I passed by a park. I saw a white dog that was playing with a ball. There was also a black dog next to it*.).

In order to control for the duration of presentations, sixteen 36-s-long movie files were created each containing three photographs and three voice recordings. In each video, target person whose photograph appeared at the top of the screen matched the other two persons either in terms of gender or language. For instance, if the target was a Spanish-speaking female, then one of the other persons was a Spanish-speaking male and the other person was a Turkish-speaking female. Each photograph appeared 2 s before the voice clip started and disappeared 2 s after the voice clip had ended. Photographs always appeared one by one in the same order starting with the target person's photograph. Finally, all three photographs appeared together for 2 s.

Design and Procedure

Stimuli were presented using PsyScope program (Cohen, MacWhinney, Flatt, & Provost, 1993). Participants were instructed that they would be introduced to some individuals and then they would be asked some questions about these individuals. Participants proceeded to the movie by clicking any key on the keyboard and they were randomly assigned to watch one of the 16 presentation videos. Across these videos, the positions (top, left or right) of the photos and voice clips were counterbalanced. Thus, the gender and the language of the target individual and the side/order of the language/gender matching individual and language/photo pairings were counterbalanced across participants.

After watching the movie, participants were asked one of the two following questions: "Imagine that a song was played to these persons. Which one of the two persons below would *know* a song that the person above *knows*?" (Shared Knowledge Condition) or "Imagine that a song was played to these persons. Which one of the persons below would *like* a song that the person above *likes*?" (shared preference condition). Participants recorded their answer by pressing one of the two keys on the keyboard.

At the end of the testing session, participants were asked to type the languages each individual spoke in the order they heard them and they were asked some demographic questions including their age, gender, and languages they speak.

Results and Discussion

Participants' choices (language-match or gender-match) across the two conditions (shared knowledge vs. shared preference) were submitted to a chi-square test with participant gender (male vs. female) also included as a control variable. The results showed that percentage of participants, who chose individuals speaking the same language as the target, was higher in the shared knowledge (83%) than in the shared preference condition, 57%; $\chi^2(1, N = 160) = 13.96$, $p < .001$, $\phi = .3$; see

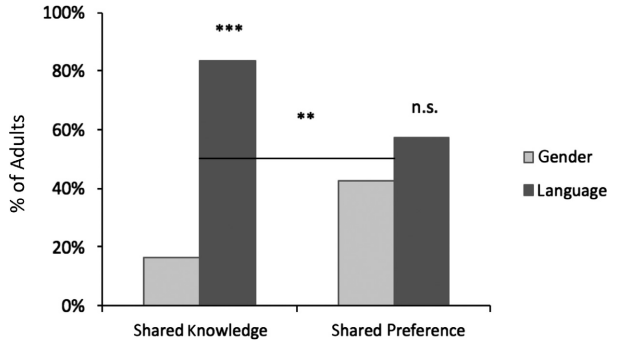

Figure 2. Results of Study 2. Percentage of adults who chose same-language speaking or same-gender individuals as the target in shared knowledge and shared preference conditions $^{**}p < .01$. $^{***}p < .001$.

Figure 2. Further, this pattern was observed both for female participants, $\chi^2(1, N = 92) = 5.13$, $p = .023$, $\phi = .24$, and for male participants $\chi^2(1, N = 68) = 9.57$, $p = .002$, $\phi = -.38$. When participants were asked to generalize song knowledge, 65 of 78 participants chose the same-language speaking, different-gender individual; and 13 participants chose the same-gender, different-language speaking individual ($p < .0001$, two-tailed binomial test, $OR = 4.88$). When participants were asked to generalize song preference, 47 of 82 participants chose the same-language speaking, different-gender individual; and 35 participants chose the same-gender, different-language speaking individual ($p = .224$, two-tailed binomial test, $OR = 1.33$).

The results of Study 2 show that, like children, adults generalized knowledge of songs across same-language speaking rather than same-gender individuals. Furthermore, similar to children, adults did not systematically generalize liking of songs across either category. Thus, despite having more selective preferences or acquiring knowledge through various sources in addition to social communications, adults also selectively generalize knowledge of songs across same-language speaking individuals and they are equally likely to generalize preferences across gender and language.

General Discussion

The present research explored children's and adults' attributions of shared cultural knowledge and shared preference based on the categories of gender and language. These attributes habitually co-occur and are indicative of similarity among individuals, but knowledge can be a more exclusive marker of cultural boundaries, because it is primarily conveyed through social interactions within cultures, whereas preferences can have various sources. Even though children and adults might differ in how they acquire knowledge and preferences, examination of their inferences of shared song knowledge and shared song preference revealed remarkable parallels in the two groups' generalizations across language and gender categories. Both adults and children generalized knowledge of songs across individuals who speak the same language rather than same gender individuals. In contrast, both groups generalized preference for songs equally across the two categories.

These findings contribute to a growing body of evidence revealing early emerging competencies in social group understanding by showing that, starting in childhood, social category-based generalizations of abstract properties such as cultural knowledge and preference are selective and both children and adults attribute shared cultural knowledge primarily to speakers of the same language. Previous research also showed an early emerging link between culture and language individuals speak, focusing on conventional norms and actions (Liberman et al., 2018; Oláh et al., 2014; Weatherhead et al., 2016). While songs, similar to norms, represent a form of cultural invention, they also differ from norms in important ways. Societal norms are associated with different behavioral outcomes and are essential in promoting cooperation among group members (Fehr & Fischbacher, 2004; Henrich & Henrich, 2007). Even though such critical outcomes are not necessarily expected as a result of acquiring knowledge of songs, because songs have also been learned through cultural transmission throughout history, humans might have developed a bias to associate such idiosyncratic forms of knowledge with cultural groups from early on.

These findings might also have implications for research on shared preferences. At first sight, the results might seem to contrast previous research on shared preferences, because several studies suggest a link between social group membership and preferences both in childhood and also in adulthood (e.g., Birnbaum et al., 2010; Diesendruck & HaLevi, 2006; North & Hargreaves, 1999; Plötner et al., 2016; Rentfrow et al., 2009). The current findings might suggest, however, that preference-based social inferences might arise in part because preference implies both knowledge and liking and they imply that preferences are complex and arise due to various reasons, whereas knowledge simply needs to be acquired. This interpretation is also in line

with previous research showing that knowledge and preference are distinguished by children and adults when making affiliative inferences and social choices (Kalish, 2012; Soley & Spelke, 2016; Vélez et al., 2016).

While there was no systematic generalization of preferences over gender or language, because current studies used a forced-choice paradigm, we cannot conclude that individuals did not use either category to attribute preferences. It is possible that for attributions of preferences, both language and gender are used, but one is not more privileged than the other. Many studies suggest that preschool children use gender information to predict individuals' preferences for toys, activities, and games (e.g., Bauer & Coyne, 1997; Diesendruck & HaLevi, 2006; Leinbach, Hort, & Fagot, 1997; Martin & Little, 1990). In line with these findings, in the current studies, even though individuals did not systematically use gender to predict others' music preferences, they based their generalizations on gender more when generalizing preference than when generalizing knowledge. The lack of a systematic preference for gender might reflect the more gender-neutral nature of music compared to games and toys, or it might also be indicative of preferences, particularly preferences for music, being closely related to individual characteristics such as people's personalities (e.g., Rentfrow & Gosling, 2003). Thus, individuals might infer that social category membership is not informative about music preferences, but perhaps other factors, such as their personalities are (e.g., Diesendruck & HaLevi, 2006; Kalish & Lawson, 2008). Nevertheless, these results leave open the possibilities that children's and adults' attributions of song preference might be driven by their inferences that preferences are individual-specific or that they are more widely-shared compared to knowledge.

In the current studies, shared knowledge and shared preference conditions were carefully matched to rule out a number of possibilities regarding the interpretation of the findings. The songs were not specified, in an attempt to avoid introducing different cues regarding who would like or know such songs. As an example, a particular unfamiliar song could nevertheless be liked by children, and this would have elicited different inferences about who would know or like it. Therefore, we only stated that "a song" was played to the targets. Introducing the songs this way, we expected that the assumptions children (and adults) made about the songs, would apply similarly to knowledge and preference conditions. Still, song knowledge might have different indications, such as being able to recognize a song as a result of previous exposure, as well as knowing its notation and/or its lyrics so that one can play or sing that song, and some of these assumptions (e.g., knowing the lyrics of a song) might lead to a stronger association between song knowledge and language compared to song preference and language. While we cannot conclude regarding what specific assumptions underlie participants' choices in the current studies, previous research demonstrating differences in social inferences and preferences based on shared knowledge and preference, using instrumental music or using other stimuli such as movies (Soley & Spelke, 2016; Vélez et al., 2016), suggests that the current findings may not be specific to songs with lyrics or even to music. Another factor that could have influenced children's inferences might be that, because maternal singing is a cross-culturally prevalent behavior, songs can be more strongly associated with females than males (Trehub, Unyk, & Trainor, 1993). If this was the case, however, children should have associated song knowledge and preference similarly with females, or perhaps, females should have been expected to know more songs than males. However, if such assumptions were made, children would not be expected to choose same-language speaking individuals as the target in the knowledge condition, as this would mean choosing males for half of the trials. Furthermore, the parallel between adults' and children's choices suggest that the effects are unlikely to be driven by children's associations of songs and their female caregivers.

It might also be important to note that while we did not measure whether the gender and language differences were similarly salient to the participants, the results are unlikely to be explained by such differences. Previous studies using photos similar to those used in the current studies depicting children's heads and shoulders, or using short sound clips contrasting different languages reported social preferences based on gender, and language (e.g., Kinzler et al., 2007; Shutts et al., 2013), suggesting that children have no difficulty distinguishing targets' genders based on similar photos, or distinguishing targets' languages based on similar sound clips. In the current studies, because the photos were available at all times, while the languages had to be remembered, particularly when participants were asked the test question, targets' genders might have been somewhat more salient than their languages. Nevertheless, the current findings cannot be explained by this, because the participants

privileged language over gender in their choices, and they did selectively so, only in the shared knowledge condition.

The current results raise interesting questions for future research. While music might be an important part of culture, cultural groups also share other knowledge such as particular traditions, rituals or folk tales. Inferences about different forms of cultural knowledge are likely to lead to similar generalizations. On the other hand, different kinds of knowledge that are not defined by cultural boundaries, should not elicit similar social inferences. For instance, previous research suggests that 4- to 7-year-old children expect generic knowledge to be more widely shared compared to nongeneric knowledge (Cimpian & Scott, 2012). Thus, knowledge of generic facts might be expected to be generalized across speakers of the same language to a lesser degree than knowledge of songs. Relatedly, while in the current studies, children and adults prioritized language over gender for inferences of shared knowledge, our results do not warrant the conclusion that the category of gender, on its own, would not be used to infer shared knowledge. Different social groups might license different kinds of knowledge to be shared among its members. Consequently, it is important for future research to determine the specificity of cues to group boundaries and the developmental course of selective social inferences based on shared knowledge.

Another question arising from the current findings is whether and how children update their social category representations and the inferences they make based on social categories, as they are exposed to different social environments. For instance, even though children and adults in our sample indicated their native language as Turkish, all participants were exposed to another language (English) on a regular basis. Investigating the effects of exposure to different languages on children's and adults' social inferences based on language would allow us to see whether there would be any differences among children (and adults) who are true monolinguals (i.e., only exposed to one language), or those who grew up as bilinguals. One possibility is that language-based group membership inferences would be amplified in samples, where individuals, particularly children, are not familiar with any languages other than their native language.

Previous research suggests that differences in languages are mapped onto differences in various categories such as race, ethnicity, nationality or social class, both by adults and also by children (e.g., Hirschfeld & Gelman, 1997; Kinzler & DeJesus, 2013; Labov, 2006). Accordingly, in this study, participants could have made similar inferences and assume that speakers of a different language are from these different groups. While, for the purposes of this study, we did not distinguish between these possibilities, future studies might explore this as well. Specifically, it would be interesting to see, for instance, how children would generalize cultural knowledge and preference, contrasting language and race, because even though these two categories might be related, previous research also points to possible differences in their usefulness as cues to cultural groups (e.g., Kinzler et al., 2009; Kurzban et al., 2001; Pietraszewski & Schwartz, 2014b). Such investigations may help us better understand the underlying mechanisms of early social choices based on various social categories and broaden our understanding of children's representations of the social world and how these representations change with development.

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