



Selective Permeability and Situated Cognitive Harm in Multicultural Classrooms



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Abstract

This article examines multicultural classrooms through the selective permeability model, which posits that individuals encounter different action possibilities or affordances in the same setting. The goal is to illuminate how educational environments may support some students while disadvantaging others, thereby causing *situated cognitive harm*. The article proceeds in several parts. First, it explores selective permeability in relation to what Gibson describes as “positive” and “negative” affordances, articulating how these polarities can change depending on a person’s cultural background. Second, it integrates insights from cultural psychology, such as the influence of regional geography and city design on behavior-constraining cultural norms. These norms can productively funnel actions and learning. Yet when a student’s cultural norms clash with tacit classroom prescriptions, the situation can be analogous to arriving at a rink with rollerblades only to be placed on ice: the learner confronts action limiting negative affordances and undergoes situated cognitive harm. Third, the article presents qualitative and quantitative data that clarify how culture moderates what students find helpful or hindering. Notably, incongruent norms are not always detrimental; under certain circumstances, they can serve as a catalyst for growth.

Keywords Affordances · Cultural psychology · Education · Multiculturalism · Selective permeability · Situated cognitive harm

1 Introduction

A starting premise of this article is that cognition—any form of problem-solving driven by organisms—is not confined to the brain but extends into the body. Since bodies interact with the world, it too is involved, making cognition “situated.” For instance, mountains play a role in funneling monarch butterflies to migratory destinations, just as apps like Google Maps scaffold human wayfinding. While scholars usually focus on why situated cognition is *favorable* to agents, it may also be *harmful* (see Sterelny 2003; Aagaard 2021). Sometimes this translates into what Timms and Spurrett (2023) define as “hostile” situations, where beneficiaries inflict harm on victims, as when casino operators refine gambling platforms to increase addiction.

This article focuses on situated cognitive harm, using the concept of selective permeability to explicate how

educational settings injure some. In other words, failure may not reflect poor student aptitude as much as situated injustices. Examples are unjustified cultural biases or gendered practices embedded in classrooms that exclude certain cognitive styles. This usually implies winners and losers. Here, however, one can debate the extent to which those who come out ahead are causally involved in inflicting situated harm and benefiting from it, raising questions about whether the scenario meets Timms and Spurrett’s (2023) threshold for being “hostile.” Another question is whether misalignment between learning arenas and cognitive styles might at times resemble what Maria Montessori (1912) termed “non-fit,” growth-promoting challenges.

The concept of selective permeability builds on Gibson’s (1966, 1979) position that agents directly perceive a setting based on its action possibilities or “affordances.” Selective permeability suggests that even in a single locale, people do not encounter the same affordances because of their embodied situations, which can include culturally acquired habits or skills (Crippen 2022, 2024a). Gibson states that affordances offer benefits and harms, as when a river is either safely navigable or dangerously flooded,

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and he accordingly equates them to values. Along similar lines, individual places can be selectively threatening to some, and so may correspondingly constrain action—as in urban areas, where women suffer more sexual harassment than men. The literature to date primarily applies selective permeability to cities and architecture. But the framework has other applications. These range from selective hostility in digital spaces to the idea that some cultures create mental illnesses by treating alternative ways of being as disorders. As will be shown, the framework also applies to learning situations that can favor some by impeding others.

A key consideration is the intersection between culture and situated cognitive harm in learning venues. However, in studying how curricula, technologies, teaching styles, student interactions and physical setups combine to selectively impede the learning of some, the suggestion is not that certain cultures are inferior. The concern, rather, is about teaching arenas that favor certain cultural backgrounds at the expense of others, paralleling “disabilities” that arise because of selectively unaccommodating settings, as opposed to problems “in” students. Thus, without commenting on shared learning objectives, forcing students to pursue the same goal by the same means in multicultural venues virtually guarantees situated inequality. The scenario is akin to requiring people without arms to steer with their hands, excluding those who can pass driving tests by controlling vehicles with their feet (Crippen and Lindemann 2024).

The argument proceeds first by exploring selective permeability and its link to affordance theory, and then draws on cultural psychology to explain regional differences in thought, behavior and perception, focusing primarily on East Asians and Westerners. Cultural psychologies entail various behavioral constraints, referred to as “normative,” “social” or “world” grammars. “Grammars” are here resemble what psychologists have called “scaffolds,” defined as social-physical arrangements that limit—and thereby guide—thinking and behavior, and thus support cognitive performance (Wood et al. 1976). Although grammars often orient people productively, they can also create obstacles as formidable as walls, thus approaching Gibson’s (1979) “negative affordances,” which threaten harm and severely limit actions. The role that city design and natural geography have in scaffolding cultural factionalism will later be offered as an analogue to the selectively harmful grammars that appear in educational environments. The scenario does not meet the earlier mentioned threshold for hostility if one group of students does not prosper by actively harming another. Still, if an education system favors, say, Western learning styles at the expense of others, then the *practical effects* get close to what Timms and Spurrett’s (2023) describe.

These ideas provide a theoretical foundation for the qualitative and quantitative data presented near the end of the

article. These data concern what students find helpful or hindering, leading to several conclusions. To start, mismatches between culturally based cognitive styles and classroom norms can cause situated cognitive harm. However, modest misalignments may foster student growth. Additionally, the findings align with results from cultural psychology, with some exceptions. The exceptions, combined with the selective permeability construct, reinforce what the great education theorist John Dewey (1973, p. 58; posth. pub.) stressed in lectures delivered in China: that “sweeping generalizations” and “universal laws” are inadvisable. Instead, Dewey advocated focusing on “individual cases in particular situations,” recognizing that each may warrant its own customized solution. An implication is that exceptional teaching is an art, as it involves sensitive adjustment to the evolving peculiarities of unique circumstances.

2 Linking Selective Permeability and Affordances

Gibson (1979) holds that energy and chemical arrays (light, sound, heat, food sugars, etc.) convey the presence of affordances to organisms (Chs. 4, 14). He also touches on cultural habits (Ch. 8), which can affect affordance availability, as when nonproficiency with chopsticks makes eating hard for a tourist. The availability of affordances, together with corresponding social and cultural norms, creates what we may call a “grammar”: a set of customary habits guiding a person’s situated behavior. Gibson does not really address how these normative grammars function as affordances, which is crucial for the concept of selective permeability. This section therefore reviews the notion of selective permeability and shows how, despite some differences, it aligns enough with Gibson’s framework to be considered affordance-based. This connection will be an important part of the argument for the situated cognitive harm done in certain educational settings.

Affordances are environmental features that enable or limit actions and shape our perception of the world, including the values or meanings we register. Gibson (1979) states: “a stone can be a paperweight, a bookend, a hammer” or part of “a stone wall” (p. 134). For humans, a stone’s value is the functions it affords. To a deer, however, stones lack these purposes and are more value-neutral, though a high rock barrier may be entrapping or a hiding place. For Gibson, “all these benefits and injuries, these safeties and dangers, these positive and negative affordances are properties of things taken with reference to an observer” (p. 137), even while existing independently of the perceiver (p. 127). Moreover, “the ‘values’ and ‘meanings’ of things ... can be directly perceived” (p. 127). As a realist, Gibson believes that affordances, though related to an individual’s capacities, remain

in the world regardless of whether anyone is there to use them. Seen thus, a low stone wall has properties that afford sitting, even with nobody there to exploit them (Heft 2020).

Gibson's (1979, Ch. 8) discussion of stones and cultural sitting habits suggests that social practices, including tool use and tool construction, shape affordance availability. Later scholars extended this thought by proposing the existence of social and technological affordances (e.g., Krueger 2011; Majchrzak and Markus 2013). Such affordances and their resulting grammars connect to selective permeability, where individuals encounter distinct action possibilities within the same setting. For instance, a young and ebullient paraglider with requisite training and tools might value a cliff because it affords flying, while the same precipice avails (and means) something different to a tired octogenarian lacking equipment and skill (Crippen 2020). Similarly, a gesture that is friendly in one country can provoke aggression elsewhere (see Li 2015), showing that culture selectively shapes meaning.

Variations in individual embodiment (e.g., health, tools, cultural habits) can accordingly lead people to encounter disparate affordances, making places, including classrooms, selectively permeable. Psychology experiments indicate that heavy backpacks, sadness, low blood sugar, illness, tiredness, indebtedness and inclement weather—in short, energy-depleting conditions—make hills and stairs look steeper or farther away (Bhalla and Proffitt 1999; Schnall et al. 2010; Zadra et al. 2010; Riener et al. 2011; Liu et al. 2018; Ekawati et al. 2022). Urban planners exploit comparable effects, using decorative curbs, low walls, elevation variations and changing walkway tiling to subtly mark space as private or semi-private. Outsiders feel uncomfortable upon entering, with the result sometimes stronger for the exhausted homeless than for the affluent (Crippen 2023). Similarly, authorities added the aforesaid territory markers to Cairo's Tahrir Square in 2015—a few years after the Arab Spring—making it more hostile to politically and economically depleted locals than to tourists. Thus, while access was not physically restricted in that period, Tahrir was usually empty, as if fenced. Egyptians saw the area as threatening, and it was more dangerous to them than to tourists, who faced little risk of harassment from police (Crippen and Clement 2020; Crippen 2021a). Therefore, Egyptians perceived something akin to what Gibson calls action-closing negative affordances.

We might describe this scenario by saying that Tahrir Square had a normative grammar. These grammars, also known as social or world grammars (Crippen 2010, 2022), can be grasped in terms of situated cognition. Consider, for instance, how high heels can amplify negative affordances for women (Crippen and Lindemann 2024; Spurrett and Brancazio 2024), who tend to see stairs as steeper than men do (Eves et al. 2014). Without denying that average height

plays a role, it has been argued that even women in sneakers, influenced by gender norms habitually reinforced by the presence of others wearing heels, may perceive stairs as less viable and opt for elevators or escalators (Crippen and Lindemann 2024; Spurrett and Brancazio 2024). Often, actions are physically possible but censured, like the restrictions Rosa Parks faced or prohibitions against sipping from a stranger's cup in a café. Though some suggest that Gibson's affordance theory inadequately explains social restrictions (see Di Paolo et al. 2017; McKinney 2020), this is misleading. First, while affordance theory emphasizes vision, the philosophical realism of the outlook is not located merely in the fact that the ambient light hitting the eye has a spatial and temporal structure that directly corresponds to layouts since Gibson (1966) talked about the odor of food affordances (p. 146). Second, Gibson coined the term “affordance” as a non-subjective “substitute for values” (p. 285), elsewhere equating potentialities of benefit and injury to positive and negative affordances (Gibson 1979, p. 137). Third, etiquette standards exist independently of any single agent, and breaches can entail personal risk, including bodily harm. Given these considerations, the notion of a social grammar fits cleanly into a version of Gibson's affordance framework and is therefore useful for describing embodied situations that result in cognitive harms (Crippen 2024b).

Indeed, students who participated in qualitative portions of this study gave their own examples of the impact of social grammars on cognitive performance. Their preferences for cognitive styles and learning will be addressed in detail later, but for now note that many were studying in English in a country where that language is not the norm—that is, it is not part of the customary social grammar. This mismatch led to situated cognitive harm. Some reported that learning the local language not only opened action avenues but also closed them. One student fretted that becoming literate enough to read “no entry” signs on trails added obstacles functionally akin to fences. Others talked about how increased language proficiency amplified tacit demands that they follow difficult regional customs. Whether it was intricate dining rituals or expectations for Muslims to abandon hijabs, drink alcohol or eat pork, the greater expectation to conform made previously welcoming spheres difficult to negotiate—and an argument will be made that such difficulties can extend to the classroom.

These last examples illustrate how normative grammars, which scaffold cognition and behavior, can be selectively constraining. These grammars also fit many of Gibson's realist commitments. Granted, they are not specified immediately in energy and chemical arrays, but they are there independently of any single agent and can be unforgiving realities with which people must contend. Indeed, confronting them, in Gibson's (1979) terms, can mean encountering

something akin to “positive and negative affordances” (p. 137). Some of these include situated cognitive harms.

3 Cultural, Affordances and Normative Grammars

This section expands on the previous points by exploring cultural differences in perception, cognition and behavior, focusing on East Asians and Westerners, but considering other groups as well. The aim is to show that the affordances in a single setting vary as a function of a person’s culture. Later, this will be connected to educational settings, which can be selectively antagonistic, paralleling intentionally obstructive design choices, such as anti-skateboarding nubs or low overpasses blocking bus traffic from Black neighborhoods to leisure locations (Caro 1974; Németh 2006; Crippen 2016). In learning environments, though, it is cognitive performance that is harmed by these social and educational grammars.

An opening caveat is that discussing culture or ethnicity involves overgeneralization, as large communities have diverse and evolving traditions (Ess 2014). However, regional societies still shape identifiable normative habits that influence what people can do in a context. This raises the following question: are some affordances dependent on one’s culture?

One reason to answer “yes” is that culture influences embodiment at a very basic level. For example, the Asian squat (Fig. 1) opens affordances for sitting and gathering that are less available to Westerners (see Cranitz 1998). In addition, Koreans and Westerners typically have different stride patterns (Ryu et al. 2006), which may affect walking efficiency and energy use, subtly altering the perceived accessibility of distant locations. These examples highlight the culture-based selective availability of affordances.

Another reason action possibilities (affordances) may vary with culture is that group coordination alters what

individuals can do. For instance, the brainless eukaryote *Physarum polycephalum* can navigate mazes collectively. This is achieved partly by leaving slime paths and then avoiding them, something not feasible for a lone species member (Crippen 2020). Similarly, a massive log can be moved or a barn raised by a group, but not by a single person working without machinery. Human behavior often organizes around artifacts, enabling complex forms of distributed cognition, such as sailors synchronizing tasks around specialized technologies to operate a military vessel (Hutchins 1995).

In short, joint activity synchronizing around artifacts opens many affordances that would otherwise be absent. But it closes them too. For instance, the layout and normative protocols on a warship preclude certain actions. Language is an artifact as well. It structures affordance landscapes, both by instilling and allowing ways of coordinating. Partly because language is transmitted to offspring, younger generations go on to replicate and evolve manners of social organization. Language obviously instills many normative prescriptions, some quite subtle, as when a pause or intonation combined with a bodily gesture indicates it is time for another to talk or to end the conversation (see Rouse 2023, Chs. 2, 6).

Regarding whether people coordinate differently in accordance with regional culture and thus encounter different affordances or constraining grammars, South Korea (hereafter Korea) serves as an illustration. While shamanism, Buddhism, Daoism and Christianity influence Korean life, the nation is often considered the most Confucian (Slezia 2013; Chung and Oh 2022). Confucianism, like many other East Asian perspectives, emphasizes social harmony. However, unlike Buddhism and Daoism, it advocates harmony-building through fulfilling roles within social hierarchies, a prescription encoded in the Korean language.

Korean has various levels of formality based on the age and status of the interlocutor, which fine-tunes social interactions. This can frustrate younger generations. Nonetheless, a common issue among Korean and non-Korean students is the former’s tendency to inquire about age to gauge the proper level of deference. This can lead to younger students avoiding collaboration with older ones, something non-Korean interviewees mentioned during our qualitative data gathering. For Koreans, however, it is hard to speak their own language without ascertaining relative social status since they conjugate verbs based on many levels of formality, and since mistakes can have consequences, such as rejection after a job interview (Choo 1999; Brown 2011). One article (Premack 2017) quotes a Korean remarking, somewhat hyperbolically, that breaking accepted forms of behavior can be nearly as rude as urinating in a colleague’s briefcase. The social norms here can be compared to those that prevent someone from sipping a stranger’s coffee and, while



Fig. 1 Westerner vs. Korean

they are just norms, they can act like impassable walls and so serve as functional equivalents to negative affordances.

The takeaway is that cultural ways of coordinating can open or close action possibilities, and there are data to support this. Psychologists, for instance, have found that East Asian students and managers are less likely to engage in social loafing when they believe that they are working together, whereas the opposite is true for Americans (Gabrenya et al. 1985; Earley 1989). Here, normative grammars embedded in people's habits dictate when it is time to put in effort, altering the sorts of tasks that can be accomplished. Group behavior—and the affordances therefore available—varies with cultural background.

A value in many East Asian philosophies, particularly Confucianism, is humility, along with the normative expectation not to elevate oneself. This can make some Koreans students averse to active participation (Li 1998), which also influences seating preferences, as will be seen later; the possibility for cognitive harm here is clear. While the specifics will be explored when the data is presented, the emphasis many East Asians place on humility combines with another factor: heightened susceptibility to shame (Lutwak et al. 1998; Hong 2008). This is partly because East Asians often perceive the self as publicly visible and shared, in contrast to Westerners, who tend to regard it as more private and hidden (Markus and Kitayama 1991; Tafarodi et al. 2004).

Dewey's (1920/1929) remarks on China, from his two years there, explain public self-construals and shame susceptibility as a corollary of material conditions, which are embodied situations in the sense this article laid out at the outset. Many areas in China were densely packed; people rarely left their communities, and thus felt themselves under the nearly constant scrutiny of familiars. Dewey notes that railroads expanded mobility, yet cultural understandings of self do not instantly adapt to such changes. Even today, Asian regions remain crowded, and data presented later show that educational practices continue to reinforce a public sense of self. This amplifies shame, leading to situated obstacles in Westernized classrooms where open discussions—and the inevitable exposure of errors—are often the norm. Along similar lines, Dewey mentions a Chinese headmaster who sacrificed “his ‘face’ to the good of his school and the country” (p. 219) by accepting donations—a genuine sacrifice Dewey felt most Westerners would not grasp, as they rarely navigate the same social grammars. This reiterates once more that normative grammars can be hard and dangerous obstacles, analogous to the negative affordances a non-swimmer confronts when walking on a narrow path alongside a deep river. If learning requires swimming, then what can be done?

Just as the Chinese did not abandon their public sense of self with the arrival of railroads, students do not entirely discard long-held cultural values when adapting to a new

setting. If classroom norms strongly conflict with the social grammars that students habitually follow, certain affordances may be cut off, selectively hindering their learning—thereby inflicting situated cognitive harm. The next section shall make this connection explicit.

4 Cultural Psychologies and Learning

Although studies (e.g., Miyamoto et al. 2006; Shell and Flowerday 2019) suggest that culture shapes affordance detection, a stronger point is defended in what follows: that people from two cultures can encounter objectively different affordances, even in the same setting, making an environment such as the classroom selectively permeable. This section explores how cultural backgrounds influence perception, thought and behavior in connection with learning. The result can be instances of situated cognitive harm in classrooms.

Casual commentators often advance a Western vs. non-Western binary, as if only two monolithic cultures exist. Hampden-Turner and Trompenaars's (1993) data show that this is problematic. They find, for example, that Australians, British, Canadians, Dutch, Swedes and Americans typically like jobs where individual initiative is rewarded, while Japanese and Singaporeans usually prefer that nobody is celebrated over others. Belgians, French, Germans and Italians fall somewhere in between. When asked if their job is to execute individual tasks or contribute to team projects, Americans still heavily opt for the first choice, but only about half of the respondents from other Western nations agree with it, with French, Germans and Italians being especially moderate. Japanese and Singaporeans, once more, favor teamwork. All these cognitive styles are potentially relevant in a classroom environment.

In East Asia, we find both similarities and divergences between regions. On the one hand, the Japanese and Chinese are more likely than Europeans and Americans to agree with both sides of opposing views, favoring “compromise” and seeking a middle ground that promotes social harmony (Spencer-Rodgers et al. 2009). On the other hand, they differ in key areas. For instance, the Japanese admire indecisiveness in politicians as a sign of thoughtful consideration, while the Chinese prefer decisiveness, even more so than Americans (Yates et al. 2010).

These are just a few of the relevant findings. Analyzing any region by factors such as socioeconomic status, religion, politics, urban vs. rural, age or time period would reveal additional variations. Furthermore, statistical results are averages, meaning they imply exceptions. Both the patterns reported above and their exceptions establish a crucial point: what is true in one case may not be true in another. As a result, educational settings will almost always be selectively permeable, and even more so in multicultural classrooms. In

conjunction with heterogeneous cognitive styles, it is plausible that the cultural differences discussed so far can lead to situated cognitive harm.

The above implies psychological findings are not entirely reliable and are better taken as illustrative, in this case of the variations that might be encountered in a multicultural classroom. Let us begin by exploring Kearins's (1981) experiment with white Australian children and Aborigines. In the experiment, objects were removed from a grid and children were asked to replace them in their original positions. White children tended to verbally puzzle through the task, while Aboriginal children often relied on nonverbal spatial cognition, which they could not easily articulate. Moreover, when asked to sort objects that are not readily segregated into separate verbal categories (e.g., little stones), Aborigines significantly outperformed white children, despite typically scoring lower on school tests. Knapp and Seagrim (1981), who struggled to replicate these findings, warn against basing curricula on supposed ethnic cognitive styles owing to substantial in-group diversity. Along these lines, some East Asians in this article's data pool, even in cases when they had not lived abroad, identified as Westernized and stressed generational differences from their parents. These differences are then reflected in their preferred cognitive styles, meaning that the social grammar they follow in the classroom may diverge from that of their ethnic peers, which opens them to distinct situated cognitive benefits and harms.

Of course, if a culture has significant in-group variation in cognitive styles, and if standardized curricula or tests are deployed, then members can still suffer what Højholt (2015) calls "situated inequality." Put otherwise, some environments support the learning of certain individuals while disadvantaging others, imposing cognitive harm selectively. For example, tight time limits might favor bold students over cautious double-checkers. Having the second cognitive style might get students labeled as "disabled" in some jurisdictions, but does this indicate shortcomings in the students themselves? An alternative is to locate the deficiencies in the social grammars structuring the tasks they are assigned. These grammars can inflict situated cognitive harm on those who express styles that ill-fit the grammars.

All of this together suggests a preliminary conclusion about generalized educational models. If heterogeneous cognitive styles are valuable, then a rigidly standardized educational model selectively punishes individuals who are gifted in ways diverging from prevailing norms. In this situation, the resulting cognitive harm is clear.

Now culturally out-of-sync situations do not all inflict this harm, as they can sometimes offer "non-fit" challenges (Montessori 1912) that push learners into new areas. In contrast, near-fit situations refine existing skills (Montessori 1912). The difficulty is identifying which cognitive styles will be pushed by which social grammars, in which

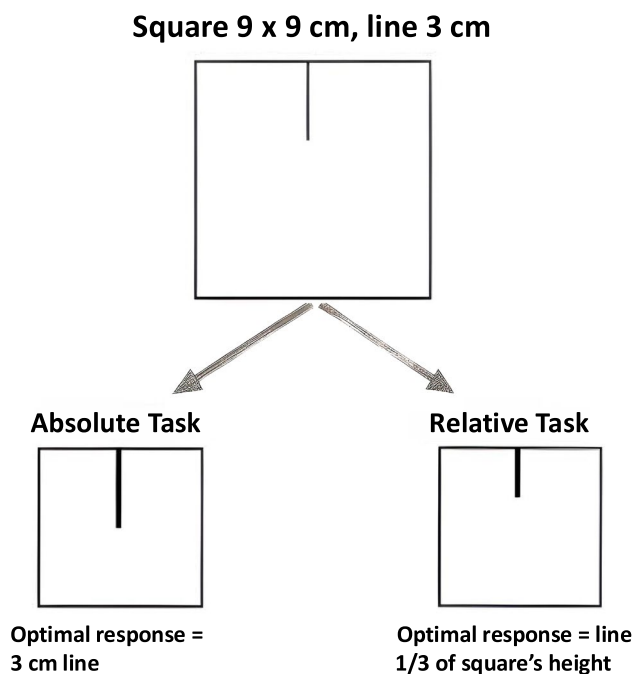


Fig. 2 Americans excel on the absolute task, East Asians on the relative task

embodied situations; as Dewey noted, it is hard to *helpfully* distill general guidelines for how to produce these results. More than anything, these theoretical points and the empirical results call into question the desirability of generalized or universal educational curricula, which are largely blind to the selective permeability of educational environments and to the associated cognitive harms.

Returning to cultural cognitive styles, while Kearins's (1981) conclusions are debated, other results are robust. One finding is that East Asians are better at perceiving overall scenes, with the same suggested for Indigenous Americans, whereas Westerners focus more on foreground objects (Masuda and Nisbett 2001; Boduroglu et al. 2009; Shell and Flowerday 2019). Recent eye-tracking studies on infants and adults corroborate this, though this varies regionally (Jurkat et al. 2022; Šašinková et al. 2023). Looking at things contextually means registering relationships, not just isolated entities. East Asians in fact excel at drawing lines proportionally to different-sized shapes, Americans at reproducing absolute lengths (Kitayama et al. 2003; Hedden et al. 2008; see Fig. 2). When presented with pictures of a cow, chicken and grass and asked which two objects go together, Chinese students usually group in accordance with the relational fact that the cow eats grass. Americans often classify based on discrete categories, in this case identifying cows and chickens as animals (Chiu 1972; see Fig. 3). These findings imply culturally specific normativity in perception and

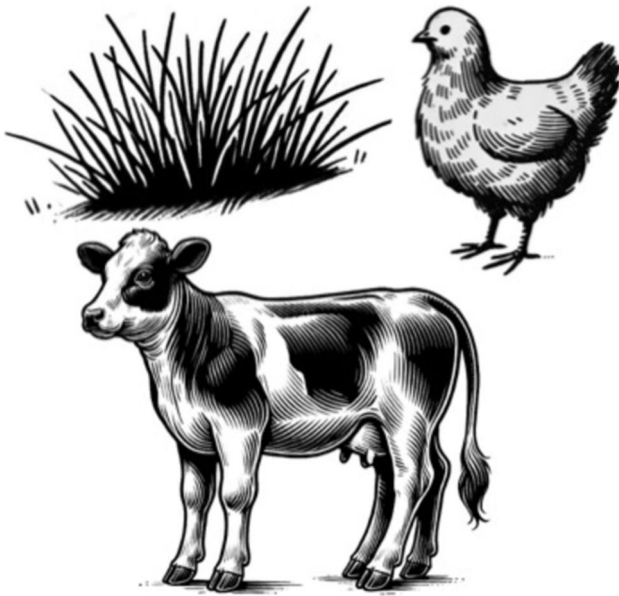


Fig. 3 Which two go together?

cognition, and we will soon see how this affects the types of affordances that are registered.

We see similar grammars at work in questions requiring self-reflection. When asked about themselves, East Asians often provide conditional answers (e.g., “I’m serious at school, but light-hearted when partying with friends”). Americans typically mention role categories (e.g., carpenter, professor), personality traits (e.g., loyal, honest) and activities (e.g., I play piano) (Lewis et al. 2008; Kitayama et al. 2009). East Asians tend to tolerate contradictions more than Westerners, both in themselves and in the world; they often expect circumstances, like personal fortunes, to reverse (Ji et al. 2001; Spencer-Rodgers et al. 2009). Chinese children learn verbs faster and nouns slightly more quickly than English and French speakers (Yee 2020). During a certain developmental window, Chinese infants focus more on actions, compared with object-oriented US infants (Waxman et al. 2016). Asians frequently attribute choices to situational factors rather than inner agency, viewing failure on math exams as an indication that more effort is needed rather than a reflection of innate deficits (Stevenson and Stigler 1992; Morris and Peng 1994; Choi et al. 1999; Masuda and Kitayama 2004).

Though not focused on education, a good example of culturally situated learning comes from Miyamoto et al.’s (2006) investigation into whether differences in East Asian and Western affordance detection correspond to variations in local architecture. To explore this, they sampled photographs from Japanese and US cities. Japan’s built environments were usually more complex, for example, with less clear distinction between foreground and background objects.

East Asian design choices may partly reflect the cultural philosophies of decision-makers, but they may also result from the mountainous topography and limited space relative to population, which of course affects possibilities for action (affordances). Consequently, roads and buildings are often constructed on different levels, with the latter densely packed in non-aligned directions. The high visual complexity means fewer focal points, reflecting the less object-oriented attentional styles of East Asians. These complicated arrangements can create a sense of cities organically morphing around individuals, an effect amplified by winding street layouts, resembling unpredictable trails, along with the mist that frequently cascades down mountains (see Fig. 4). These perceptually dynamic aspects parallel another finding discussed earlier: that East Asians are attuned to change and often anticipate sudden reversals in fortune. Additionally, distances that can now be crossed in a 10-min car ride were difficult to traverse before tunnels were built in the latter half of the twentieth century, for instance, in places such as Korea. The past situation helps to explain comments from interviewees in the qualitative portion of this study, during which some mentioned distinct dialects and prejudices among neighboring provinces, especially with older generations.

It is admittedly difficult to determine whether the culturally specific cognitive styles examined here might help or hinder East Asians moving to Western countries to study; some suggestions are made below, but this is an area for future research. While the literature shows that East Asians—particularly from countries such as China, Japan and South Korea—often outperform other ethnic groups, a typical high school day in these countries can exceed 12 h, followed by private tutoring. Students are often seen studying more than socializing in cafés near universities. Given this, their academic success may be less a consequence of systems favoring them than of them working extremely hard to bypass whatever negative affordances a classroom might present to them—a point explored in the next section.

5 Selective Permeability and Multicultural Classrooms

This section presents data, both qualitative and quantitative, to support, refine and elaborate the account of selective permeability in multicultural educational settings that has so far been developed. The quantitative data come from universities worldwide. The qualitative data are from in-person interviews and online free-response remarks from a diverse cohort within a single English-speaking department at a Korean institution that has an almost exclusively Western faculty. Respondents represent regions across Africa, Asia, Europe, Russia and the Americas, with some having



Fig. 4 East Asian city (Busan) with high visual complexity and buildings at different angles and heights

intersectional identities (e.g., Korean-Russian, Indigenous South American). The sample also includes Buddhists, Christians, Hindus, Jews, Muslims and atheists.

As an opening analogy, imagine for a moment what it might be like to arrive at an ice rink with rollerblades. We can take this hypothetical scenario as comparable to the situation a learner encounters: the affordances they expect to perceive and be able to interact with may be available only given certain learning “equipment” at certain places. When there is a mismatch of cognitive styles, social grammars and classroom expectations, it may be that a rollerblades-on-ice situation arises: the wrong techniques in a starkly incompatible environment. In fact, even if two people both had ice skates and so were ready for the terrain, those two people might still confront different affordances when one is experienced but the other is not. This second scenario is akin to situations of ill-fit between cognitive styles and embodied classroom situations that, as has been said, can encourage growth, yet also be limiting. For example, some international respondents with non-conforming genders or sexual identities felt physically safe in Korea, certainly a crucial aspect of learning, but recognized that local norms restricted their free expression. Similarly, Latin American and African students mentioned feeling somewhat stigmatized and excluded.

This may appear to suggest that Korea—where the qualitative data were collected—imposes more situated cognitive harm than do countries in the West. To clarify, however, both international and local respondents, even those with complaints, were generally positive about their schooling and the regional culture. With that caveat stated, this section focuses on certain Korean practices—some involving the

physical structuring of learning environments—that foster a public sense of self and can sometimes intensify shame.

Without necessarily endorsing Western individualism, which at times devolves into surface-level expressions such as clothing choices or refusing to wear masks during COVID, it is relevant that Koreans have a concept of “we-self” or *uri* (우리). This concept manifests in everyday language, where people might refer to another’s child or spouse as “our daughter” or “our husband” (Kim 2021). *Uri* implies collective concerns, and Koreans reported hesitating to participate in discussions, fearing their contributions might waste time or take away speaking opportunities from classmates. Such a social grammar may inflict cognitive harm understood in the now familiar sense of diminished learning opportunities. Indeed, many saw their potential contributions to a classroom discussion as “unimportant,” aligning with the emphasis East Asian cultures place on humility. As we shall see, though, the quantitative findings—presented shortly—indicate that Koreans nonetheless value diversity of individual expression.

It is worth taking a moment here to make explicit the connection between the theoretical background in the first part of this paper, and the data gathered here. That background informs the empirical research, but some may worry that the data are a step removed from the harm-related situations that have been described; in other words, critics might wonder if details about self-reported preferences, whether qualitative or quantitative, reflect the genuine reality about how cognitively congenial an environment is for certain learners.

While this point raises a valid concern, there are nonetheless grounds for expecting the results to illuminate the

theoretical picture that has so far been advanced. First, notions such as “cognitive style” and “situated cognitive harm” are psychological constructs, and a way to study them is by means of what we can measure or observe. In this case, it is reasonable to expect a tight link between one’s felt experience in a learning environment and one’s self-report of that experience; though it is true that people may not understand the nuances of their cognitive style, a basic principle of charity would lead us to take at face value what people say about the congeniality of an environment to learning. Second, although observations such as self-reports are used to explicate these psychological constructs, the inferences drawn from the data are extraordinarily ampliative. In other words, the inferences stick close to the evidence, and the gap between what the data strictly speaking show, on the one hand, and inferences about the psychological constructs, on the other, is not very large. And while this gap allows for alternative explanations of both reported preferences and cognitive styles, the same holds for most any interval between an observable measurement and its corresponding construct, especially in psychology. With these remarks in mind, let us turn to more of the data.

Korean respondents described how their education fosters a public sense of self, echoing Dewey’s observations about China. At various stages in schooling, as one respondent explained, students may receive higher shoeboxes or top floor dorm rooms for good grades, publicly displaying success or failure. This pattern continues at the post-secondary level, and another interviewee talked about university team projects with significant monetary prizes, with rankings down to last place announced. Additionally, some Koreans said that mental health records are accessible to schools and employers. The belief appears to be false, except in the case of biannual medical checkups that include a cursory psychological evaluation. However, the erroneous conviction highlights normative grammars in which the self is experienced as more public than is commonly observed in Western contexts. While these grammars and corresponding situated obstacles are comparatively foreign to many international students, they often objected to what might be called regimented collectivism. One of them noted that dorms enforce rules like expulsion for self-harm, which discourages seeking help, adding that curfews limit late-night therapeutic strolls. Even walking in the hallways looks strange to any who might be monitoring feeds from video cameras, which are ubiquitous and reinforce in Koreans the idea that the self is nearly always under public scrutiny.

Public self-construals in Korea relate to an emphasis on personal reputation, including achievements and physical appearance (De Mente and Kingdon 2018), with social media further fueling upward comparison that degrades mental health and academic performance (Lee and Park 2021; Kwak et al. 2022; Song 2023). Koreans self-monitor

for even minor violations of protocol. Questioning a professor’s assertions can constitute a breach, and interviewees added that classroom discussion is uncommon outside their Westernized department. With such a strong normative grammar in place, enforced by social repercussions, it is not surprising that we would find reported mismatches between cognitive styles and the learning environment in the Westernized department that was studied.

One consequence is that Koreans often adhere to social norms that restrict what might be called participatory affordances. Ingrained cultural habits do not evaporate when moving to a new environment, and many Koreans said that they were reserved even in debate-heavy classes taught by Western professors and comprised mostly of international students. Koreans reported concern over public exposure for errors, which, for them, is metaphorically akin to being stripped naked in front of others. Thus, some Koreans (and others too) encounter “hard” barriers that exclude them from class discussions, even when studying abroad. This is situated cognitive harm, as it puts their learning at a disadvantage. While the scenario does not meet Timms and Spurrett’s (2023) previously referenced threshold for hostility since, for example, Western students and professors are not actively hindering Koreans for their own gain, the practical outcomes are basically the same as what these researchers describe. And insofar as the situation is harder for some than others, the educational milieu is selectively permeable.

As seen in earlier discussions of Tahrir Square, spatial arrangements can likewise be selectively permeable, and this holds in educational settings. Take, for instance, an office desk placed between a professor and a student. The desk might inhibit open dialogue for one student. But for another with an alternative cognitive style, such as a student wary of inappropriate contact owing to past experiences, it could create a safe space. Gibson (1979, p. 137) refers to “safeties and dangers” as “positive and negative affordances.” Whether or not he would classify the desk this way, the example illustrates how space can be selectively permeable: for one student, the desk is an obstacle; for another, it offers protection.

In fact, interviews revealed that Westerners sometimes wish to sit near the back of classrooms owing to lack of interest. In comparison, multiple Koreans reported seeking shelter at the rear of participation-heavy classes in hopes of not being asked to speak, a tactic surely used by shy Westerners as well. How might we mitigate situated cognitive harms that these choices intensify? A possible countermeasure is arranging desks in a circle, which reduces opportunities to retreat. Participation-averse students may feel more exposed and dislike the layout, possibly viewing it as a hindrance to their learning. But the uncomfortable situation might promote growth by inviting learners to experience a situation with a new cognitive style, all without singling out

any culture or ethnicity. We should take care here, however, for always deploying such an approach can be problematic. For example, one international student with severe anxiety found sitting at the front and facing away from the rest of the class created a less crowded and more comfortable atmosphere—but this fit between the cognitive style and the situated environment is not available with a circular classroom arrangement.

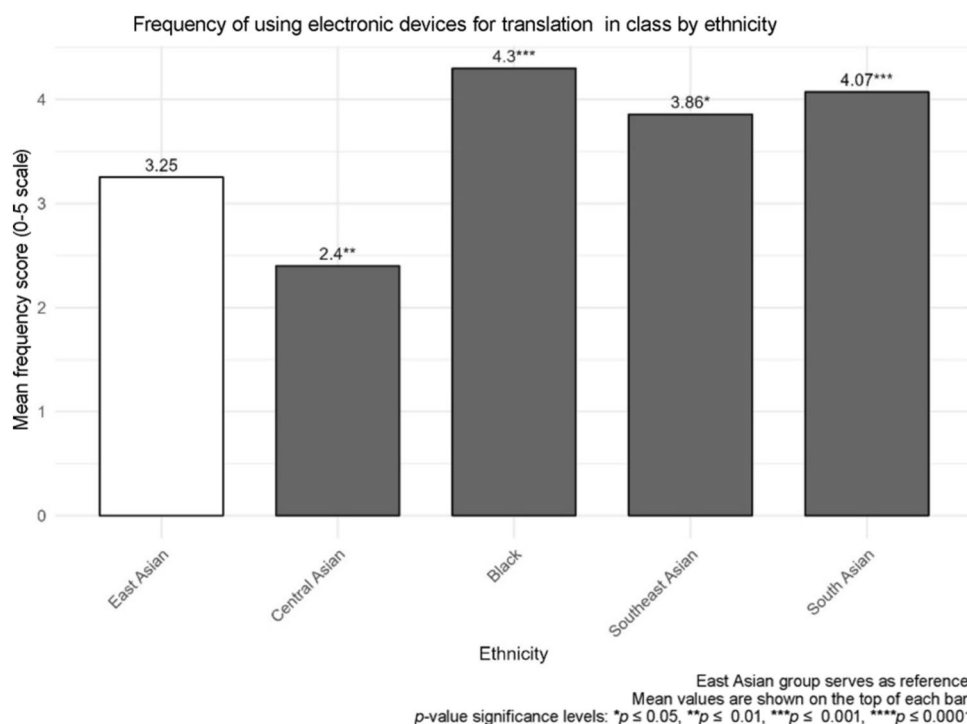
In sum, the qualitative data show how cognitive styles, together with the social grammars they conform to, can conflict with the social grammars and embodied situations of classrooms. In at least some cases, the result is selectively imposed situated cognitive harm.

Moving to the quantitative data, gathered from universities around the world, a preliminary caveat is that the results are illustrative rather than definitive, for several reasons. First, participants opted in, which might introduce an element of selection bias. Second, data parsing can be somewhat arbitrary. For instance, should students be categorized by national origin or by ethnic identity? Cultural psychologists use both methods, but the latter was chosen. The reasoning is that classifying US students as one group, Australians as another and so on overlooks the ethnic diversity within these groups. Additionally, psychologists have found differences, for example, between white Westerners and other targeted groups, even when the research is confined to America or Australia (e.g., Kearins 1981; Spencer-Rodgers et al. 2004).

Standard in paired comparisons, *t*-tests were used for the statistical analysis. The significance threshold was set at the commonly accepted level, $p \leq 0.05$, meaning that the probability of obtaining a result from random chance is equal to or less than 5%. One-sided *t*-tests were chosen based on specific directional hypotheses derived from qualitative focus group findings, which revealed patterns suggesting that certain ethnic groups exhibited stronger preferences for particular technologies, cognitive styles, teaching methods and similar factors. So as not to have an unmanageable number of combinatorial comparisons, one base-group, East Asian ($N = 105$), was compared to other ethnicities for which numbers were sufficient. These include white Westerner ($N = 42$), Central Asian ($N = 25$), South Asian ($N = 14$), Black ($N = 10$) and Southeast Asian ($N = 7$). Furthermore, to maintain clarity in graphs and charts, differences with *p*-values exceeding the designated threshold are not reported. The discussion of the findings organizes into five illustrative points, all regarding expressed preferences, cognitive styles and the match or mismatch between certain embodied learning environments. The same qualification given above regarding the quantitative data applies here (i.e., about the gap between the empirical data, the psychological constructs and the theoretical background). To better contextualize the quantitative data, follow-up free response remarks were collected. They are integrated into the report below.

First, the graphs in Fig. 5 show that Black, South Asian and Southeast Asian students used translation devices in class more often than East Asians, who relied on them more

Fig. 5 Mean number of deployments of translation technologies per class



than Central Asians (see Appendix, Table 2, for chart). Follow-up questions showed that students were quite judicious. They deployed translation devices when struggling with time constraints or technical vocabulary. However, many noted limitations—for example, questionable translations from English to Uzbek. Further, many students—and especially East Asians—reported deploying devices reservedly. They worried about impeding language improvement or about interrupting an “English way of thinking” or about generating disjoint experiences of course materials. More than one also preferred to use a dictionary. Simultaneously, there was broad agreement that banning translation devices would be injurious. A reasonable conclusion is that translation devices reduce selective impenetrability for EFL (English as a Foreign Language) students.

Second, preferences for video materials were measured (see Fig. 6). Compared to Central Asians, East Asians liked recorded videos of in-class sessions as a means of reviewing lessons. Follow-up free responses, in fact, showed overwhelming appreciation from both EFL students and native English speakers, albeit more so for the former. EFL students, particularly East Asians, valued class sessions posted on YouTube for allowing them to slow playback, use closed

captions and pause or rewind to take notes or better understand challenging sections. Another reason for wanting videos was attentional challenges, though students acknowledged pitfalls, such as the availability of recordings reducing their motivation to stay focused in class. One top student, however, said that she concentrates best in the quiet hours between 1:00 AM and 4:00 AM, making video recordings an asset. When it comes to hybrid classes, Central Asians favored them more than Black, Southeast Asian and South Asian students. East Asians valued supplementary instructional videos more than most groups except for Black and Southeast Asian students, where differences were insignificant. Interestingly, lecture slides were less important to East Asians than to white Westerners (hereafter Westerners) and South Asians (see Appendix, Table 3, for chart). The follow-up showed that students appreciated having slides before class for annotation. All agreed slides are helpful. But some admitted slides can reduce active engagement and note-taking. Overall, though, it is clear that traditional classrooms without video resources and slides risk various forms of situated cognitive harm.

Third, there were differences in preferred seating arrangements (see Fig. 7 for options and Fig. 8 for graphs). East

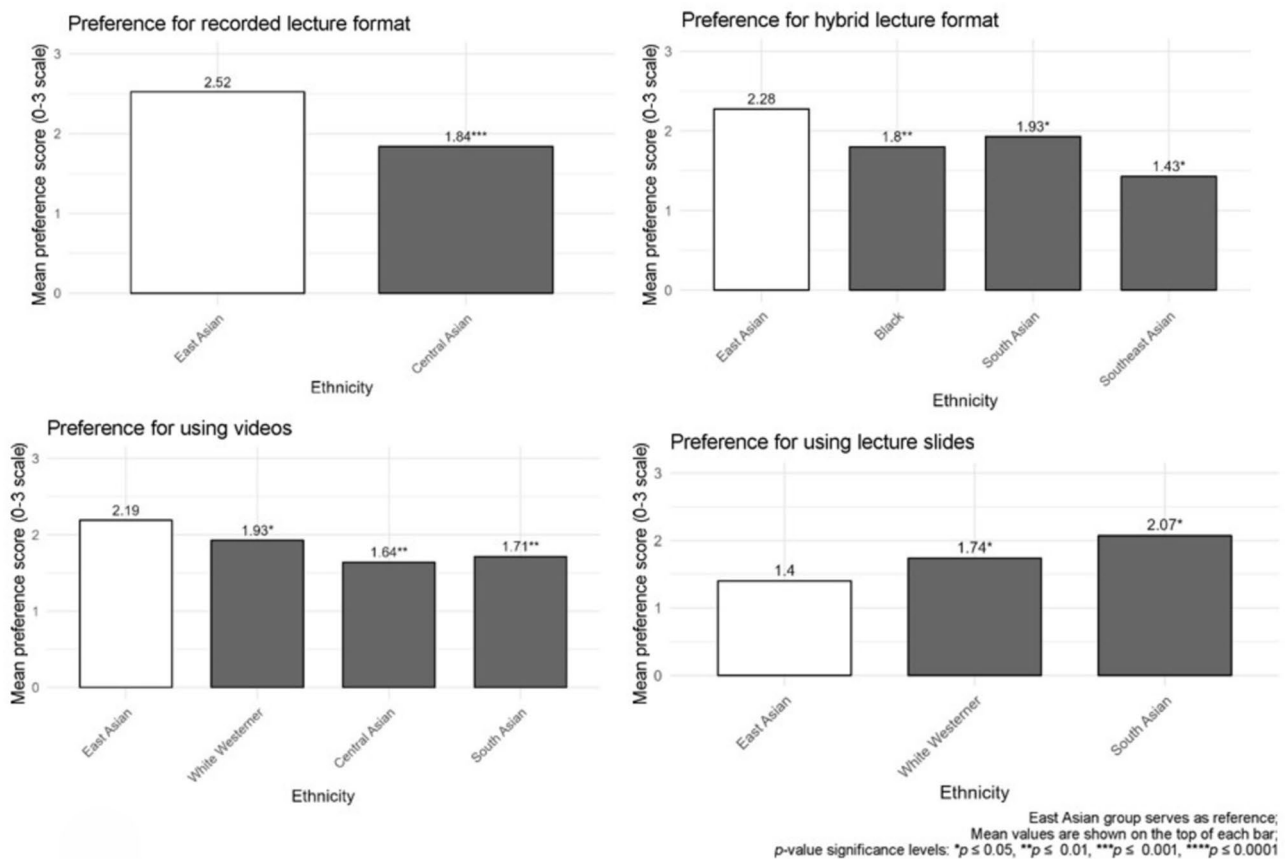


Fig. 6 Preferences for teaching technologies

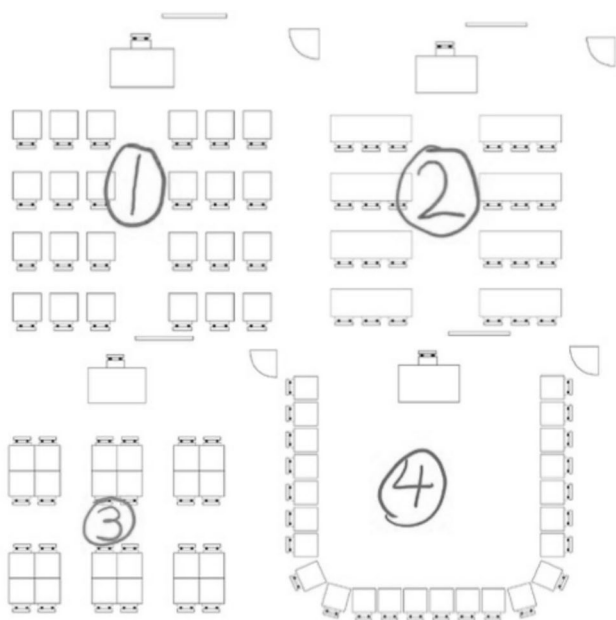


Fig. 7 Seating options

Asians favored arrangement No. 2 (front-facing desks for three students) compared with Southeast Asian and Black students. They also favored arrangement No. 4 (semicircular seating) more than South Asians. While qualitative data suggested that some East Asians liked the back of the classroom, the quantitative findings indicate some preference for socially engaged seating, which reflects a certain cognitive style (see Appendix, Table 5, for chart).

Fourth, the quantitative analysis shows that East Asians had a stronger preference for energetic professors than other groups. While also valuing strict professors (mean = 2.33 out of a maximum of 3), they preferred them less than South

Asians and Westerners (see Fig. 9 for graphs and Appendix, Table 1, for chart).

Fifth, Fig. 10 shows that, compared with all ethnicities except South Asians, for whom there was no statistically significant difference, East Asians viewed group assignments as a way to improve teamwork. They also appreciated group homework for fostering diverse perspectives more than did other ethnicities, except Southeast Asians, where no significant difference was found. Interestingly, despite claiming to be participation-averse in interviews, East Asians valued in-class discussions more than all other ethnicities, as shown in Fig. 11 (see Appendix, Table 4, for chart). This highlights an important point: while Westerners may seem to dominate discussions in mixed-nationality classes, most students do not speak much, but a few talkative Westerners can camouflage this. It would be worth examining these interactions in greater detail later, to specify the relevant cognitive harms.

We have been talking about student preferences, what they encounter as usable and valuable. But it is not necessary to frame all these results unequivocally in terms of affordances, despite Gibson (1966, 1979) equating affordances to values. It is enough to show that students carry culturally based normative grammars with them into classrooms, and that these restrict and facilitate certain behaviors, creating affordance-like openings and closures for learning—and thus also creating cognitive benefits and harms for themselves. The case is bolstered by the fact that the findings mostly align with well-established ones from cultural psychology. Interpretating these two data sources, it seems clear that a given educational setting usually inflicts situated cognitive harm on some, whether or not others experience some marginal benefit. However, avoiding fixed teaching and assessment approaches may mitigate some of these harms.

While the results align with research suggesting that East Asians lean toward collectivism, some qualifications are

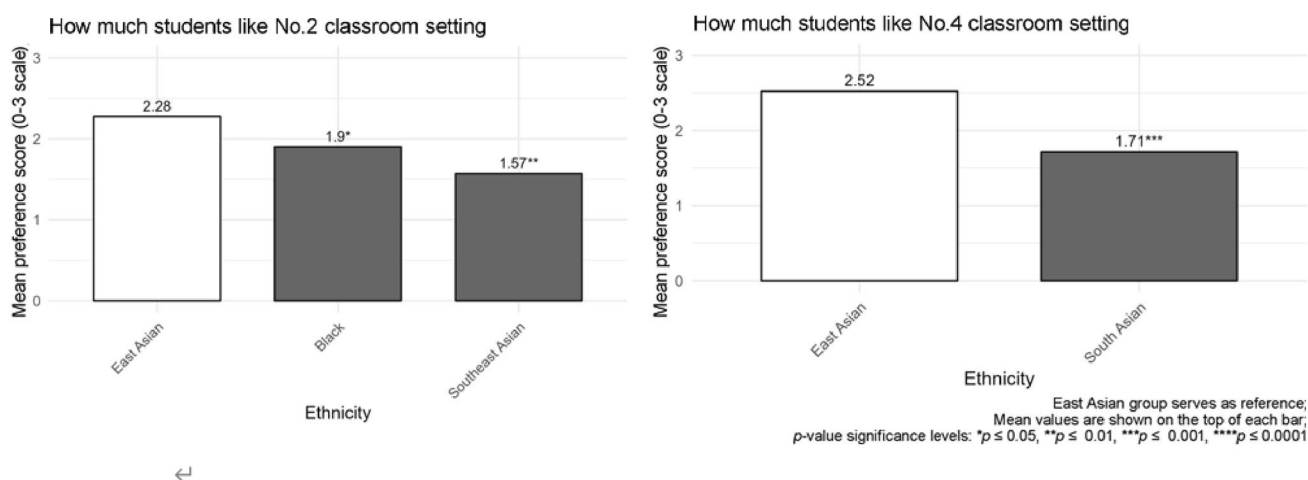


Fig. 8 Preferences for seating arrangements

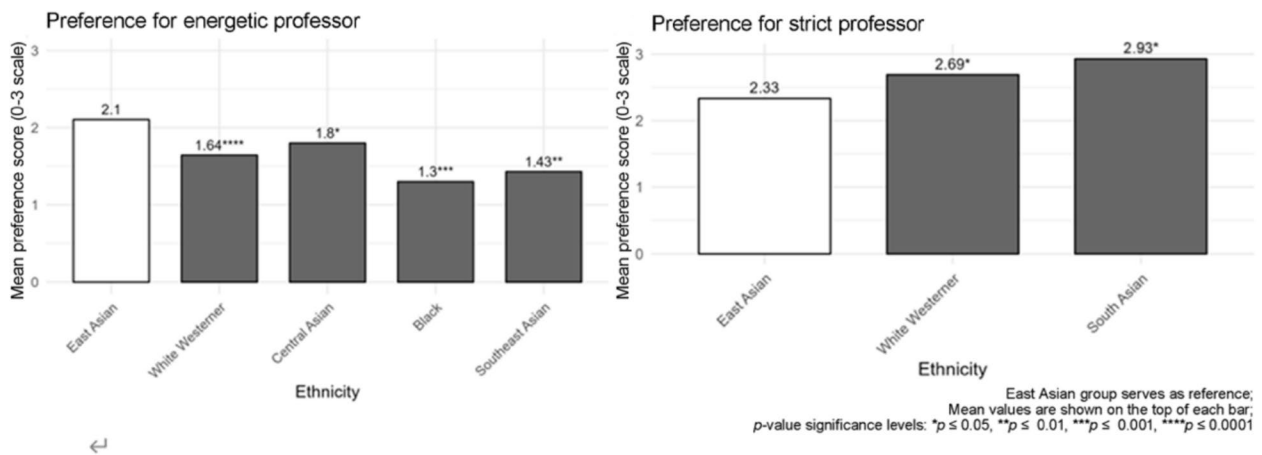


Fig. 9 Preferred professor characteristics

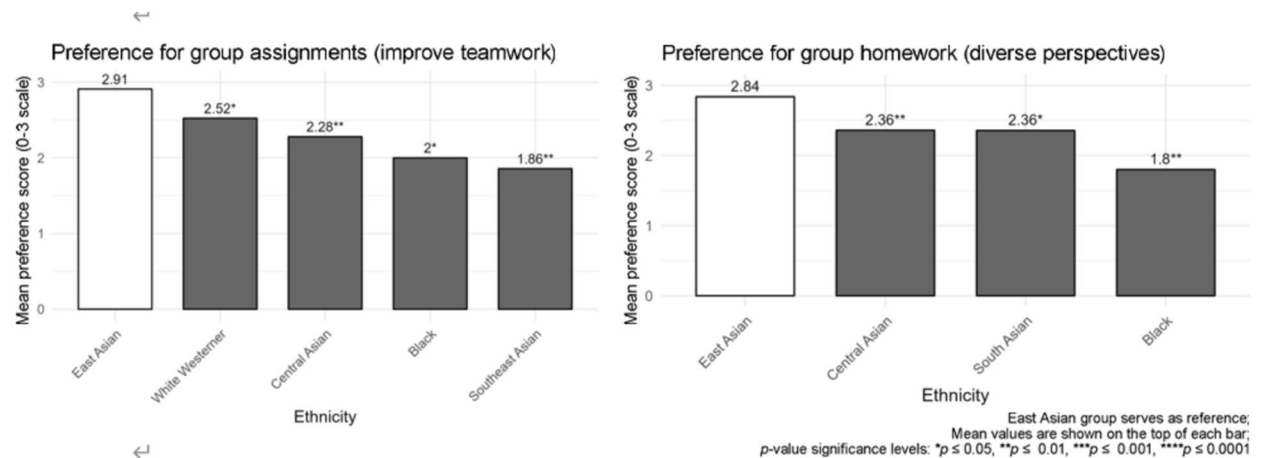


Fig. 10 Preference for group assignments

warranted. Specifically, the findings reiterate problems with the conventional individualism vs. collectivism binary. Personal expression occurs within group settings, as we often care more about expressing ourselves around others than we do when we are alone. East Asians either matched or surpassed others in valuing group work for fostering diverse perspectives. They also enjoyed class discussions more than any other ethnicity, and even when not actively participating, East Asians may still value listening, which supports the individual expression of speakers; in other words, their cognitive style is quite multifaceted. Additionally, more than East Asians, Westerners preferred stricter professors, which can be associated with hierarchical orientations. Together, these results somewhat undercut observations from Nisbett (2003, p. 77), one of the most famous cultural psychologists and a prominent East Asia specialist, who asserts that East Asians are debate-averse and accepting of hierarchy. To be sure, these learners may be

equipped to negotiate hierarchical social grammars and may avoid open disagreement. But this is not the same as liking hierarchy and evading debate, which would have to be kept in mind in designing classroom experiences.

The qualitative investigations add further nuance. East Asians reported frustration with how quickly Western students criticize ideas. This fits with the earlier-cited finding that they tend to exhibit tolerance for contradictions and thus not to see debated matters as needing to resolve into either *this* or *that* (an idea conveyed by the well-known notion of Yin and Yang). Accepting multiple sides can promote diversity. Additionally, one can ask: are undergraduates usually equipped to critique someone like Kant, whom experts spend their lives studying? By constantly pushing students to take sides, we not only inflict situated harm on those from certain cultural backgrounds, but we may also teach others to attack without understanding—a hallmark of uncritical thinking.

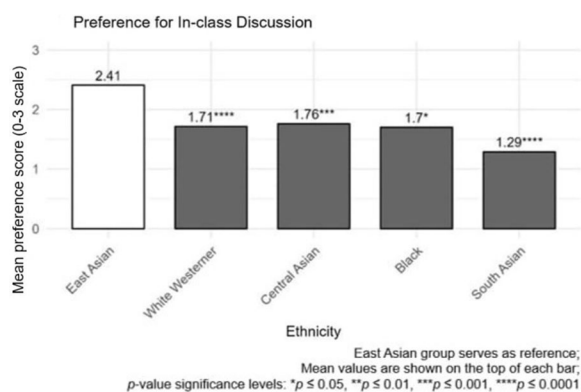


Fig. 11 Preferences for in-class discussion

6 Conclusion

This article applied the selective permeability model to examine how culturally rooted cognitive styles—particularly in non-Western students—may conflict with certain teaching approaches and thus create situated cognitive harm by hindering learning. Put another way, behavioral norms or social grammars can make an educational environment such that it inflicts situated cognitive harm on certain groups rather than on others. This idea links to affordance theory but with a deviation from Gibson’s original concept: normative grammars emerge from complex, socially extended contexts, whereas Gibson locates affordances in the immediate environment. However, like affordances, normative grammars exist independently of an individual and structure behavior in fairly unyielding ways, bestowing both benefits and harms.

After outlining these claims, findings from cultural psychology were reviewed to demonstrate that people from different cultures often diverge in their perceptions and thinking. As a result, individuals face different action constraints and, hence, affordances. Aligning with established findings from cultural psychology, the data illustrated how one student may encounter a positive affordance where another confronts a negative affordance. The data introduced to this debate certain provocative nuances, particularly regarding the contrast between individualism and collectivism—a point that was tied to situated cognitive harm in classrooms. Also emphasized was the risk of overgeneralizing findings.

An additional challenge—offered self-critically—is that it is difficult to ensure that participants interpret questions the same way in surveys. For instance, Westerners scored higher in their preference for strict professors. However, the result could stem from East Asian and Western students having different benchmarks for “strict.” East Asian students, accustomed to a comparatively rigid educational system, might

prefer more easygoing professors. Western students, on the other hand, may have experienced professors using student-centered learning as an excuse for poor preparation. Within this frame, a stricter approach may have appeal. None of this, however, challenges the idea that students from different cultures encounter varying opportunities and challenges in the same setting. After all, studies not subject to the interpretive issues just described still find cultural variations in cognitive styles. Among those cited were eye-tracking experiments, tests on information extraction from scenes and investigations about the ability to draw lines matching absolute vs. relative lengths.

A common issue in cross-cultural education research is the tendency to generalize cultural styles associated with the white Global North as being the most advantageous, sometimes based on anecdotal evidence. For example, Zhang and Sternberg (2005) explore field dependence and independence—how individuals use or disregard their surroundings to orient themselves cognitively and behaviorally. On average, field dependence associates with East Asian cognitive styles, while independence links to Western ones (see Nisbett 2003). Zhang and Sternberg argue that field independence is superior, giving an example about how this cognitive style helps pilots and divers avoid accidents. However, this example is itself field-dependent: it is expressed in the contexts of certain kinds of tasks. Additionally, many situations benefit from field-dependent cognitive stances. Recent studies demonstrate that context is vital for accurately interpreting facial expressions that could otherwise be misunderstood (Heaven 2020; Crippen 2021b). Moreover, East Asians often excel at contextualizing social matters, which helps them read moods (see Kitayama and Ishii 2002; Ishii et al. 2003). This should bestow advantages in high-stakes political or economics negotiations, which can in fact save human lives (Crippen and Lindemann 2024).

Although there are some social grammars that we can comfortably reject, such as favoring students because of their gender or race, it is usually problematic to elevate one cultural style over another. Doing so in classrooms can inflict situated cognitive harm. An anecdote from Gibson’s (1966, pp. 137–141) second-to-last book helps elaborate the point. There, he equates food values with affordances. But he does not draw attention to the fact that not everybody encounters food-based affordances in the same way. For example, some people develop peanut allergies and accordingly confront peanut products as action-limiting negative affordances. Likewise, the same learning environments may either support or hinder different students. Whether this is based on their cultural backgrounds or for other reasons, it calls into question generalized approaches to teaching that do not take into account cognitive styles or the rich cultural backgrounds and social grammars they presuppose.

Appendix

See Tables 1, 2, 3, 4, 5, 6.

Table 1 Comportment of professor

Variable explanation	Ethnicity comparison	Direction	East Asian mean	Other group mean	Possible value range	<i>p</i> -value
Preference for energetic profs	White Westerner	Greater	2.104762	1.642857	0~3	4.13×10^{-5}
	Central Asian	Greater	2.104762	1.8	0~3	0.01927126
	Black	Greater	2.104762	1.3	0~3	0.0001636255
	Southeast Asian	Greater	2.104762	1.428571	0~3	0.007177787
Preference for strict profs	White Westerner	Less	2.333333	2.690476	0~3	0.0110841
	South Asian	Less	2.333333	2.928571	0~3	0.03246729
Preference for caring profs	Central Asian	Greater	1.609524	1.36	0~3	0.03400528
	Black	Greater	1.609524	1	0~3	2.0586×10^{-14}

Table 2 Technological tools

Variable explanation	Ethnicity comparison	Direction	East Asian mean	Other group mean	Possible range	<i>p</i> -value
Total frequency of using electronic devices in class	Central Asian	Greater	3.94186	1.956522	0~5	2.62×10^{-6}
Frequency of using electronic devices for translation in class	Central Asian	Greater	3.252632	2.4	0~5	0.005564476
	Black	Less	3.25263	4.3	0~5	0.0003479966
	Southeast Asian	Less	3.252632	3.857143	0~5	0.03527116
	South Asian	Less	3.252632	4.071429	0~5	0.0003392171

Table 3 Teaching components

Variable explanation	Ethnicity comparison	Direction	East Asian mean	Other group mean	Possible range	<i>p</i> -value
Preference for in-person lectures	White Westerner	Greater	1.552381	1.309524	0~3	0.02010379
Preference for making recorded lectures available for studying	Central Asian	Greater	2.52381	1.84	0~3	0.0005766852
Preference for using readings as teaching materials	South Asian	Greater	2.295238	1.714286	0~3	0.00688134
Preference for hybrid lecture format	South Asian	Greater	2.27619	1.928571	0~3	0.04058401
	Black	Greater	2.27619	1.8	0~3	0.004411853
	Southeast Asian	Greater	2.27619	1.428571	0~3	0.01443786
Preference for making lecture slides available for studying	White Westerner	Less	1.4	1.738095	0~3	0.01707366
	South Asian	Less	1.4	2.071429	0~3	0.01354498
Preference for using videos as teaching materials	South Asian	Greater	2.190476	1.714286	0~3	0.00880792
	White Westerner	Greater	2.190476	1.928571	0~3	0.03224126
	Central Asian	Greater	2.190476	1.64	0~3	0.003481837
Preference for low-structure lectures	Central Asian	Greater	2.514286	2.16	0~3	0.02908073
	South Asian	Greater	2.514286	1.714286	0~3	0.00688134
Preference for student-centered lectures	Central Asian	Greater	2.247619	1.8	0~3	0.004802597
	South Asian	Greater	2.247619	1.714286	0~3	0.01068298
	Black	Greater	2.247619	1.6	0~3	0.001637412
What percentage participation should be graded for non-STEM courses	White Westerner	Less	2.368421	2.756757	0~3	0.006989598

Table 4 Learning experience

Variable explanation	Ethnicity comparison	Direction	East Asian mean	Other group mean	Possible range	<i>p</i> -value
Like group assignments because it can improve teamwork	White Westerner	Greater	2.914286	2.52381	0~3	0.01307838
	Central Asian	Greater	2.914286	2.28	0~3	0.002176302
	Southeast Asian	Greater	2.914286	1.857143	0~3	0.002807877
	Black	Greater	2.914286	2	0~3	0.01758928
Like group homework because of it can supply diverse perspectives	Central Asian	Greater	2.838095	2.36	0~3	0.004848186
	South Asian	Greater	2.838095	2.357143	0~3	0.02033505
	Black	Greater	2.838095	1.8	0~3	0.001114756
Do not like group homework because the grading is unfair	White Westerner	Less	2.07619	2.547619	0~3	0.006067991
	Central Asian	Less	2.07619	2.72	0~3	0.006361233
	Black	Less	2.07619	2.8	0~3	0.002859389
Do not like group homework because it is inefficient for studying	White Westerner	Less	2.419048	2.928571	0~3	0.006912426
	Central Asian	Less	2.419048	2.88	0~3	0.0279833
How much student likes discussion in class	White Westerner	Greater	2.409524	1.714286	0~3	2.04×10^{-6}
	Central Asian	Greater	2.409524	1.76	0~3	0.0004204917
	South Asian	Greater	2.409524	1.285714	0~3	2.353022×10^{-6}
	Black	Greater	2.409524	1.7	0~3	0.02272817
Difficulty reading the mood of the room	White Westerner	Greater	3.638095	3.428571	0~2	0.01849838

Table 5 Physical arrangement of classrooms

Variable explanation	Ethnicity comparison	Direction	East Asian mean	Other group mean	Possible range	<i>p</i> -value
How much student likes No.2 classroom setting	Black	Greater	2.27619	1.9	0~3	0.03694211
	Southeast Asian	Greater	2.27619	1.571429	0~3	0.005980449
How much student likes No.4 classroom setting	South Asian	Greater	2.52381	1.714286	0~3	0.0001559728
How much student likes having a stage in classroom	South Asian	Less	1.990476	2.5	0~3	0.04552575

Table 6 Sample size and gender breakdown for each ethnic group

Ethnicity	Female	Male	Other gender*	Total
East Asian	72	29	4	105
White Westerners	30	12	0	42
Central Asia	21	4	0	25
South Asian	7	5	2	14
Black	7	3	0	10
Southeast Asian	5	2	0	7
Identities with insufficient numbers for analysis	8	4	0	12
Total	145	57	6	215

*Other includes non-binary gender identities and those who did not want to identify

*The following tables present only the statistically significant results from the one-sided t-tests, with all results showing a p -value of less 0.05. These tables compare the preferences and perceptions of East Asian students with other ethnic groups. The direction of the difference is indicated, along with the mean values for both groups and the possible range.

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Data Availability Quantitative data is available.

Declarations

Competing interests The author declares no competing interests.

Ethical Approval Ethically approved by Pusan National University's Institutional Review Board.

Research Involving Human & Animal Participants The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed Consent Participants signed informed consent forms.

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