



# Seeing what other people see: accessible cultural mindset affects perspective-taking

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## Abstract

People can think about themselves as both separate and distinct from others (an individualistic mindset) and as connected and related to others (a collectivistic mindset) though societies differ in the frequency that each mindset is cued in everyday life. We predicted that an activated collectivistic mindset bolsters perspective-taking compared to an activated individualistic mindset for tasks requiring 2- and 3-dimensional mental rotation. We tested our prediction in four studies ( $n = 910$ ) with German participants. We used an autobiographical recall task (Studies 1 and 2) and a pronoun-circling task (Studies 3 and 4). The recall task was to look at a photograph of children playing alone and think about a time one had worked alone (individualistic mindset) or to look at a photograph of children playing together and think about a time that one worked together with others (collectivistic mindset). The pronoun-circling task entailed reading a different narrative paragraph before each dependent measure and circling the first person singular (individualistic mindset) or plural (collectivistic mindset) pronouns in the text. Brief cultural mindset priming was sufficient to change perspective-taking (performance on a 3-buildings variant of the classic 3-mountains task). Our results support our prediction that accessible collectivistic mindset improves momentary ability to perspective-take—see things from another’s perspective. Effects are small but consistent and specific. Self-reported social sensitivity, self-reported perspective-taking skill, and empathy are not affected across studies. Neither, consistently, is performance on an “R” mental-rotation task.

**Keywords** Perspective-taking · Cultural mindset · Individualism · Collectivism · Priming

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## Introduction

Imagine that you are supervising student teachers. To facilitate active peer-to-peer learning, you recommend that teachers have their students sit in 4-desk clusters facing one-another rather than in rows facing the teacher. You observe classrooms and find that at some points during the day, all teachers need to explain a task or show their students something. Some teachers seem to automatically intuit what this requires adjustment—they either move around the classroom so all students see them or they ask students to rotate in their chairs. Other teachers seem not to notice that students with their back facing them see something different than they do. You wonder if teaching may be easier for teachers who adjust for rather than ignore the visual perspective of their students. In fact, the teaching literature suggests that teachers who more often engage perspective-taking are more effective as teachers (e.g., Hyun and Marshall 1997; O’Keefe and Johnston 1989) in part because accurately reading their students’ cues allows them to adjust their interactions (Hunt 1976). Indeed, some researchers have argued that spatial reasoning is connected to empathic perspective-taking (Duan et al. 2008) and social skill (Shelton et al. 2012). We pursue this question in the current studies; focusing on the possibility that compared with an individualistic mindset, an accessible collectivistic mindset can boost spatial perspective-taking—seeing things from another’s perspective when an other’s visual perspective is to be taken. As our opening example implies, the ability to take the visual perspective of others, to see what they see, might be pragmatically useful for people pursuing teaching degrees. Hence, we focus primarily on student teachers, asking if small cues can improve their spatial perspective-taking and if this effect is unique to visual perspective taking when an other’s visual perspective is to be taken or if it carries over to better spatial ability when no other is implied (for example in a letter “R” mental rotation task) and to belief in one’s own social skill.

## Perspective-taking

Cognitive-developmental frameworks including Piagetian theory (Piaget 1972) and theory of mind (e.g., Baron-Cohen et al. 1985; Wimmer and Perner 1983) conceptualize perspective-taking as part of human culture. That is, the ability to recognize the mental states of others, having a ‘theory of mind’ is assumed to be vital across cultural groups (Wellman 1988). Each of these frameworks assumes normal development, anchoring, and adjustment of self to others (e.g., Epley et al. 2004). By adulthood, having the capacity to perspective-take is taken for granted; some degree of decentering becomes automatic (e.g., Piaget 1926; Surtees and Apperly 2012). While the idea that people do perspective-take is generally accepted, what people actually do when they perspective-take is a continued topic of research (e.g., simulation theories, Chambers and Davis 2012). For example, to perspective-take people can mentally rotate an object to imagine it from another perspective or they can mentally move away from themselves to gain another’s perspective (Hegarty and Waller 2004).

## Sensitivity to common ground

One way to think about perspective-taking is that it facilitates people's ability to consider the "common ground" in social interchange. The common ground, following Gricean logic of communication, entails the ways in which communication partners take into account the intent of the questioner and the responses of the respondent (Schwarz 2015). At any point in time, perspective-taking performance varies in part because a mindset to do so is not always activated (Epley and Caruso 2008). Contextual cues can shift sensitivity to perspectives other than one's own. For example, Duran and Dale (2011) randomized participants to be "requesters" who made requests and "workers" who fulfilled them and found that simply being in the requester role tended to reduce egocentricity in spatial instructions.

Similarly, the cross-cultural literature on cultural mindsets suggests that small contextual cues can shift whether people make sense of their experiences using an individualistic or collectivistic mindset and that these cultural mindsets matter for sensitivity to common ground – a component of perspective-taking (for reviews, see Oyserman 2017; Oyserman et al. 2002). For example in a series of experiments participants were asked two seemingly redundant questions: "How happy are you with your life?" "How satisfied are you with your life?" (Haberstroh et al. 2002). In this case, paying attention to the common ground would imply that the questioner likely means something different in the two questions, otherwise why would the questioner ask twice. Compared to Germans, Chinese participants were more likely to notice and adjust to this possible redundancy by providing unique information when the two questions appeared on the same questionnaire. In contrast, German participants were insensitive to this cue unless they had been primed with a collectivistic mindset.

The priming task entailed reading a paragraph and circling the first-person plural (*we, our, us*) pronouns it contained. This simple task activated a mental procedure—focus on the common ground—that carried over to the subsequent questions. German participants who were not primed with collectivistic cultural mindset gave the same answer twice (Haberstroh et al. 2002). German participants who were primed with collectivistic cultural mindset looked like Chinese participants they were sensitive to the common ground. Indeed, Colzato et al. (2012) used the same pronoun circling task to show that Dutch participants were better at a social coordination task (pressing colored buttons with a partner in a version of a Simon task) after circling first person plural (*we, our, us*) pronouns. Similarly, Miyamoto and Wilken (2010) found that Americans were better able to recall the relative length of a line in a framed-line task, if they had just been assigned to the role of a matcher, following another's lead rather than as leader. These studies suggest higher sensitivity to the common ground can translate to better performance on social coordination tasks and that cultural mindset priming can change momentary access to a collectivistic or an individualistic perspective (Oyserman 2017).

Some research even shows that activated individualistic or collectivistic mindset may influence the kinds of spatial judgment biases people are prone to (Krishna et al. 2008). However, a number of gaps remain based on prior research. We do not yet know, if an accessible cultural mindset affects performance on 3-dimensional

perspective-taking and 2-dimensional mental rotation tasks and, if it affects people's beliefs about their social skill and empathy (for a meta-analytic review, see Oyserman and Lee 2008a, b). Some studies suggest that people with more spatial perspective-taking skill describe themselves as more socially skilled (e.g., Shelton et al. 2012) and better at perspective-taking (e.g., Erle and Topolinski 2015). For example, Shelton and colleagues (2012) found that engineering students who are better at accurately figuring out whose perspective is being taken in photographs showing angle of vision of figures surrounding three buildings are also less likely to self-report social skill deficits on an autism symptoms checklist. Erle and Topolinski (2017) found that people who attempt to see what a target person sees adopt the thoughts ascribed to this person and report more similarity or sympathy with this person. These studies imply that social perspective-taking, spatial abilities, and social sensitivity or empathy might have common roots. At the same time, cross-culturally, spatial reasoning and social sensitivity do not go hand in hand. Classic formulations of the interplay between culture and cognition suggest that collectivism is associated with both more socially sensitive and more context-dependent processing (Markus and Kitayama 1991; Markus and Oyserman 1989). The implication is that interconnected ways of experiencing the self are associated with more social sensitivity but less ability to mental rotate objects (more field dependence).

Indeed, the cultural and cross-cultural research does not provide information as to how differences in sensitivity to the conversational common ground translate into the kind of perspective-taking with which we opened this paper—the ability of a teacher to take the visual perspective of another. The cross-cultural literature on the effects of collectivism on perspective-taking and spatial abilities shows mixed effects. Some comparative findings support the prediction that collectivistic mindset matters; thus, Wu and Keysar (2007) found differences between Chinese and American participants on a visual perspective-taking task and attributed differences to cultural mindset. However, other cross-cultural comparisons of performance on mental rotation (Li and O'Boyle 2011) and spatial reasoning (Knauff and Ragni 2011) tasks are inconclusive, showing both significant and null effects. Similarly, though there is some neural evidence that priming a collectivistic mindset prepares people to take another's perspective (Wang et al. 2013), neural evidence for the relationship between culture and empathic response is complex and subtle (e.g., de Greck et al. 2012). What is missing is more direct evidence that activated cultural mindset affects perspective-taking skill on 3-dimensional perspective-taking tasks and, in turn, carry over to mental rotation tasks or to self-reported social sensitivity and empathy. In the current studies, we test the prediction that activating a collectivistic mindset improves perspective-taking, and we explore whether collectivistic mindset also affects mental rotation performance and self-report of social sensitivity, social skill, and empathy.

## Current studies

We conducted our studies in Germany, using the standard back-translation process for materials not already available in German. In each study, we randomized participants to cultural mindset (individualistic, collectivistic) condition. Our prime

was an autobiographic memory cue (see Fig. 1) in Studies 1 and 2 and the already described commonly used pronoun-circling task in Studies 3 and 4 (for review of cultural mindset priming, see Oyserman and Lee 2008a, b). We started with a single cultural mindset prime before the first dependent variable (3-buildings task) in Studies 1 and 2. This allowed us to test if activating cultural mindset affects visual perspective-taking on a task with an implied agent or other whose perspective was to be taken (3-buildings task) and if this carries over to affect other, potentially related, abilities and self-reports. In Studies 3 and 4, we provided a cultural mindset prime prior to each dependent variable. This allowed us to test whether accessible cultural mindset affected perspective-taking on the 3-buildings task, and on the R-mental-rotation task in which no agent or target’s perspective is implied, and self-report of perspective-taking and empathy scales. Study 4 is a preregistered (<https://aspredicted.org/>, AsPredicted#: 14387) replication of the first two tasks in Study 3.

In the sections below, we provide the method we used to determine final sample size as well as all measures, manipulations, and exclusions. In no case did we continue collection after data analysis.

### Planned sample size and power analyses

Our focus was on people pursuing a degree in education. Little psychological research exists on people pursuing a degree in education or teachers generally in part because schools of education do not have research participation requirements (subject pool) and volunteer pools are too small for research. Hence, to obtain a large enough sample size in Study 1, we collected data from 14 different German

Löst es zusammen!



Große Dinge entstehen, wenn Teams zusammenarbeiten.  
Nimm dir eine Minute Zeit und denke an eine Zeit, in der Zusammenarbeit geholfen hat!

Schreibe ein Beispiel deiner Gedanken in das leere Feld!

Löse es selbst!



Große Dinge entstehen, wenn Menschen allein arbeiten.  
Nimm dir eine Minute Zeit und denke an eine Zeit, in der Alleinarbeit geholfen hat!

Schreibe ein Beispiel deiner Gedanken in das leere Feld!

**Fig. 1** Priming a collectivistic mindset regarding teaching by the picture at left. Tagline was “Working together!” and the caption “Great things can happen when people work together. Take a moment to relive a time that working together mattered. Then write keywords below so that you can fix that experience in your mind!” Priming an individualistic mindset regarding teaching by the picture at right. Tagline was “Working alone!” and the caption “Great things can happen when people work alone. Take a moment to relive a time that working alone mattered. Then write keywords below so that you can fix that experience in your mind!”

teacher-education programs at universities located across Germany. In Studies 2, 3 and 4, we collected data from three different cohorts of a single German university without sample overlaps.

In their meta-analysis of 67 cultural mindset priming studies, Oyserman and Lee (2008a, p. 319) described a range of small-to-moderate effect sizes (Cohen's  $d_{\min}=0.30$ ,  $d_{\max}=0.60$ ) and a mean weighted effect of  $d=0.34$ . We chose our sample size based on power analyses (within the R environment: `pwr.anova.test`,  $k=2$ ,  $d=0.25$ ,  $p=.05$ ,  $\text{power}=.80$ , Champely 2015, and by G\*Power, Faul et al. 2007) using pretest results and the prior research showing the effect of accessible cultural mindset on performance on cognitive tasks (e.g., Oyserman and Lee 2008a) and moderate effect of training on change in processing of spatial information (e.g., Hedge's  $g=0.47$ , Uttal et al. 2013, p. 352). Our power analysis suggested a total sample of  $n=128$  participants ( $n=64$  individualistic mindset condition,  $n=64$  collectivistic mindset condition). We doubled the target number of participants due to experience from two pilot studies in which participants failed the manipulation check or omitted responses.

Prior to Study 3, we recalculated the likely effect size and hence required sample size by examining our obtained effect in the 3-buildings task (Study 1:  $d=0.25$ , Study 2:  $d=0.37$ ) and used  $d=0.37$  to recalculate our target sample size (`pwr.anova.test`,  $k=2$ ,  $d=0.37$ ,  $p=.05$ ,  $\text{power}=.80$ , Champely 2015, and G\*Power, Faul et al. 2007). This analysis suggested a total sample of at least  $n=60$  participants ( $n=30$  individualistic mindset condition,  $n=30$  collectivistic mindset condition). We again doubled the target number of participants due to experience from Study 1 in that participants failed the manipulation check or omitted responses.

Prior to Study 4, we again recalculated by examining our obtained effect of primed cultural mindset on the 3-buildings task (Study 1:  $d=0.25$ , Study 2:  $d=0.37$ , Study 3:  $d=0.20$ ) and used  $d=0.20$  to recalculate the power analysis (`pwr.anova.test`,  $k=2$ ,  $d=0.20$ ,  $p=.05$ ,  $\text{power}=.80$ , Champely 2015, and G\*Power, Faul et al. 2007). These analyses suggested a total sample of at least  $n=200$  participants ( $n=100$  individualistic mindset condition,  $n=100$  collectivistic mindset condition).

## Sample

Table 1 provides demographic information. In Study 1 (14 German universities  $N=384$ ) and Study 2 (one other German university  $N=209$ ), we recruited undergraduates majoring in education as volunteers, providing tips on teaching as compensation. In Study 3 ( $N=477$ ) we recruited undergraduates from another cohort from the same university as in Study 2 who volunteered for insights into examples of research procedures. In Study 3, students were education ( $n=216$ ) and psychology ( $n=120$ ) majors; the few other majors ( $n=9$ ) were not included in analyses examining effects of major given their small number. In Study 4, ( $N=305$ ) we recruited education undergraduates from another cohort from the same university as in Studies 2 and 3. Participants were not in subject pool but volunteered for insights into examples of research procedures. Some volunteers (Study 1  $n=98$ , Study 2

**Table 1** Participant characteristics by study

Study	Sample size		Demographics			GPA		Education major	
	( <i>N</i> )	Completed manipulation check ( <i>n</i> )	Completed demographics ( <i>n</i> )	Age <i>M</i> ( <i>SD</i> )	Female (%)	Native German speaker (%)	<i>M</i> ( <i>SD</i> )	STEM (%)	Languages (%)
1	384	213	157	24 (3.64)	81	57	2.26 (0.53)	12.2	32.2
2	209	111	111	24 (4.73)	65	95	2.09 (0.55)	42.5	20
3	477	315	307	22 (3.74)	80	94	1.96 (0.54)	32.7	28.3
4	353	271	266	23 (2.74)	64	82	2.08 (0.51)	31.1	33.8

*n* for analyses is lower due to participants who dropped out before the manipulation check or typed letter or number strings instead of responding to manipulation in Studies 1 and 2, as detailed in the text. Study 1 includes students from 14 universities; Study 2, Study 3, and Study 4 include undergraduates from different cohorts at a single university. Demographic information is provided with sample size (*n*) because participants sometimes skipped this information, perhaps to preserve anonymity. Native Speaker = German native speaker. GPA = academic grade point average; 1 = High achievement, 4 = Low achievement

$n=88$ , Study 3  $n=132$ , Study 4  $n=48$ ) opened the study link but did not proceed to the manipulation and were excluded.

In studies 1 and 2, our manipulation check was that participants wrote something—we dropped those who wrote nothing or something irrelevant to the question such as a string of letters (e.g., “abc”). Online Resources 1 and 2 provide full lists of responses. In Studies 3 and 4 our manipulation check was the number of pronouns participants clicked on, we dropped participants from analyses when they clicked fewer than half of relevant pronouns—following Grossmann and Jowhari (2018) who replicated Kühnen and Oyserman (2002) using this criterion. The number of manipulation check failures were: Study 1  $n=73$ , Study 2  $n=10$ , Study 3  $n=21$  first manipulation check, Study 3  $n=10$  second manipulation check,  $n=28$  third manipulation check,  $n=36$  fourth manipulation check, and Study 4  $n=34$  first manipulation check,  $n=64$  second manipulation check.

Our final samples for analyses (Study 1  $n=213$ , Study 2  $n=111$ , Study 3  $n=315$ , Study 4  $n=271$ ) in Studies 1, 3, and 4 were sufficient given our power analysis targets. Note that our final sample for Study 2 ( $n=111$ ) was lower than the planned  $n=128$ . We ran a sensitivity analysis using G\*Power ( $n=111$ ,  $p=.05$ , power = .80; Faul et al. 2007) that yielded  $d=.27$  as the minimal effect size detectable at this power and sample size in a 2-condition design.

## Procedure

### Recruitment

In Studies 1 and 2, we used university-intranet platforms and closed teacher education groups on Facebook to invite participants in a study about seeing what other people see, following up with a second call 2 weeks after the initial offer. We offered tips for classroom-based perspective-taking as compensation. In Studies 3 and 4, the first author provided a brief overview of research methods in two educational-psychology lectures and solicited participation afterwards.

### General set up

We tailored our perspective-taking tasks to fit the necessity of doing on-line studies given lack of lab space and physical distance: volunteers clicked a URL. The first screen explained the anonymous and volunteer nature of the study and instructed participants who agreed to participate to click to continue on the task. This click to continue resulted in randomization to individualistic or collectivistic mindset condition.

### Mindset prime

In Studies 1 and 2, we used autobiographical recall to prime cultural mindset (see Fig. 1). In the individualistic mindset condition, participants saw a photograph of a child in a classroom setting working alone with linked tagline (“Working alone!”)



and text (“Great things can happen when people work alone. Take a moment to relive a time that working alone mattered.”). In the collectivistic mindset condition, participants saw a photograph of five children working together in a classroom setting with linked tagline (“Working together!”) and text (“Great things can happen when people work together. Take a moment to relive a time that working together mattered. Then write keywords below so that you can fix that experience in your mind!”, see Online Resources 1 and 2 for full lists of keywords). The survey ended with demographics (gender, racial-ethnic heritage, age) questions that many participants chose not to answer.

In Studies 3 and 4, we used pronouns to cue mindset (see Fig. 2). Participants were instructed to read a passage and click on all of the first-person pronouns that they saw. They were randomized to see either a paragraph with first-person singular (in German *ich, mir, mich*) or first person plural (in German *wir, uns, unsere*). The content of the paragraphs was city sightseeing, restaurant, beach, and sunrise (a German translation taken from Oyserman et al. 2009).

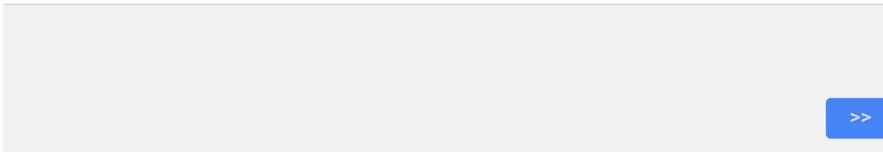
## Dependent measures

We provide the full set of instructions and the items we used for each scale on Online Resource 4 (German) and Online Resource 5 (English translation for the current report). After the priming tasks, tasks were presented in the following order: first, our critical dependent measure task, the 3-building task (a variant of the classic Piagetian 3-mountains task developed by Shelton et al. 2012), second, the R-mental rotation task (Cooper and Shepard 1973), and third, self-report skill measures. The self-report measures were presented in the following order (Study 1): self-reported perspective-taking and empathy (Davis 1980), self-reported social skill (Baron-Cohen et al. 2001), perspective-taking self-efficacy (adapted from Tschannen-Moran and Woolfolk Hoy 2001), and social shifting (adapted from McHugh 2015). The battery was long and perhaps for this reason, participants quit or skipped scales (*ns* per task per condition are presented in Table 2) so in Study 2, we dropped one (self-reported perspective-taking self-efficacy, see Online Resource 6). This helped but we still lost a quarter before the final task (74.7% completed). Hence in Study 3, we shortened the protocol again (see Online Resource 7). This allowed us to replicate with our full sample the null effects found on self-reports in Studies 1 and 2. This convinced us that priming does not affect self-reported skill. Hence, in our preregistered experiment (Study 4) we focused only the effect of activated cultural mindset on our perspective-taking (3-buildings task) and mental rotation (Letter “R” mental-rotation task) tasks.

## 3-Buildings task

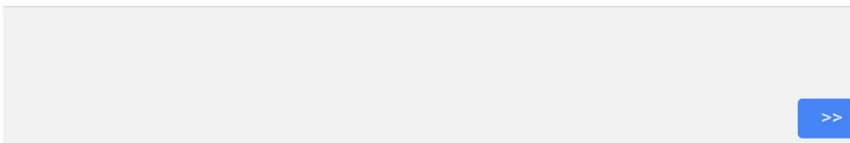
Following Shelton and colleagues (2012), we built buildings from Lego bricks and placed seven differently colored wooden targets around three buildings on a round platform at 45° intervals and took photographs of each of the vantage points. Like Shelton and colleagues the wooden targets varied so that for one building the targets were blocks, for another building the targets were animals, and for the other building

Vor dem Beginn: Es ist nützlich, den Kopf frei zu bekommen. Lies dafür bitte den Absatz auf der nächsten Seite und klicke auf alle singulären (ich, mir, meine) oder plural (wir, unsere, uns) PRONOMEN, die du im im Absatz siehst.



**Ich** gehe oft in die Stadt. Mich erfüllt Vorfreude, wenn **ich** die Wolkenkratzer sehe. **Ich** entdecke jede Ecke, keine Attraktion kann **mir** entkommen. **Meine** Stimme füllt Luft und Straße. Ich besichtige alle Sehenswürdigkeiten, betrachte Schaufenster, und überall, wo ich hingehge, sehe **ich** Reflexionen von **mir** im Glas von hundert Fenstern auf mich zurückblicken. Bei Einbruch der Nacht verweile **ich**, meine Zeit in der Stadt ist fast vorbei. Wenn **ich** schließlich gehen muss, gehe ich mit dem Wissen, dass ich bald zurückkehren werde. Die Stadt gehört mir.

Vor dem Beginn: Es ist nützlich, den Kopf frei zu bekommen. Lies dafür bitte den Absatz auf der nächsten Seite und klicke auf alle singulären (ich, mir, meine) oder plural (wir, unsere, uns) PRONOMEN, die du im im Absatz siehst.



**Wir** gehen oft in die Stadt. **Uns** erfüllt Vorfreude, wenn **wir** die Wolkenkratzer sehen können. **Wir** entdecken jede Ecke, keine Attraktion kann uns entkommen. **Unser** Stimmen füllen Luft und Straße. Wir besichtigen alle Sehenswürdigkeiten, betrachten Schaufenster, und überall, wo wir hingehen, sehen wir unsere Reflexionen im Glas von hundert Fenstern auf uns zurückblicken. Bei Einbruch der Nacht verweilen wir, unsere Zeit in der Stadt ist fast vorbei. Wenn wir schließlich gehen müssen, gehen wir mit dem Wissen, dass wir bald zurückkehren werden. Die Stadt gehört uns.

**Fig. 2** Example of the primes used in Study 3, for guiding to use a collectivistic mindset above and an individualistic mindset below (see also Online Resource 7)

**Table 2** Effect of cultural mindset condition on accuracy in the visual-spatial perspective-taking (3-buildings task) task

Study number	Sample size ( <i>n</i> ) by condition		Mean (SD) performance (% accurate) by condition	
	Individualistic	Collectivistic	Individualistic	Collectivistic
1	106	107	45% (33%)	53% (31%)
2	56	55	60% (24%)	68% (19%)
3	157	158	75% (24%)	78% (19%)
4	138	133	70% (39%)	75% (32%)

the targets were dolls. We showed participants their own view of each building (straight on at 0°) and then a second photograph taken from the perspective of one of the seven wooden targets (or 0° again) and asked participants whose perspective they saw.

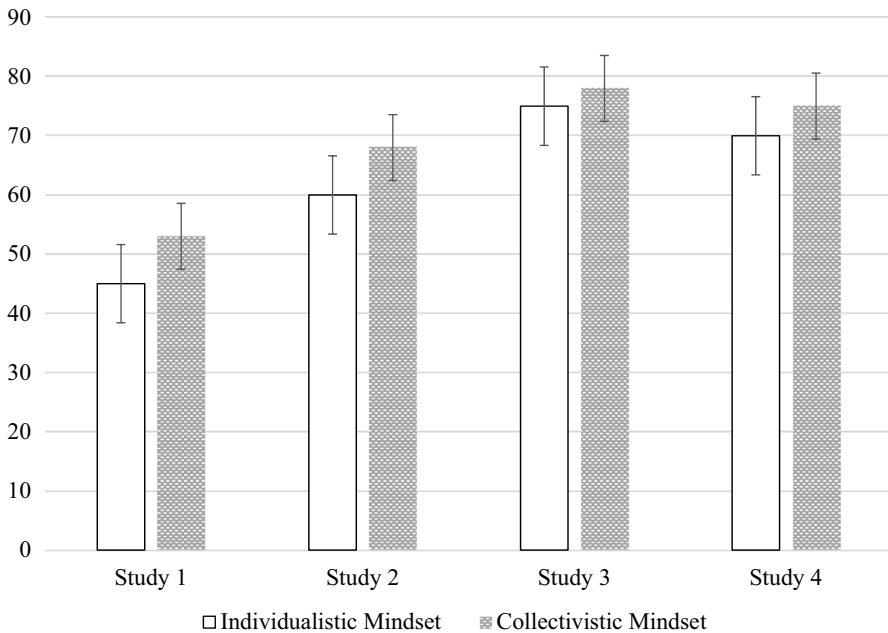
In Study 1, we followed Shelton et al. (2012) and used color to mark the seven targets and gave participants a single practice trial before proceeding. Feedback suggested problems: Color was sometimes difficult to see, responding by color was unduly confusing, and the fully on-line task was hard and needed more practice to clarify it. Hence in Study 2, we made three revisions: We put targets on numbered pedestals, we used these numbers to mark the seven targets, and we added five practice trials. Specifically, one's own perspective was straight on 0° (*me*), the red (#1) target was placed at 45°, the orange (#2) target at 90°, the yellow (#3) target at 135°, the green (#4) target at 180°, the blue (#5) target at 225°, the (#6) purple target at 270° and the pink (#7) target at 315°. Online Resource 3 shows the two variants of the 3-buildings task we used.

Participants completed the task three times. In Studies 1 and 2, we used three original Shelton et al. (2012) target variation (blocks, animal toys, dolls), eight trials each. However, the doll trials had high error rates and did not consistently scale (Study 1  $\alpha = .75$ , Study 2  $\alpha = .30$ ). Hence, we dropped these trials from analyses, taking the mean of the animal and block trials to obtain acceptably reliable perspective-taking scores: Study 1  $\alpha = .94$ , Study 2  $\alpha = .70$ . Given the repeated failure to obtain a reliable measure of perspective-taking with the doll target trials and no ability given the on-line nature of the experiment, to know why, we dropped these targets in Studies 3 and 4, again obtaining adequate reliability for the block and animal toy trials (Study 3  $\alpha = .70$ , Study 4  $\alpha = .88$ ), all computed within the R environment, (R Development Core Team 2009). Order of trial presentation was randomized, each position was presented once, and time to respond was limited to 15 s. Performance was mean accuracy of responses (each correct response was coded '1', each missing or incorrect response was coded '0', following the suggestion of Lee and Ying (2015) for coding this kind of data.

## Results

### Collectivistic mindset facilitates 3-dimensional perspective-taking

Accessible cultural mindset mattered for visual-spatial perspective-taking. People who were randomly assigned to the collectivistic mindset condition were more accurate in their taking the perspective of colored (Study 1) or numbered (Studies 2 to 4) blocks and toy animals to report which view of each of the three Lego buildings they saw. Results are displayed graphically in Fig. 3, summarized in Table 2, and detailed next. In Study 1, people who were randomly assigned to take a moment to relive a time that working together mattered ( $M = 53\%$ ,  $SD = 31\%$ ) were more accurate at figuring out which block or animal toy's perspective on each Lego building they saw than people who were randomly assigned to take a moment that working alone mattered ( $M = 45\%$ ,  $SD = 33\%$ ,  $F(1, 211) = 3.23$ ,  $p = .07$ , 95% CI  $[-.17, .01]$ ,



**Fig. 3** Effect of priming condition on 3-buildings accuracy (whisker bars show 95% confidence intervals calculated as confidence coefficient  $\times$  standard error, that is  $0.95/2 \times$  standard deviation/root from sample size)

$\eta_p^2 = .02$ ,  $d = 0.25$ ). We replicated this effect in Study 2, collectivistic mindset condition  $M = 68\%$ ,  $SD = 19\%$ , individualistic mindset condition  $M = 60\%$ ,  $SD = 24\%$ ,  $F(1, 109) = 4.23$ ,  $p = .04$ , 95% CI  $[-.16, -.03]$ ,  $\eta_p^2 = .04$ ,  $d = 0.37$ . We found the same small-sized effect using our alternative cultural mindset-priming task, circling pronouns in a paragraph. Thus, in Study 3, people who were randomly assigned to circle ‘we’, ‘our’, ‘us’ in a paragraph (collectivistic mindset condition  $M = 78\%$ ,  $SD = 19\%$ ) were more accurate at figuring out which block or animal toy’s perspective they saw than people who were randomly assigned to circle ‘I’, ‘me’, ‘my’ in a paragraph (individualistic mindset condition  $M = 75\%$ ,  $SD = 24\%$ ),  $F(1, 313) = 4.227$ ,  $p = .04$ , 95% CI  $[-.07, -.002]$ ,  $\eta_p^2 = .01$ ,  $d = 0.20$ . We replicated this effect in our preregistered Study 4 ( $M_{\text{collectivistic}} = 75\%$ ,  $SD = 32\%$ ,  $M_{\text{individualistic}} = 70\%$ ,  $SD = 39\%$ ,  $F(1, 229) = 4.11$ ,  $p = .044$ , 95% CI  $[-.09, -.001]$ ,  $\eta_p^2 = .02$ ,  $d = 0.27$ ), which also used the pronoun-circling task to prime collectivistic mindset.

### Collectivistic mindset effects are specific

We tested the possibility that salient collectivistic mindset, whether activated by considering a time working together mattered or by circling ‘we’, ‘our’, or ‘us’ in a narrative, affected perspective-taking whether reporting which figure saw each perspective on the Lego buildings or ability to rotate a letter R to report which rotation

was feasible. We found that performance on the two tasks was distinct. We clearly found that activated collectivistic mindset improved perspective-taking on a task in which an agent's perspective was to be taken. In contrast, the effect of activated collectivistic mindset on perspective-taking on a task in which an agent's perspective was not implied (the letter R mental-rotation task) was weaker. Taken as a whole, as detailed next, we did not find sufficient evidence to conclude that activated collectivistic mindset significantly improved performance on this non-social spatial task.

First, performance on the social and nonsocial tasks is distinct. We found only a small significant ( $p < .05$ ) positive ( $r = .30$  Study 1,  $r = .21$  Study 3, and  $r = .26$  Study 4) correlation between the social visual-spatial perspective-taking and the nonsocial mentally rotating the letter R (detailed in Table 3) except in Study 2, in which the correlation was nonsignificant and negative,  $r = -.17$ . Second, performance on the R mental-rotation task was neither directly nor indirectly (via 3-building perspective-taking) affected by cultural mindset condition. These results are detailed in Table 4 (tested using the statistical package *lavaan*, Rosseel 2012; R Development Core Team 2009). Third, even when mindset activation immediately preceded the task, though the pattern was in the predicted direction, activated collectivistic mindset yielded a small but not consistently significant effect on performance on the R mental-rotation task. In Studies 3 and 4 we gave participants a second narrative paragraph with pronouns to reactivate cultural mindset immediately prior to doing the R mental-rotation tasks. People randomly assigned to the 'we' 'our' 'us'

**Table 3** Relationships among the dependent variables: Pearson's correlations by study

Study 1 above the diagonal, Study 2 below the diagonal							
Variable	1	2	3	4	5	6	7
1 3-Buildings accuracy	–	.30*	.09	0	–.04	.12	.14
2 R-mental rotation accuracy	–.17	–	.03	.07	0	.14	.13
3 Mean self-reported perspective-taking	–.01	.16	–	.33*	.35*	.33*	0
4 Mean self-reported empathy	–.04	.03	.53*	–	.29*	.33*	.01
5 Mean self-reported social skill	.09	.10	.67*	.58*	–	.46*	–.05
6 Mean perspective-taking self-efficacy	–	–	–	–	–	–	.12
7 Mean social shifting	.08	.11	.17	.23*	.20*	–	–
Study 3 above the diagonal, Study 4 below the diagonal							
Variable	1	2	3	4			
1 3-Buildings accuracy	–	.21*	.18*	.04			
2 R-mental rotation accuracy	.26*	–	–.12*	–.07			
3 Mean self-reported perspective-taking	–	–	–	.42*			
4 Mean self-reported empathy	–	–	–	–			

Presented in the order of presentation in each study. As detailed in the text, in each study we included fewer constructs to reduce burden and given null relationship with priming condition. "–" marks variables omitted. The figures in the 3-buildings task were identified by color in Study 1 and by numbers in Studies 2, 3, and 4

\* $p < .05$

**Table 4** Test of indirect effects of cultural mindset prime on R mental-rotation performance via 3-building performance

Model	Study 1			Study 2			Study 3			Study 4		
	$\beta$ (SE)	$\beta$ 95% CI	<i>p</i>	$\beta$ (SE)	$\beta$ 95% CI	<i>p</i>	$\beta$ (SE)	$\beta$ 95% CI	<i>p</i>	$\beta$ (SE)	$\beta$ 95% CI	<i>p</i>
c	.08 (.07)	-.06, .22	.28	-.07 (.09)	-.26, .12	.49	-.04 (.06)	-.14, .07	.51	-.02 (.07)	-.15, .11	.72
c <sup>1</sup>	–	–	–	–	–	–	.14 (.05)	.04, .25	.006	.072 (.07)	-.06, .20	.28
b	.50 (.09)	.32, .68	<.01	-.16 (.09)	-.33, .02	.08	.23 (.07)	.09, .37	.001	.22 (.06)	.10, .34	<.001
a	.13 (.07)	-.01, .26	.07	.19 (.09)	.01, .37	.04	.11 (.05)	.0001, .21	.049	.13 (.07)	.01, .26	.040
ab	.06 (.04)	-.01, .13	.08	-.03 (.02)	-.07, .01	.18	.024 (.02)	-.01, .05	.11	.03 (.02)	-.003, .06	.08
Total Effect	.14 (.08)	-.01, .29	.07	-.10 (.09)	-.29, .09	.31	-.01 (.06)	-.12, .10	.84	.01 (.07)	-.13, .14	.93

c = mindset condition 1  $\rightarrow$  R mental-rotation accuracy, c<sup>1</sup> = mindset condition 2  $\rightarrow$  R mental-rotation accuracy (obtained only in Studies 3 and 4), b = 3-buildings accuracy  $\rightarrow$  R mental-rotation accuracy, a = mindset condition  $\rightarrow$  3-buildings accuracy, ab = indirect effect mediation analysis by saturated structural equations using weighted least squares estimation and bootstrapping

pronouns scored higher (Study 3  $M=94\%$ ,  $SD=12\%$ , Study 4  $M=94\%$ ,  $SD=16\%$ ) than those randomly assigned to the ‘I’ ‘me’ ‘my’ pronouns ( $M=91\%$ ,  $SD=18\%$ ,  $M=91\%$ ,  $SD=18\%$ ). This difference was significant in Study 3,  $F(1, 324)=4.72$ ,  $p=.03$ , 95% CI  $[-.06, -.003]$ ,  $\eta_p^2=.02$ ,  $d=.22$ ), not in Study 4,  $F(1, 229)=1.19$ ,  $p=.28$ , 95% CI  $[-.06, .02]$ ,  $\eta_p^2=.01$ .

As also shown in Table 3, self-report of social skill and empathy measures were correlated with each other but not with actual performance on either the Lego (social visual-spatial perspective-taking) or the nonsocial R mental-rotation tasks. None of the self-report measures were affected by the priming condition,  $F_s < 1.0$ , suggesting that accessible collectivistic mindset does not enhance belief in one’s social skills or empathy.

## Discussion

Modern societies differ in whether an individualistic or a collectivistic mindset is chronically accessible but likely not in whether each of these mindsets can be brought to mind and we used this basic idea in the context of variability in perspective-taking skill. Perspective-taking is a valuable social skill that is critical to social interaction. We introduced its importance with the example of teachers varying in the likelihood that they notice the visual-spatial perspective of their students. We suggested that teachers who do not perspective-take may fail to appropriately orient themselves and their students to a common ground so that all can engage in each educational task, resulting in poor student performance, disengagement, and misbehavior since teacher’s lack of skill in orienting to students implies to students that their teacher does not see them as mattering.

In our four experiments, our participants were mostly people studying to become teachers and our task entailed the kind of 3-dimensional perspective-taking they will be called upon to make in their classrooms. We predicted and found that our participants were better at reporting who saw which view of three buildings after looking at a photograph of children playing together and thinking about a time that they worked together with others (collectivistic mindset). We replicated this boosting effect of collectivistic mindset when we had our participants read a narrative paragraph (e.g., about going to the city or to the beach) and highlighting the pronouns in the paragraph—if the pronouns were ‘we’ ‘our’ ‘us’ rather than ‘I’ ‘me’ and ‘my.’

We asked, if collectivistic mindset indirectly (Studies 1 and 2) or directly (Studies 3 and 4) affected performance on a 2-dimensional nonsocial spatial-ability task (mentally rotating the letter R), a task in which the perspective of an agent was not implied, as well as self-reported social skill, perspective-taking, and empathy. We did not find carryover effects on self-reports of social skill, perspective-taking, and empathy. Accessible collectivistic mindset consistently affected 3-dimensional perspective-taking when the perspective of a target other was to be taken. Effects on ability to mentally rotate the letter R in 2-dimensional space (with no implied social referent) were weaker and not consistently significant. Our results are important because they document that perspective-taking performance and decentering capacity can be momentary improved by cuing collectivistic cultural mindset which

seems to activate a focus on the possible common ground. The take-home for teachers is to consider themselves as joining with their students in ‘our’ classroom rather than to consider their students as being in ‘my’ classroom.

In Studies 1 and 2, participants completed a single cultural mindset-priming task and this produced a small-to-moderate sized effect on a 3-dimensional perspective-taking task and a non-significant carryover to the second task they worked on, an R-rotation task and no carryover effect on self-reported skills. Actual performance and self-reported social skill were not related to each other. In Studies 3 and 4, participants completed multiple cultural mindset-priming tasks, one prior to each task or measure so we ruled out the possibility that a cultural mindset effect would have been found, if the cultural mindset prime immediately preceded the mental rotation of the letter-R task and self-report social and empathic skill measures. We found no effect on self-reported skills, inconsistent effects on R-mental rotation and no correlation between actual and self-reported skill, perhaps because the priming task facilitated decentering rather than a belief in one’s distinctive skills.

Our findings move beyond prior research on the effects of cultural mindset on social sensitivity (e.g., Haberstroh et al. 2002), confidence in cognitive abilities (e.g., Lee et al. 2010) and actual cognitive abilities, whether assessed using neural response or performance (e.g., Han and Humphreys 2016; Oyserman and Lee 2008a, b; Wu and Keysar 2007). None of this prior research documented an effect of accessible cultural mindset on 3-dimensional perspective-taking skill.

We also document that effects do not necessarily translate to less context dependence, as shown in the equivocal findings for the letter “R” mental-rotation task. Indeed, a number of classic approaches to cultural psychology argue that cultures that accentuate a collectivistic, interdependent, related sense of self, should process information contextually, limiting capacity to pull apart and decenter (e.g., Markus and Kitayama 1991; Markus and Oyserman 1989). Supporting this claim, context-dependent processing is higher when collectivistic mindset is primed (Kühnen and Oyserman 2002), or participants are drawn from collectivistic societies (e.g., Kitayama et al. 2003). Our distinct results in 3-dimensional perspective-taking and the 2-dimensional letter “R” mental-rotation task suggest that our effects are specific to tasks experienced as entailing an other’s visual-spatial perspective.

Our results focus on visual spatial perspective-taking. We did not find effects on self-report of empathy, social skill, or perspective-taking. It is possible that self-reports are problematic because the questions themselves imply an individualistic perspective on what “I” can do. But it is also possible that any effect of cultural mindset on reading an other’s thoughts and emotions is inconsistent and unreliable, depending on other factors not cultural mindset itself. In support of this latter possibility, consider Vu et al. (2017) who examined perspective-taking in terms of accurate assessment of a target’s emotions and cognitions (theory of mind) among Dutch and Vietnamese. Though they hoped to look at between-country differences, but found that their results were too disparate for comparison, and within country, the authors found no relationship between endorsement of individualistic and collectivistic mindset and perspective-taking accuracy. Indeed, among Dutch



participants there was no relationship between primed cultural mindset and accuracy of assessing target's emotions or cognitions. Only among Vietnamese participants was any relationship found, but only for primed cultural mindset and accuracy in reading a target's emotions, not in reading their thoughts. Given the large number of comparisons made and the modest ( $n=72$ ) sample size for the Vietnamese sample, even this finding should be taken with caution.

Of course, like any study set, our set of studies has a number of limitations. First, our experiments all took place in Germany, an individualistic country with a rapidly increasing population from collectivistic cultures; future research in other countries is needed to test generalizability. Second, our participants were volunteers and dropped out of the self-report measure portion of our studies and so we could not test many measures simultaneously. Hence, follow-up studies are needed perhaps with paid participants and in another cultural context. That said, our perspective-taking results are consistent across studies using somewhat different measures of perspective-taking and differing priming tasks, so we believe that they are likely to be stable at least in the kinds of likely individualistic contexts we sampled. Our results show that in individualistic Germany, collectivistic mindsets can be primed with brief tasks including autobiographical recall and that primed collectivistic mindset influences perspective-taking when a social referent is implied. Results are important because they provide evidence that momentary cultural mindset matters to performance on tasks requiring perspective-taking even while not changing participants' self-reported empathic skill.

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## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All presented studies have been approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. All persons gave their informed consent prior to their inclusion in the study. Details that might disclose the identity of the subjects under study were omitted. The manuscript does not contain clinical studies or patient data.

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