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Young Children From Three Diverse Cultures Spontaneously and Consistently Prepare for Alternative Future Possibilities

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This study examined future-oriented behavior in children (3–6 years; $N = 193$) from three diverse societies—one industrialized Western city and two small, geographically isolated communities. Children had the opportunity to prepare for two alternative versions of an immediate future event over six trials. Some 3-year-olds from all cultures demonstrated competence, and a majority of the oldest children from each culture prepared for both future possibilities on every trial. Although there were some cultural differences in the youngest age groups that approached ceiling performance, the overall results indicate that children across these communities become able to prepare for alternative futures during early childhood. This acquisition period is therefore not contingent on Western upbringing, and may instead indicate normal cognitive maturation.

The capacity to imagine and prepare for specific future events, or *episodic foresight*, has often been placed at the centre of humans' ascendancy over the planet (e.g., Ambrose, 2010; Buckner & Carroll, 2007; Schacter, Addis, & Buckner, 2007; Suddendorf & Corballis, 2007). Being able to reflect on various upcoming possibilities and actively shape the future to their own desire may have enabled our ancestors to survive and thrive in a wide range of hostile and uncertain environments (Suddendorf, 2013), and this faculty continues to provide substantial benefits in modern life. Developmental psychologists have shown an increasing interest in foresight in recent years, with an abundance of studies documenting the ontogeny of children's future-oriented language skills and behavioral capacities (for reviews, see Atance, 2015; Hudson, Mayhew, & Prabhakar, 2011; McCormack & Atance, 2011; Suddendorf, 2017; Suddendorf & Redshaw, 2013). Studies have principally focused on young children, with major performance shifts often occurring between 3 and 5 years. This overall pattern of results could be taken to indicate that typically developing children acquire a basic capacity for foresight during these years as a part of normal human cognitive maturation.

One glaring oversight in this field, however, is that the vast majority of studies have focused on children growing up in so-called WEIRD (Western, Educated, Industrialized, Rich, and Democratic) societies (cf. Henrich, Heine, & Norenzayan, 2010). And while a handful of studies have examined non-WEIRD children (e.g., Naito & Suzuki, 2011; Wang, Capous, Koh, & Hou, 2014), no published studies so far have directly compared children from

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WEIRD and non-WEIRD cultural groups on the same future-oriented behavioral task. In many domains, children from WEIRD societies represent a very limited slice of humanity as a whole, as their developing brains are exposed to various cultural phenomena that are acutely novel on the scale of human history and yet still unshared with many contemporary societies (see Nielsen & Haun, 2016; Nielsen, Haun, Kärtner, & Legare, 2017). Such phenomena may profoundly influence how these children represent and behave in the world, and thus it may be inappropriate to use their performances on future-oriented tasks alone to make claims about the universal development of foresight. Elaborate child-directed parental narratives about future events, for example, are pervasive in WEIRD cultures (Hudson, 2001, 2002, 2006), and might be expected to greatly accelerate the development of future-oriented behavior in these children (see Fivush, Haden, & Reese, 2006; for a review of similar effects on memory development). Early exposure to Westernized preschooling might also be expected to influence children's foresight along with more general cognitive changes (cf. Duncan, 2003; Peisner-Feinberg et al., 2001).

On the other hand, given the central importance of foresight to human success across the planet, there are reasons to expect broadly similar developments in children's future-oriented cognition and behavioral capacities across both WEIRD and non-WEIRD cultural groups. Indeed, like other critical human traits, such as language (Kuhl, 2004) and imitation (Nielsen & Tomaselli, 2010), one might predict there to be a relatively fixed maturation period during which these capacities are acquired by children irrespective of their cultural environment. This is not to necessarily say there would be no cultural influences at play, as children may require at least some exposure to future-oriented language and concepts in order for this normal period of emergence to manifest. Given that future tense and/or other future-oriented markers appear to be universal across languages (Bittner, 2005; Comrie, 1985; Malotki, 1983), however, one might not expect much variation between children from WEIRD and non-WEIRD cultures on this basis alone.

One fundamental component of foresight that has received attention in the developmental literature is the capacity to imagine and prepare for multiple, even mutually exclusive future possibilities. Given that the future is often uncertain, it can be prudent to "hedge one's bets" to ensure that one will end up acquiring benefits no matter how an undetermined event transpires. Beck, Robinson, Carroll, and Apperly (2006) were the first to investigate the development of this basic capacity, utilizing a paradigm where a toy mouse could fall down one of two slides in an unpredictable fashion. When children (from a WEIRD society) were asked to place cotton wool at the bottom of the slides to protect the mouse, few 4-year-olds and just over half of 5-year-olds placed wool at the bottom of *both* slides, thus ensuring the safety of the mouse. Robinson, Rowley, Beck, Carroll, and Apperly (2006) found a similar pattern of results in a conceptually similar but structurally distinct task, where children (from the same WEIRD society) had to place containers at the bottom of two chutes to ensure they would catch a falling block.

Inspired by these early paradigms, Redshaw and Suddendorf (2016) developed a minimalist, largely nonverbal task that could be used with even very young children (and nonhuman primates). In their "forked tube" paradigm, the experimenter dropped a desirable item into an inverted Y-shaped tube with two possible exits, with a hidden internal mechanism forcing the item to exit from either side in a pseudorandom order. Two- to 4-year-old children from Brisbane, Australia (a WEIRD group), were initially shown six demonstration trials, before being given the opportunity to catch the item over several trials. Although 2-year-olds (and nonhuman great apes) typically covered only one exit when preparing to catch the item, some 3-year-olds and most 4-year-olds spontaneously and consistently covered both exits from the first trial onwards. These results indicate that children from at least one WEIRD society generally acquire the basic capacity to prepare for mutually exclusive future possibilities around 3–4 years of age, much earlier than the older studies suggested (also see Beck, 2017; Suddendorf, Crimston, & Redshaw, 2017). What remains unclear, however, is whether this acquisition period generalizes beyond WEIRD societies, or if it is an expression of peculiar cultural traits. The forked tube task may be particularly valuable for answering this question, as its minimalist and largely nonverbal design means that differences in children's performance are unlikely to be related to cultural variations in understanding the structure and contingencies of the task itself. Moreover, the use of several trials allows one to distinguish between response patterns suggestive of insight, such as where a child passes consistently after initially covering two exits, or incomplete comprehension, such as where a child regresses to covering only one exit after first covering two (see Redshaw & Suddendorf, 2016).

This Study

In this study, we administered the forked tube task to 3- to 6-year-old children from three diverse cultural groups in local settings. Of these three groups, one was a WEIRD society (Brisbane, Australia; a partial replication and extension of the original study), whereas the other two were geographically isolated communities that have connections with but are not directly influenced by Western culture (Indigenous Australians and South African Bushmen; see Author Note for information pertaining to our use of the term "Bushmen"). Although studies on parent–child talk about the future in these two groups are unfortunately lacking, all of their everyday languages use auxiliary verbs (e.g., equivalent to *will*, *shall*, or *am going to* in English) or other grammatical particles to indicate future reference (Angelo & Schultze-Berndt, 2016; Vossen, 2012). If the Brisbane children were to perform significantly and substantially better than the other groups across ages, then this might suggest that the emergence of the capacity to prepare for alternative futures is subject to WEIRD cultural influences. If, on the other hand, competence were to emerge in early childhood across all three cultures, then this would suggest that Redshaw and Suddendorf's (2016) findings generalize beyond WEIRD societies and may even indicate a relatively fixed acquisition period that manifests as a part of normal cognitive maturation.

Method

Participants

As is customary in cross-cultural research, all children in the rural communities who wanted to participate were tested. This resulted in uneven participant numbers (96 Bushmen and 33 Indigenous Australians), and so we decided to collect an intermediate number of participants in Brisbane (64). Across groups, children's ages were recorded as a single whole number between 3 and 6 years, as we did not have access to the Bushman children's dates of birth and we did not wish to bias the analyses by only entering precise ages for the other two groups. Few Indigenous Australian 6-year-olds were available to participate, and so we decided to restrict this sample to children aged three to five. Participant demographics are summarized in Table 1, and detailed descriptions of each culture are produced in Supporting Information. Data were collected between September 2014 and December 2016.

Table 1
Participant Demographics Across the Three Cultural Groups Tested

Participant group	Brisbane	Indigenous Australian	South African Bushman
3-year-olds (*m*, *f*)	16 (8, 8)	8 (6, 2)	25 (16, 9)
4-year-olds (*m*, *f*)	16 (8, 8)	16 (9, 7)	22 (10, 12)
5-year-olds (*m*, *f*)	16 (8, 8)	9 (5, 4)	24 (13, 11)
6-year-olds (*m*, *f*)	16 (8, 8)	—	25 (9, 16)
Total (*m*, *f*)	64 (32, 32)	33 (20, 13)	96 (48, 48)

Children participated one at a time in local settings. All Brisbane children were tested in a secluded area of a local science museum that they were attending with a parent or guardian either on the weekend or during school holidays. Indigenous Australian children were tested either inside or just outside of day-care crèches (mostly 3-year-olds), preschool classrooms (mostly 4- and 5-year-olds), or public school classrooms (some 5-year-olds) on days they were attending these facilities. Bushman children were tested either inside or just outside of day-care crèches (all 3- to 5-year-olds) or public school classrooms (all 6-year-olds). Structured learning from qualified educational practitioners is customary in Australian preschools and schools such as those in Brisbane and the Indigenous communities, which children typically enroll in from around age 4 (Australian Bureau of Statistics, 2017). Formal, Westernized education is also available in the public schools attended by the 6-year-old Bushman participants. Attendance levels at these schools are variable, although we sampled the children on a normal school day and no students arrived specifically to be tested. The day-care crèches where we tested the younger Bushman children, however, have limited educational and staffing resources available, with formal lessons uncommon. Attendance levels are typically low, and many children arrived late in the day specifically to be tested (see Supporting Information for extra details; and for more information on these communities and their schooling practices, see Nielsen, Mushin, Tomaselli, & Whiten, 2014).

Materials

The forked tube apparatus was the same as that used in the original study (Redshaw & Suddendorf, 2016). The experimenter could drop a ball into a single opening at the top of the tube and surreptitiously control which of two bottom exits it would fall from. Children could ensure they would catch the ball by simply covering both exits with one hand each. The "single tube," which was used only in the practice phase, consisted of a simple straight pipe with one opening at the top and one exit at the bottom. Children placed caught balls into a small bucket beside them, whereas missed balls fell into a large container where children were not permitted to retrieve them (see Supporting Information for further details on testing materials; and see Figure 1 for a representative depiction of the testing setting across each of the three groups).

Procedure

Testing Procedure

The experimenter asked children to place their hands behind their back and watch (and also demonstrated this), before dropping three balls consecutively into the single tube–with the balls falling into the large container in front of the children. The experimenter then told the children that they could try to catch the balls, before demonstrating how to do so by placing a hand directly over the single tube exit. Children were told they were to place any caught balls into the small bucket beside them, and the experimenter again dropped balls into the single tube until the child had caught three consecutively (nearly always on the first three attempts).

The experimenter then introduced the children to the forked tube, before again asking the children to place their hands behind their back and watch. The experimenter dropped six balls into the tube, with the balls exiting in the following pseudorandom order: *right*, *left*, *left*, *right*, *left*, *right* (from the experimenter's perspective). Again, the experimenter told the children that they could try to catch the balls and place them into the bucket, and that this time if they caught lots of balls they would be rewarded with stickers. The experimenter told the children that they could do whatever they wanted when trying to catch the balls, without mentioning the opportunity to cover both exits. The experimenter then began the six test trials, with the balls exiting the tube in the following pseudorandom order: *right*, *left*, *left*, *right*, *left*, *right* (from the experimenter's perspective). If the experimenter mistakenly deviated from this sequence, subsequent trials were adjusted to retain the overall distribution of the ball emerging from each exit 50% of the time. Some children received six further trials, but others did not because of time constraints on testing. We therefore analyzed children's performance on only the first six trials in order to make statistical comparisons more interpretable. All children were rewarded with stickers at the end of the experiment.

Delivery of Verbal Instructions

Verbal instructions to the Brisbane children were delivered in English by the experimenter (first author). Instructions to the Indigenous Australian children were delivered by one of two experimenters (third or fourth author). Although many of the Indigenous Australian children speak a local vernacular termed "Kriol" in everyday life (Mushin, 2010), they are instructed in English at their crèches, preschools, and schools, and are able to comprehend English. In line with previous research (e.g.,

Figure 1. Representative testing settings across the three cultural groups, showing the task from different angles. All (a) Brisbane children were tested inside a local museum, whereas (b) Indigenous Australian children were tested either inside or just outside daycare crèches or preschool classrooms, and (c) Bushman children were tested either inside or just outside day-care crèches or public school classrooms. The large container varied across groups due to differing availability of materials. All three example children are demonstrating the correct response of covering two exits.

Neldner, Mushin, & Nielsen, 2017; Nielsen et al., 2014), therefore, instructions were also delivered to these children in English. Instructions to the Bushman children were initially delivered in English by the experimenter (first author) and subsequently translated for these non-English speaking participants by a local community member.

Coding

Children were considered to pass a trial if they were at least partially covering two exits (with one hand each) as the ball fell. Children did not necessarily have to catch the ball to pass, as rarely a ball would bounce off their hand and fall away even when they were covering both exits. Children who covered a single exit (or, very rarely, no exits) were considered to fail that trial. Additionally, following Redshaw and Suddendorf (2016), children were classified into one of four categories based on their response patterns across the six trials: (a) those who covered two exits on the first trial and all subsequent trials, (b) those who failed to cover two exits on the first trial, but did cover two exits at some stage and maintained that response across all subsequent trials, (c) those who covered two exits on at least one trial (first or otherwise) but regressed to covering only one exit on at least one subsequent trial, and (d) those who failed to cover two exits on any trial. Performance was video recorded and later scored by the experimenter who tested the children, and 25% of the data from each sample were also scored by a second coder. Reliability was excellent, with 97.9% agreement between coders (282 out of 288 double-coded trials).

Results

First Trial Performance

Children's responses on the first trial were examined with a series of binomial generalized estimating equations (GEE) analyses nested within the full factorial model of Culture (Brisbane vs. Indigenous Australian vs. Bushman) × Age (linear variable ranging from 3 to 6 years) × Sex (male vs. female). See Supporting Information for comprehensive details of model selection procedures.

The best performing model contained significant main effects of Age, $\chi^2(1) = 22.55$, $p < .001$, and Culture, $\chi^2(2) = 11.84$, $p = .003$, but no effect of Sex and no interactions. Older children were more likely to cover two exits on the first trial than younger children, $b = 0.70$, $SE = .16$. Following up the Culture effect (and applying a Bonferroni adjustment for three comparisons) revealed that, across ages, Brisbane children were significantly more likely to cover two exits on the first trial than Bushman children, $\chi^2(1) = 10.26$, $b = 1.86$, $SE = .37$, adjusted $p = .004$. There were no significant differences in performance, however, between the Brisbane and Indigenous Australian children, $\chi^2(1) = 0.51$, $b = 0.33$, $SE = .47$, adjusted $p > .999$, or between the Indigenous Australian and Bushman children, $\chi^2(1) = 3.86$, $b = 0.85$, $SE = .44$, adjusted $p = .148$.

Trial-By-Trial Performance

Children's responses across all six trials (see Figure 2) were examined with a series of binomial GEE analyses nested within the full factorial model of Culture (Brisbane vs. Indigenous Australian vs. Bushman) × Age (linear variable ranging from 3 to 6 years) × Sex (male vs. female) × Trial (linear variable ranging from 1 to 6). See Supporting Information for comprehensive details of model selection procedures.

The best performing model contained significant main effects of Age, $\chi^2(1) = 27.64$, $p < .001$, Trial, $\chi^2(1) = 22.51$, $p < .001$, and Culture, $\chi^2(2) = 14.79$, $p = .001$, but no effect of Sex and no interactions. Older children were more likely to cover two exits on any given trial than younger children, $b = 0.74$, $SE = .13$, and children across ages were more likely to cover two exits on later trials than earlier trials, $b = 0.17$, $SE = .03$. Following up the Culture effect (and applying a Bonferroni adjustment for three comparisons) revealed that, across ages, Brisbane children were significantly more likely to cover two exits on any given trial than Bushman children, $\chi^2(1) = 13.62$, $b = 1.17$, $SE = .32$, adjusted $p = .001$. Again, there were no significant differences in performance between the Brisbane and Indigenous Australian children, $\chi^2(1) = 0.89$, $b = 0.38$, $SE = .40$, adjusted $p > .999$, or between the Indigenous Australian and Bushman children, $\chi^2(1) = 4.47$, $b = 0.79$, $SE = .38$, adjusted $p = .103$. Comprehensive summaries of the proportion of trials passed as a function of age and culture are reproduced in Supporting Information (see Table S5).

Post-Hoc Comparison of Brisbane and Bushman Children Across Age Groups

Although the best performing model did not contain a Culture × Age interaction, the descriptive statistics from the Brisbane and Bushman children

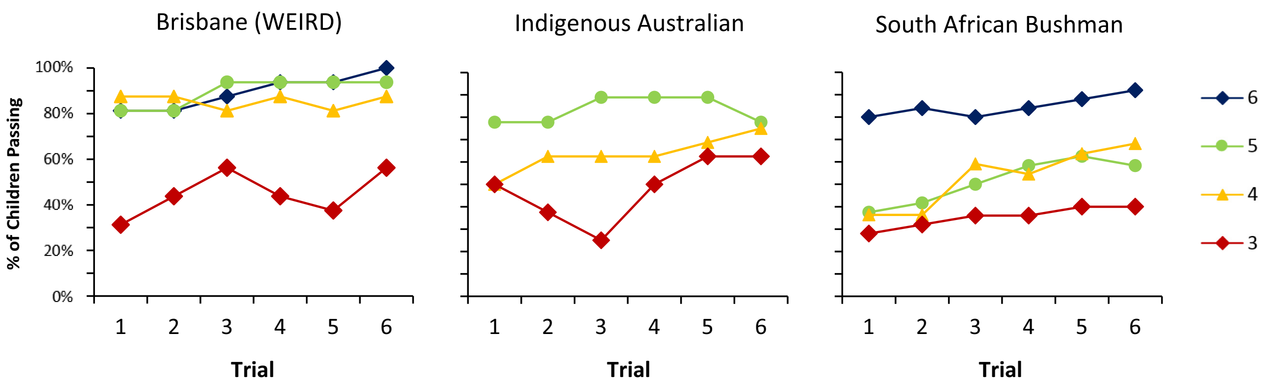

Figure 2. Percentage of children (across cultures and age groups) who covered two exits on the forked tube task over all six trials.

suggested a more complicated story. As is evident in Figure 2, there appeared to be little cross-cultural variation between the 3-year-olds (who performed at a moderate level) and the 6-year-olds (who performed close to ceiling) from these groups. Thus, the Culture main effect appeared to be driven largely by cross-cultural differences between the 4- and 5-year-olds. In order to systematically explore the nuances of this unexpected pattern of variation, we first checked for curvilinear age-based differences between the Brisbane and Bushman children. We did this by creating a dummy variable where 3- and 6-year-olds were coded as 0 and 4- and 5-year-olds were coded as 1, such that 4- and 5-year-olds represented the top of the curvilinear function. The best fitting GEE model contained a significant interaction between this dummy variable and Culture, $\chi^2(1) = 6.85$, $p = .009$, indicating that the performance differences between these cultures were indeed curvilinear with age and greater among 4- and 5-year-olds than among 3- and 6-year-olds. We then conducted four series of post-hoc GEE analyses checking for statistical differences between the Brisbane and Bushman children across each of the age groups tested. The four best performing models suggested that there were indeed performance differences between the 4- and 5-year-olds from these two cultures, but not the 3- and 6-year-olds (see Table 2 for summary).

Response Patterns Across Trials

Children's categorized response patterns across all six trials are summarized in Figure 3. Inspecting this figure shows that, across all three cultures there were some 3-year-olds who either covered two exits on every trial (see blue bars) or failed the first trial but spontaneously covered two exits at some stage and sustained that response thereafter (see green bars). The majority of 3-year-olds from all three groups passed at least one trial (see all nonred bars). Across cultures, at least half of the 4- and 5-year-olds showed one of the two most optimal response patterns (see blue and green bars), and very few children older than 4 regressed to covering only one exit after initially passing (see yellow bars). The majority of Brisbane children passed all trials from 4 years onwards (replicating Redshaw & Suddendorf, 2016), whereas this performance level was not achieved until 5 years in the Indigenous Australian children and 6 years in the Bushman children (see blue bars).

Discussion

This study provided the first cross-cultural investigation of children's performance on a future-oriented behavioral task. In a sample of 3- to 6-year-old children from one WEIRD society and two non-WEIRD societies, we found that at least half of the 3-year-olds in each group spontaneously prepared for two mutually exclusive versions of an immediate future event on at least one trial. Whereas some of these younger children regressed to covering only one exit after passing, other 3-year-olds from each culture passed consistently, which indicates they possessed insight into the contingencies of the task. This level of performance was superior to the floor performance evinced by 2-year-old WEIRD children in the original study (Redshaw & Suddendorf, 2016), suggesting that initial signs of the capacity may appear in all three groups at similar ages. Although there was some cultural variation in the youngest ages that participants approached ceiling performance, our results

Table 2
Summary of Post-Hoc Generalized Estimating Equations Analyses of Age-Based Cross-Cultural Performance Differences

Age group	QIC value for null model	QIC value for cultural difference	Conclusion
3-year-olds	336.73	341.57	No evidence for cultural difference, $\chi^2(1) = .63$, $p = .426$[a]
4-year-olds	297.99	279.13	Brisbane > Bushman, $\chi^2(1) = 7.34$, $p = .007$
5-year-olds	314.20	276.75	Brisbane > Bushman, $\chi^2(1) = 9.22$, $p = .002$
6-year-olds	200.65	205.55	No evidence for cultural difference, $\chi^2(1) = .40$, $p = .527$[a]

Note. Models were selected on the basis of lowest Quasi-Information Criterion (QIC) value (see Pan, 2001). Sex and trial effects were not considered in these analyses, as there was no suggestion that these effects varied across cultures.
[a]These null results come from the models including the culture effect, which were not selected as the final models for 3- and 6-year-olds.

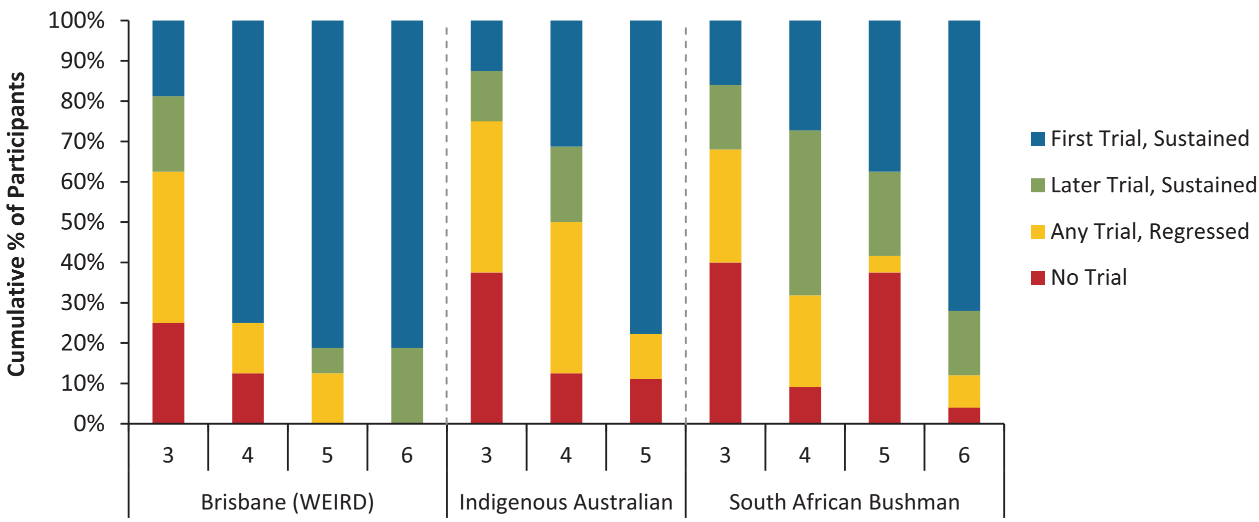

Figure 3. Cumulative percentages of children's response patterns across ages and cultural groups. Blue bars indicate children who covered two exits on every trial. Green bars indicate children who failed the first trial, but eventually covered two exits and sustained that response across all subsequent trials. Yellow bars indicate children who covered two exits at least once but regressed to covering a single exit on at least one subsequent trial. Red bars indicate children who failed all trials.

suggest that children across all three societies typically become able to imagine and prepare for alternative future possibilities during the first 6 years of life. The acquisition of this capacity in early childhood, therefore, is not specific to WEIRD cultural upbringing, and may even indicate normal cognitive maturation.

Although the consistent age-related improvement seen across all three cultures is likely related to developments in the capacity to consider alternative futures, it may also be partly explained by more general early childhood developments in inhibitory control and task shifting (see Garon, Bryson, & Smith, 2008, for a review). Indeed, one critical requirement of passing the forked tube task is to inhibit the prepotent response of covering only one exit (learned during the practice phase) and instead switch to covering two exits (Redshaw & Suddendorf, 2016). Children's significant improvement across the six test trials could be attributed in part to overcoming these demands with increasing experience of the task. Nevertheless, the fact that this trial effect did not interact with the culture effect suggests that inhibitory demands, even if applicable, were not differentially related to performance in WEIRD and non-WEIRD children. We did not include measures of inhibitory control and task switching in this initial study, as we wanted to keep linguistic and other superfluous task demands to a minimum for the benefit of both the non-WEIRD children and their translators. Future cross-cultural research, however, may wish to include such measures, given the central role of executive factors in overcoming a tendency to focus on the present and instead acting for the future (Suddendorf & Corballis, 2007).

The Brisbane children performed significantly better overall than the Bushman children, but closer inspection of the data showed that this effect applied only to 4- and 5-year-olds, and not 3- and 6-year-olds. We can only speculate as to the reasons for this unexpected pattern, but one possibility involves cross-cultural variations in the childcare that children of these ages receive. In Brisbane, the large majority of children begin structured learning around age four when they enroll in preschool (Australian Bureau of Statistics, 2017). In the crèches where we tested the 3- to 5-year-old Bushman participants, however, attendance levels were typically low and limited educational and staffing resources were available (see Method and Supporting Information). Given that the quality of preschool classroom practices has been found to modulate children's early cognitive development (Duncan, 2003; Peisner-Feinberg et al., 2001), one might infer that the 4- and 5-year-old Brisbane children received a performance boost due to their increased education levels. In other words, these children may have performed at a level beyond what would be expected during human cognitive maturation in the absence of modern, Westernized schooling and associated parenting practices. The Bushman children, on the other hand, may not have received such a performance boost until they began attending public school aged six. Alternatively, public schooling may have provided these children with the requisite confidence and skills to interact with strange adults and demonstrate previously latent competence on novel tasks such as ours. Note, however, that the Bushman children's performance was improving with age even before they turned six, and so they likely would have approached ceiling around this age or just after even without the benefits of schooling.

Whatever the reasons for the difference, the data suggest that similar proportions of Brisbane and Bushman children show signs of competence on the forked tube task before either group has begun formal education at age three, and by the time they are six a large majority of children from both cultures are competent. There was no significant evidence that the Indigenous Australian children—who also begin formal learning around age four in local preschools—performed any differently from the Brisbane children across the age groups tested, although given the relatively small sample size of the Indigenous group we caution against concluding there are indeed no population differences.

To summarize, although certain elements of WEIRD societies such as formal preschooling may modulate children's performance on the forked tube task, the overall pattern of acquisition during early childhood may be relatively fixed. And like other capacities that appear to universally develop during this period (see Kuhl, 2004; Nielsen & Tomaselli, 2010), the faculty to imagine and prepare for alternative future events may represent a critical adaptation that gives humans a decisive advantage over other animals. Indeed, this capacity may have been essential to the emergence of complex novel planning practices in our ancestors, such as hedging bets by preparing for multiple possible contingencies of various future events (Hoerl & McCormack, 2018; Redshaw, 2014), or mentally comparing and adjusting several possible courses of action before deciding on a final plan (Ambrose, 2010; Baumeister, Maranges, & Sjåstad, in press; Suddendorf & Corballis, 2007). Initial results suggest that our extant great ape relatives may not be able to consistently pass the forked tube task or related tasks (Redshaw & Suddendorf, 2016; Suddendorf et al., 2017; Tecwyn, Thorpe, & Chappell, 2013), implying that the capacity may have evolved in a relatively recent common human ancestor after the split from the chimpanzee lineage. Nonetheless, it is important to point out that here we only have data from children living in one WEIRD society and two non-WEIRD societies. Replications with children from other groups would increase our confidence that the capacity does indeed have a relatively fixed early childhood ontogeny.

Even if typically developing children do universally become able to prepare for alternative futures during early childhood, it does not necessarily follow that the capacity would inevitably develop during this period in the complete absence of cultural influences. Rather, as suggested in the introduction, it may be that exposure to certain factors apparently common to *all* cultures, such as future-oriented language markers (Bittner, 2005; Comrie, 1985; Malotki, 1983), is a necessary prerequisite for early childhood acquisition. One way to potentially shed light on this issue would be to administer the forked tube task to deaf children whose hearing parents are not fluent in sign language. Indeed, these children are typically delayed in exposure to and acquisition of language tense (Grimshaw, Adelstein, Bryden, & MacKinnon, 1998; Meier, 1991). If early exposure to future-oriented language markers is in fact critical to development, then one might predict these children to perform relatively poorly on the forked tube task, just as they do on theory of mind tasks (see Peterson & Siegel, 1995).

On a related note, it must be acknowledged that here we have only traced the cross-cultural development of one (albeit critical) component of foresight. Indeed, as has been found in studies of theory of mind development (e.g., Shahaeian, Peterson, Slaughter, & Wellman, 2011; Wellman, Fang, Liu, Zhu, & Liu, 2006), there may still be robust cultural variations in the steps that children acquire diverse instantiations of the capacity. To this end, future research may wish to investigate the cross-cultural development of other future-oriented behaviors, such as tool acquisition and subsequent use (see Suddendorf, Nielsen, & Von Gehlen, 2011), acting for future desire states (see Atance & Meltzoff, 2006), intertemporal choice (see Bulley & Pepper, 2017; Metcalf & Atance, 2011; Mischel, Shoda, & Rodriguez, 1989), deliberate practice (see Brinums, Imuta, & Suddendorf, 2017), external reminder setting (see Redshaw, Vandersee, Bulley, & Gilbert, 2018), and affective forecasting (see Gautam, Bulley, von Hippel, & Suddendorf, 2017).

An interesting secondary finding from our study was the absence of any evidence for sex differences in children's performance. While it is always difficult to draw conclusions from null results, the fact that we failed to detect an effect in our reasonably large sample is consistent with the view that there are minimal differences, if any, between young boys' and girls' basic capacity to imagine and prepare for alternative future possibilities. If so, then the capacity may represent a part of normal cognitive maturation that is not only relatively independent of cultural background, but also relatively independent of biological sex. This does not necessarily mean that boys and girls (or men and women) will deploy the capacity equally effectively in all domains, but it may suggest that the fundamental mechanisms underlying the ability emerge around the same age in both sexes.

In conclusion, we have provided initial evidence to suggest that boys and girls from both WEIRD and non-WEIRD societies typically become able to imagine and prepare for alternative future possibilities during the early childhood years. This early ontogeny is therefore not contingent on cultural factors specific to WEIRD societies, and may even indicate a universally human acquisition period.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Supplementary Methods and Results