







# Selective permeability, multiculturalism and affordances in education

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## ABSTRACT

Selective permeability holds that people's distinct capacities allow them to do different things in a space, making it unequally accessible. Though mainly applied to urban geography so far, we propose selective permeability as an affordance-based approach for understanding diversity in education. This has advantages. First, it avoids dismissing lower achievements as necessarily coming from "within" students, instead locating challenges in the environment. This implies that settings (not just people) need remedial attention, also raising questions about normative judgments in disability nomenclature. Second, affordances can be negotiated in numerous ways to reach a goal, analogously to how people with missing arms have learned to drive with their feet, so restrictive problem-solving methods are often counterproductive. Third, our approach illuminates how cultural factors ranging from gait styles to language and hence group coordination modulate action possibilities, so that cultural groups may encounter objectively different affordances in the same classroom. But fourth, while fit with environment allows for skill refinement, non-fit can contribute to growth situations, which suggests a degree of selective closure can be desirable. Throughout, we argue social constructs – including educational ones – are literally built or enacted barriers or openings that have reality in environments in the same way that affordances do.

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## Introduction

Selective permeability extends James Gibson's (1966, 1979) ecological psychology and his theory of affordances, which holds that we perceive environments in terms of what we can do in them.<sup>1</sup> To date, selective permeability has been used in urban geography to articulate how a single setting is accessible or not depending on factors like race, gender, socio-economic status and age. In this article, we propose the outlook as an

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affordance-based approach for accommodating diversity in intercultural educational milieus.

A core idea is that people have different opportunities in the same space because they face objectively varying obstacles. For example, a woman may encounter a menacing quality in a street with sexually aggressive gazes, with men less sensitive to this because they are not affected by the same threats. Here, the woman's experience is shaped by genuine risks limiting her actions, the hazards to be avoided, which are called "negative affordances" by Gibson (1966, p. 146, 1979, p. 137, 157, 233). Though following Gibson (1966, p. 285, 1979, p. 127) in equating affordances to non-subjective values – that is, use-potentialities that are objectively beneficial or harmful to some agent – we break somewhat with his proposal. A reason is that Gibson argues that ambient arrays alone, such as light or chemicals reaching the sense organs, are enough for affordance and value detection. We hold, by contrast, that the selective fragmenting of cultural and educational settings involves registering meaningful social *gestalts* that cannot be reduced to spatial geometry and chemical vectors, though both are certainly relevant. A key idea, however, that we retain from Gibson is that a single setting varies objectively between individuals because of their embodied situation. His observation that cultural factors like tool use affect affordances is also critical to our position, which in fact carries forward classic work in learning, carried out by ecological psychologists such as Eleanor Gibson (1969) and Anne Pick (Gibson & Pick, 2000).

To name a few cases of selective permeability in educational settings, outdoor equipment avails different behavioral avenues to young children vs. tweens (Hayball et al., 2018); information technology is selectively usable according to age and skill (Guess et al., 2019; Fong et al., 2022); there are also culturally based differences in how students negotiate classrooms (Shell & Flowerday, 2019). Broadly, habitual ways of being (e.g., because of cultural or gender-based backgrounds) introduce agent-based variability in affordances in learning milieus.

So why is any of this important or helpful? First, the argument that students have different affordances available to them (as opposed to merely being attentive to different affordances) suggests many challenged pupils are better described as alternatively-abled. Put otherwise, a learning environment can be selectively disabling not because of problems inherently in students but because a setting imposes obstacles (negative affordances) for some. Second, our outlook partly fits and partly challenges prominent takes on cultural dimensions in learning (e.g., Zhang & Sternberg, 2005; Hofstede, Hofstede & Minkov, 2010; Fer, 2012; Zhang, 2021). A problem in some of this work is that it establishes only a small number of learning styles (i.e., three to four) and sets up Western variants as the gold standard, basically preordaining the conclusion that the latter is best. Our view averts such

a value judgment. Third, while we do not maintain that common learning objectives should always be avoided, our outlook contravenes the idea that such goals can be pursued or fairly measured via standardized methods, which is a mainstay in education systems around the world. Fourth, social arrangements in classrooms can alter affordances because there are certain tasks that can be executed in some group organizations but not others, and cultural factors – for reasons to be detailed – can affect this. Increased awareness can make classrooms more inclusive. Fifth, the just stated indicates that social constructions are not mere mental ways of conceptualizing, but concrete forms of organization in the world. On a meta-level, our position helps resolve realist-constructivist disputes. The reason is that constructivism does not obviate realism in the scenarios we describe, since constructed ecological alterations, once introduced as action delimiting features, really are there.

So again, our account frames educational settings as primary sources of learning problems, as opposed to blaming individuals. To that end, later sections of this article propose a taxonomy of educational affordances that explicates how selectively-present fit and non-fit situations can foster learning. Our taxonomy is not advanced as an absolute scheme, and instead is a practical tool for understanding human-environment transactions in multicultural learning settings. But on the constructive-realist scheme advanced above, we hope that such a framework can concretely engender inclusive learning environments.

### Selective permeability and multistability

Landmark theories instill zealous devotion, and “The Ten Commandments of Ecological Psychology” has already been published (Michaels & Palatinus, 2014). Sometimes scholars also absorb famous outlooks secondhand, distorting them thereby. Not wanting to go down either road, this section explains how our account is close enough to Gibson’s to warrant common nomenclature, but simultaneously highlights how we add to and depart from his original case.

Affordances, to review, are environmental features that allow or constrain actions, limiting what we can do and hence perceive. People, for instance, do not customarily perceive themselves as walking on water since this is practically impossible for them, yet not for other organisms (Gibson & Pick, 2000). Philosophically, Gibson (1966, 1979) identifies as a realist, asserting that affordances – while relative to an individual’s capacities – exist in the world independently of agents. According to this view, if an oak tree affords climbing to people, it does so irrespective of whether anybody is interested or even present to go up it (Heft, 2020). Simultaneously, the tree may afford climbing to

a young gymnast with decent sneakers but not to an infirmed and depressed grandparent resting barefoot in the yard. The upshot is that the tree is selectively climbable depending on what agents bring with them in terms of mood, health, equipment, age, athletic skill and other factors that modulate their capacities to act. The tree thus has different meanings (use-values) to the gymnast who climbs it and the grandparent who enjoys its shade.

Selective permeability is especially persistent in socially enacted or constructed settings. One case is that Robert Moses selectively prevented Blacks from going to Jones Beach by placing bus-impeding low overpasses (negative affordances) between their neighborhoods and that part of the coast (Winner, 1980). Another instance is that plazas have features to prevent skateboarding (Németh, 2006). These are visible to enthusiasts but not those who do not use skateboarding affordances. A robust finding is that sadness, low blood sugar, illness, heavy backpacks or fatigue – all energy depleting – make hills look steeper and farther away (Bhalla & Proffitt, 1999; Schnall et al., 2010; Zadra et al., 2010; Riener et al. 2011). This fact helps explain why symbolic attributes like decorative curbs and elevation changes – which tacitly cordon urban space – stand out more to the fatigued. These features have been documented to selectively repel exhausted homeless (Crippen, 2023a). Similar characteristics were added to Tahrir Square in 2015 to keep it free of politically and economically depleted protestors while leaving it open to tourists who faced less risk of arrest (Crippen & Klement, 2020; Crippen, 2021c, 2022).<sup>2</sup> From this, an argument can be made for characterizing selectively permeable arrangements in terms of “political affordances,” defined as normative openings and closures that implicitly segregate according to demographic backgrounds. The implicit side of such affordances follows from people not noticing what does not impede their actions or from excluded parties tacitly being manipulated. A professor, for instance, shrinks spatial and temporal affordances for social interaction if she consistently remains standing when students from certain ethnicities come for office visits, even though all parties may be unaware this is occurring.

The arguments above relate to the premise that certain things are multistable – that is, prone to appear and/or be used differently. Multistability is discussed by post-phenomenologists, cognitive scientists and analytic philosophers (e.g., Ihde, 1977; Stadler & Kruse, 1995; Block, 2014; Hasse 2015). In the early 20<sup>th</sup> century, pragmatists, phenomenologists and psychologists also discussed multistability under other names (e.g., Dewey 1920; Woodworth, 1921; Koffka 1935; Merleau-Ponty 1945/1962). The fact that opposing planes in Necker cubes sketches visually pop to a forward position is perhaps the most commonly used illustration of multistability. Here, there is no basis for claiming that one or the other appearance is legitimate. Yet circumstances with ecological validity (i.e., as carried out in everyday life)

are seldom like this, with appearances usually connecting to how objects are used or ecosocially situated.

Ecological psychologists also touch upon multistability. To extend one of Gibson's (1979, p. 134) examples, a paperweight is deployed to hold documents down, but we will unequivocally see it as a weapon if launched as a missile into someone's head for the obvious reason that it inflicts objective harm. Another illustration in a vein regularly deployed by ecological psychologists – along with pragmatists, phenomenologists and enactive cognitive scientists – is that lacquered wood is smooth to caressing fingertips and sinewy tough to a chisel; or again, that a pond is yielding or unforgiving depending on whether one wades into it or hits it at terminal velocity (see Crippen, 2016a, 2017, 2020). Now, ecological psychologists and enactive cognitive scientists are apt to frame these scenarios respectively in realist and constructivist terms (cf. Gibson 1979; Varela, Thompson, & Rosch, 1991). But Dewey (1925) counters that the two metaphysical framings are practically the same in embodied instances. He clarifies that realist objections that constructivism implies a distortion is simply a confusion of tense. It is not that agents bestow upon things properties that do not belong to them; it is rather that activity bequeaths traits that did not belong to things, and once conferred, these additions are really there in the world. Understood in this way, constructivism and realism amount to the same position (Crippen, 2016b, 2020).

To what extent is multistability a relational fact about the world that follows out of culturally and individually engendered variations in embodiment? This query can be pursued through a number of lines. One is what may be designated – somewhat arbitrarily – as basic embodiment. For instance, Koreans are known (on average) to have different stride patterns than Westerners (Ryu et al., 2006), and the “Asian squat” is also a popularly observed phenomenon (Zhang, 2018). Though not staggering, these variations in bodily habits suggest that Asians and Westerners typically encounter slight differences in the same settings. If it is less fatiguing for members of one group to traverse a span because of gait, then they may see targets as closer, not through cognitive distortion but because destinations are objectively easier to reach.

But what about more socially complicated cases? Consider the German blowout of Brazil in the 2014 FIFA World Cup. On average, the game looked different to Germans and Brazilians. So, paralleling the way an agent's capacities modulate a setting's affordances, the qualities of a situation varied according to people's cultural relation to it. Though one might want to reject these multistable gestalts as subjective (i.e., in the head of spectators), this is premature. To start, relationality per se is not an objection. Einstein (1952/1995) famously observes that length varies according to velocity relative to the observer. For Gibson, affordances are also

relative to agents yet are real properties of the environment. The social grammar of the FIFA event is comparable to affordances. To see why, imagine a vocal German fan in an aggressively pro-Brazil São Paulo bar. Here, there is the potential of social and even physical harm, which Gibson (1966, 1979) explicitly equates to negative affordances. Negative affordances are dangers or closures (or both) that discourage action or promote retreat, and the São Paulo bar imposes normative pressures that curb explicit enthusiasm for the German team. Changed behavioral dispositions alter action possibilities, adjusting how things appear. This was seen in the earlier-cited studies on mood, backpack weight, blood sugar levels and fatigue, and we can imagine the German gradually coming to see the Brazilian team more favorably with increasing time spent in that culture. Insofar as culture modulates people's coping skill via normative social grammars, it modifies affordance availability (Crippen, 2022). Further, while these grammars are constructed, once introduced, they are really there independently of any single agent and stand as fairly unforgiving realities with which agents must contend.<sup>3</sup>

The upshot is that multistability and selective permeability are different sides of the same coin. We already have seen that the São Paulo bar is selectively resistant to a pro-German grammar and the appearances it brings, and there are other cases with varying forms. For example, a woman may see an urban environment as more threatening than a man does. Do we reject her concern as merely subjective just because men's experiences often differ? A more plausible and responsible position is that she encounters selectively present negative affordances when, say, face-to-face subway seating pushes her into proximity with a sexually aggressive stranger (Crippen, 2022; Crippen & Rolla, 2022). Our main question in this article revolves around the extent to which similar effects – albeit hopefully less tinged with violence – occur in classrooms for reasons revolving around culture, gender and individual differences.

### **Culture, learning and affordances**

In this section, we carry out some final intermediary steps that progress us toward our position that educational environments have selectively accessible affordances. We start by offering a schematic sketch of cultural understandings of human psychology. This is a well-researched topic that suggests cultural variations in how people perceive, act, understand and neurally process their worlds (e.g., Masuda & Nisbett, 2001, Kitayama et al. 2003, Hedden et al. 2008, Wang et al., 2012). In other words, there is culturally-dependent multistability. A question we explore is how this tracks to variation in affordance availability in educational settings. Recent work argues that cultural learning modulates neural connectivity, such that people come

to selectively register some but not other affordances (Shell & Flowerday, 2019). Although this thesis is consistent with ours, we defend something much stronger: that cultural and individual variations do not merely affect what affordances we notice, but also really generate different affordances for people who are in the same space.

Though any cultural account is already an overgeneralization (Ess, 2014) scholars have documented differences between Western vs. Non-Western cognitive styles (e.g., Markus & Kitayama, 1991; Mpofu, 1994; Purdie & McCrindle, 2004; Waters 2004; Kiuchi 2006; Shell & Flowerday, 2019; Crippen, 2021b, 2023b; Dudgeon et al., 2022; Ren & Kuai, 2023). Westerners, according to this body of research, tend to stress independence, separateness and personal autonomy, with clear boundaries between “me” and “not me.” Non-Western cultures – such as certain African, Australian Aboriginal, South Asian, East Asian and Indigenous American ones – though not identical with each other, tend to share self-concepts that are entwined with others and sometimes the non-human environment. These culturally-based understandings of personal identity mirror differences in perception, cognition and learning. Those with autonomous construals tend to analytically attend to focal points to the exclusion of background information, dissecting problems into parts. This is compared to the more holistic approaches of people with interdependent self-concepts (Nisbett et al., 2001).

Results can be striking. Australian Aborigines, for instance, are exceptional at grasping objects according to their spatial relations with one another, whereas Westerners excel at organizing things according to verbal categories (Lockard, 1971; Kearins, 1981). When shown animations of underwater scenes, Japanese participants exhibit greater awareness of what is occurring in the background, while Americans attend primarily to foreground fish (Masuda & Nisbett, 2001). Another experiment presented the same two cultural groups with a 90 mm × 90 mm square with a vertical 30 mm line drawn down from the interior midpoint of the topside. There were two tasks: to free draw a vertical line of exactly the same (absolute) length in a smaller square and to free draw a vertical line in the smaller square that is in relative proportion to the one in the larger square. Americans were better at replicating absolute lengths, Japanese at approximating relative lengths (Kitayama et al., 2003). Follow-up work also revealed greater activation in frontal and parietal brain areas – associated with attentional effort – when East Asians and Americans respectively engaged in absolute and relative length tasks, indicating that culturally non-preferred judgments are more taxing (Hedden et al., 2008). Simultaneously, acclimatization to local customs seems to reduce the neural effort required to do the culturally incongruent task.



Other neurobiological outcomes involve parts of the ventromedial prefrontal cortices, believed to be critical in self-related judgments. The relevant areas fire more when Americans think about themselves than about their mothers, but exhibit no significant difference for Chinese, reinforcing claims that East Asian understandings of personal identity are more relational and socially extended than Western ones (Zhu et al., 2007; Wang et al 2012). These results dovetail with tests that show that, as compared to Americans, Japanese and Filipinos have pronounced sensitivity to social cues and context, leaving them better able to attend to vocal intonation while ignoring verbal meaning when the two are incongruous (Kitayama & Ishii, 2002; Ishii, Reyes, & Kitayama, 2003). Studies also find Westerners insistent on attributing inner convictions as causes of others' actions, whereas East Asians are cognizant of situational influences (Morris & Peng, 1994; Choi et al., 1999; Masuda & Kitayama, 2004).

Why care about any of this? Aside from its relevance to affordances in education, which we will later expand on, the studies cited in this section avoid ranking cultural learning styles. These same studies are neglected in the dominating research of Hofstede (e.g., Hofstede, Hofstede, & Minkov, 2010) and other heavily-cited work of a similar vein on cultural learning styles (e.g., Zhang & Sternberg, 2005). Hofstede's conclusions were built from data gathered in the 1960s and 70s and have been criticized for presenting a static and simple view of culture (Signorini, Wiesemes, & Murphy, 2009). Problematically, Hofstede as well as scholars theorizing about education (e.g., Zhang & Sternberg, 2005; Zhang, 2021) have elevated cultural styles associated with the white Global North, often using anecdotal illustrations. For instance, Zhang and Sternberg (2005) discuss field dependence and independence (i.e., people's use or nonuse of surroundings to behaviorally and cognitively orient themselves). They assert that field independence is superior, observing that divers and airplane pilots who score high in that dimension are less likely to drown or crash. However, Zhang and Sternberg's thinking is here field dependent because their illustrations orient around higher risk tasks involving spatial navigation. But what if we change the orienting context to one demanding an ability to read others' moods during high-stakes political or business negotiations? This task is amendable to field dependent relational dispositions, and can be lifesaving if the aim is a peace deal or an economic plan to uplift an impoverished region.

Simple paradigms with small numbers of "good" and "bad" categories may be attractive to researchers trying to model human behavior or to educational practitioners wanting straightforward techniques. Indeed, even the cultural psychology that we approvingly cite can be criticized for often only looking at Americans and East Asians (though this largely follows

from the constraints of experimental design and the geographical locations of authors' home institutions). In any case, if the concern is actually educating people and doing so in an inclusive way, then it is time to move beyond such schemes.

In our view, Shell and Flowerday (2019) take a step in the right direction when they develop a neurobiologically oriented cross-cultural affordance-based model of learning. However, unlike us, their argument highlights that environments have multistable appearances yet without getting at how cultural backgrounds literally change the affordances that are really present to agents in a setting. In their words, “differences occur because humans cannot directly perceive the totality of the affordances in their environment” since “the affordances available at any one time contain far more information than could possibly be attended, perceived, and processed” (p. 763). They explain further that the brain’s statistical sampling limits “are not random – they are biased by the individual’s unique knowledge, resulting from their past history of learning from experienced affordances” (p. 764). When combined with work in cultural psychology, this perspective suggests ways of making classrooms more accessible. One example is teaching children about animals that are set in habitats, an approach that should not distract pupils with analytic processing styles, but would simultaneously be more conducive to those with relational standpoints (Doole et al., 2015).

Again, we do not think Shell and Flowerday (2019) are wrong, for cultural backgrounds can of course lead people to notice different affordances. To this, however, we will add that culture modulates group behavior, which in turn sets limits on what people can do individually in a learning environment, which is to say, delineates the affordances available rather than just which ones get noticed. Such an observation erodes the distinction between “mere” social constructions and real physical barriers in the environment. This point is important because it highlights that problems are often not “in” the learners, but in settings that selectively exclude them.

### **Group dynamics and affordances in learning settings**

We have said that embodied situatedness can make settings selectively accessible. One variable that we touched upon, which has cultural dimensions, is gender. A fairly recent study (Eves et al., 2014) measured women’s perception of stair steepness, finding that they give higher verbal ratings than men in controlled experimental settings. This finding was corroborated by observations of stair vs. escalator use in public settings, which found that women prefer the latter more than men. Height correlated negatively with reported steepness for both genders, and on average women are shorter, so this embodied condition may play a role. Yet even after controlling for height, and whether or not women were carrying a large

bag, differences remained. Our purpose is not to disentangle biological contributors from non-biological ones, but rather to focus on cultural factors. In this case, it could be that stair avoidance ties to bodily habits instilled from being with women friends in footwear not conducive to climbing, even if one usually wears sneakers. Whatever the causes, socialized ways of acting adjust normative codes. A variation of this that this section defends is that group activity, language and other cultural dynamics make feats feasible that cannot be accomplished alone, or else allow tasks to be completed in alternative ways. In either case, this opens otherwise unavailable affordances in learning settings.

We are fortunate, in the course of our teaching, to be interacting with students from virtually every major region of the globe, but with a sizable minority from South Korea, which we focus on in this section. Because of the joint historical influences of Confucianism, Daoism, Buddhism and local shamanic practices – traditions which in various ways stress interdependency – Koreans tend to see things as interwoven. This includes human existence, which Koreans partly capture in their concept of *uri* (우리), which loosely approximates what Krueger (2011) has called “we-self.” Kim (2021) explains that the Korean comprehension of self is not an anonymous mass nor a mere conjunction of separate individuals. Instead and without canceling individual concerns, the construal of self is here based on a relational structure, comparable to a net where each link in the web depends on the interweaving of the other strings.

A second point is that “historically . . . Korea was comparatively the most ‘Confucianized’ country and culture in East Asia” (Chung & Oh, 2022, p. 71). Confucian philosophy (which was progressive by the standards of the day in which it originated) suggests that importantly human features (e.g., language, cooking, religion) are only achieved in groups. This idea is stressed in one of its central concepts, 仁 (*ren*), which combines the Chinese characters 人 for “human” and 二 for “two” to convey something like humaneness. Confucianism promotes harmony as a social good that is practiced by virtuously fulfilling one’s appropriate role within prescribed social hierarchies.

These sensibilities – both the Confucian ones and those generally related to *uri*—are encoded in linguistic cues that Korean students employ with peers. The Korean language has levels of formality to mark age differences of even just a year, which coordinates classroom activity, with older students automatically falling into leadership roles. Koreans minimize use of first-person singular pronouns in line with *uri*, and yet reassert the individuality of others by customarily using proper names over the generic “you,” except when extremely intimate.

Humility is a key Confucian virtue, and Korean students often hesitate to speak in class out of concern that what they wish to say is wrong or not that

important. They also worry about wasting others' time or taking away an opportunity for another to talk. This cultural dynamic translates to seating preferences in mixed-nationality participation-heavy classes, with Koreans often preferring to sit near the back, away from notice. By contrast, students from places like Europe, Australia, the US and the Middle East indicate (on average) that their desire to sit near the front correlates with how much they enjoy the course. These group dynamics can have contrary effects, for example, with Koreans helpfully circumspect but overly reserved, simultaneously facilitating and thwarting collaboration. Minor intercultural friction can arise as well. An innocuous illustration is that certain groups may find others too unthinkingly critical in their assessments of ideas, who in turn find them too accepting.

Already having been a little liberal in appending adjectives to the term “affordances,” we are non-committal about whether it makes sense to speak of “linguistic affordances.” We do not, however, hesitate to assert that language changes the affordances available to people because group dynamics alter what can be done. A clear and obvious function of language (though not the only one) is the coordination of human activity, and without group behavior some affordances are absent. This could be something as simple as manually moving large logs on up to something as complex as industrial operations.

Classroom affordances can be like this if students are collaboratively constructing situations that cannot be built alone and that open otherwise unavailable participatory avenues. Gibson (1966) also understands affordances as “values,” citing as examples the potential costs and benefits that are specified in “predator” and “prey odors” (p. 146). Paralleling this, and also in line with the stress on group harmony and socially extended self, Koreans advance a notion of *noonchi* (눈치), understood as the ability to read the atmosphere and grasp expectations within a setting. Non-Koreans might get the idea by considering how one immediately grasps that the presence of a gospel choir creates possibilities for lively engagement by upending the normally solemn atmosphere of churches. Here, the normative constraints or grammars – or affordances – are quite real in that gyrating and bobbing to absent gospel rhythms at a solemn funeral will put one at risk of ejection if not serious harm from angry attendees. In this sense, the gestalt quality of the atmospheric mood is functionally similar to the predator or prey odor that Gibson describes: it is a value that comes with potentialities of social benefit or even objective physical harm (Crippen, 2021a; Crippen & Rolla, 2022).

In the case of Korean students, the social grammars can be similarly imposing. In everyday language, we speak of “hitting walls” or “opening doors” when encountering obstacles and opportunities. Culturally specific social coordinations in classrooms approximate this insofar as these

conditions change the avenues environmentally available to students depending on their backgrounds. The consequence is that the social situation looks different (is multistable) and has selectively available participatory options (affordances). For example, Korean students are on average more sensitive to hierarchy and constrained by formality when it comes to questioning explorations, especially those that challenge what a professor has asserted. Awareness of these dynamics can help teachers make classrooms more inclusive. To offer an illustration, one might place desks in a circle and teach from the middle, rotating to make eye contact with all students. Such an arrangement cuts off affordances for retreat to the back of the classroom, away from participatory openings, yet does so without singling out any cultural group.

### A taxonomy of affordances in education

Making affordances central to investigations of learning environments draws attention to ways in which educational settings selectively enable or hinder participation, learning and development, which is important in fostering inclusivity. Given this, some fine-grained thinking about different types of affordances is helpful for avoiding overgeneralizations while simultaneously providing practical guidance for teachers. Hence, in this section, we propose what might loosely be called a taxonomy of affordances for use in theoretical as well as practical efforts in inclusive education-building in multicultural learning settings.

In educational contexts and elsewhere, tools are important, but there is debate about what they are. In Heideggerian terms, a tool is grasped by “the way it is used *by people in general*, the way it is used *normally*” (Declerck, 2021, p. 35). In other words, the socio-normative framework delimits what actions ought to be done with a tool, which determines what it is. But this conception is too narrow if we understand tools to be both affordances and manners of exploiting them. Yes, affordances are values on Gibson’s (1966, 1979) account, which seems to imply normative dimensions (also see Rietveld & Kiverstein, 2014). But Gibson (1979, Ch. 8) also specifies that there is multistability when he suggests that a tool – in this case, a rock – can be (valued or used as) a paperweight, hammer, missile or pendulum bob in different circumstances. In education, it is similarly tricky to specify proper ways of doing things since students have unique personalities, preconceptions, histories and cultural backgrounds, which affects how they engage with things in their surroundings. If the aim is to serve a diverse community and promote inclusivity and differentiated instruction, then it is helpful to keep in mind that individuals do not encounter the same affordances even when in the same space.

Affordances avail development in addition to action (Gibson & Pick, 2000), which can be roughly understood in terms of fit and non-fit relations. In educational contexts, near-fit situations (e.g., skiing on familiar trails) cultivate the improvement of existing skills. Overcoming non-fit (e.g., skiing for the first time) is conducive to the acquisition of new skills. Fit and non-fit can also be analyzed into different layers, which, as we will see, sheds additional light on selective permeability and its importance in education. The number of layers is somewhat arbitrary and offered as an aid for grasping some senses that environments afford skill refinement and development, but we propose three: a physical, a cultural, and a participatory layer. Furthermore, none of these are isolated. Instead, lower layers are embedded in higher ones, and are content supplying for them. Simultaneously, lower layers are “*always-already* synthetic with societal processes of meaning” (Pedersen & Bang, 2016, p. 17).

To start, *physical affordances* are the potential interactions that a concrete arrangement offers an agent, an idea Maria Montessori (1912, p. 171) nicely captures in her description of a game that had children place different-sized cylinders into matching holes. Here, equipment “*controls every error*” by modeling (affording) fit and non-fit for the learner. If the student puts any cylinder in an aperture that is too big, there will be at least one piece left that will not fit anywhere. “This self-correction,” in Montessori’s words, “leads the child to concentrate his attention upon the differences of dimensions, and to compare the various pieces. It is in just this comparison that the psycho-sensory exercise lies.” Montessori adds that “when the child with evident security places each piece in its proper place, he has outgrown the exercise.” The non-fit affordance has become too good a fit, so that the child moves on with new materials that affords further development.

Montessori (1912) offers a second instructive anecdote that reiterates the notion of physical affordances. This time it involves a narrow classroom shelf that objects fell from when children handled them. The teacher asked a carpenter to fix the shelf, but “while waiting for him she discovered that the children had learned to handle these materials so carefully” that things “no longer fell to the floor” (p. 85). It was precisely the initial non-fit that refined habits of careful handling that better fit the physical environment. Yet imagine now that Montessori’s class contained a mix of first and fourth years. Compared to those in the older group, the younger and less experienced ones would have struggled to use the shelves as such. However, insofar as they would have eventually gotten the hang of things, Montessori’s account highlights that what we might call “selective resistance” can serve educational purposes. For instance, the earlier described circular seating arrangement might push the shyer Koreans into an uncomfortable non-fit situation since it makes it impossible to hide at the back of



the classroom. Assuming skillful guidance from the teacher, the physical seating organization should enhance (create better fit in) introverted students' capacities to join debates.

While seating arrangements are physical, they are also cultural (Gibson, 1979, p. 128), as are the just discussed learning outcomes with introverted Koreans. At the level of *cultural affordances*, one might say, borrowing from Lev Vygotsky, that "the action comes from the thing's meaning, and not from the thing itself," as when "the *aufforderungscharakter* is transferred to the meaning of the word" (cited in Del Rio & Alvarez, 2007, p. 288). As aural effects, verbal statements are, on the one hand, potential physical affordances. On the other, they are something more insofar as the utterance has a certain import beyond the mere sound, which can in fact be an affordance-making power. This was seen in the previously discussed Confucian encoding of Korean language and its modulation of group coordination in classroom settings. A similar case was shown in the symbolic cordoning of Tahrir Square, which, when combined with other emblems of state authority and the heavy political atmosphere, became culturally marked as dangerous and hence closed to locals in a way it was not to tourists.

In Montessori's (1912) educational system, we may anachronistically say that the distinction between physical and cultural affordances are of special importance. This is illustrated in her method of teaching letters. Students do not begin by learning the names of the letters. Rather, they learn to couple the physical inscriptions (letter combinations) immediately to familiar, one-syllable words (Rifbjerg, 1950). So rather than beginning with relatively empty alphabet sounds, Montessori advises starting teaching multi-letter inscriptions, the pronunciation of which the child already knows and finds meaningful. The idea here is to facilitate spelling by exploiting cultural affordances that learners already have some mastery over. In other words, the fit relation between the child and the verbal use of words is the basis for progressing the child through a non-fit growth situation that cultivates skills with written language. In this way, the physical affordances (the inscriptions and sounds) are embedded in a cultural context of meaning and communication, where the two are connected.

The concept of *participatory affordances* has been deployed in reference to media platforms that invite audiences to take part in content creation (Adler Berg, 2022). Participatory affordances capture aspects of social contexts and practices that pull individuals into engaging in certain manners and developing new ways of taking part (Dreier, 1999). The idea in classrooms is to keep in mind that a student is entangled with the social practice in which she participates. This means that knowledgeable skill, the identity of the participant, the trajectory of participation and the context mutually develop each other (e.g., Lave, 1993).

Researchers, for instance, have observed that inequality in mathematics education is highly dependent on the instruction style and hardly at all on

curriculum, so that performance of women surpasses men in some yet not in other jurisdictions (Boaler, 2002). One reason is that women generally tend to be interested in forming connections, whether with people or things they are studying. They get frustrated with instruction aimed at mere problem-answering proficiency absent understanding of underlying bases (Boaler et al., 2011), such as spatial reasoning that lets us *see* that the Pythagorean theorem literally expresses that the area of two squares (as in the shapes) add up to the area of a third larger square. This sort of thinking is fundamental to mathematics itself and can be taught early with various prosthetics that make learning more “hands-on.” So opening room for girls and later women by constructing learning spaces in ways that are inviting to them should create better outcomes for students in general. Focusing on mere problem-answering proficiency, by contrast, selectively cuts off mathematics by reducing participatory invitations to certain demographics.

The upshot is that learning environments can be selectively disabling to particular students. Examples of this have already been given, and range from mathematics programs that generally favor boys or men to teaching and testing methods that privilege typical Western cognitive styles over Aboriginal and East Asian ones. These are situations of non-fit that do not entail the desired development, but rather exclude certain students. To offer one last example, it is obvious that few human beings are equipped to sit attentively in standard classroom environments. Yet some struggle more, but research shows that even specialized ADHD-pedagogy can entail the exclusion of the very students that were meant to be included (Kristensen, 2013; also see McDermott, 1993). This happens when well-meaning inclusivity agendas produce otherness that makes it hard for students to transcend identification with their disability labels. A promising strategy, however, is to encourage students, teachers and parents to be curious about how ADHD can be advantageous, e.g., ADHD individuals appear to excel at tasks that involve divergent solutions (White, 2019). The idea is to help the students discover that they can effectively do things in nonstandard ways, even when targeting the same goals as peers. Rather than being an encumbrance, non-fit relations can thereby be reoriented into avenues of development, avoiding the selective closure of learning paths for some.

Thus, a key thing to keep in mind is that each student is positioned differently in the social context and has distinct stances toward most kinds of schoolwork. This means that seemingly uniform conditions for participation that applies to every student in the class actually create different possibilities for action, participation and development. This dynamic has been called “situated inequality” (Højholt, 2015), which returns us to where we began: selective permeability. If every student in a class is required to achieve the same outcomes using comparable methods, then the reality is that students are not put in equal situations. To give a close analogy, a mid-20<sup>th</sup> century



cohort suffered prenatal effects from the morning sickness medication, Thalidomide, which could result in severely stunted arms and hands. Such people nonetheless adapted, for example, using their legs and feet to drive, thereby negotiating the same basic affordances on the road that others do. The key, then, is not necessarily to lessen achievement expectations (though some requirements may be poorly thought out). It is rather to allow flexibility in situations of non-fit, so individual adaptation and development can simultaneously occur in physical, cultural or participatory landscapes.

### **Scaffolding atmospheres and affordance approaches to teaching**

An affordance approach to teaching leads to a view of education as a complex and situated practice. A challenge revolves around creating an environment that give students different possibilities, suitable to their individual background, dis/abilities, etc. In the following, we discuss this within the context of scaffolding atmospheres. We also make practical suggestions based on the article's affordance approach to teaching.

The concept of “atmosphere” is widely deployed in education theory to explain a teacher's difficulties as well as successes. Kurt Lewin (1936, 1939) used the notion of social atmospheres to grasp how individuals deal with tensions and challenges and how they develop. More recently, Böhme (2018, p. 23) has said that atmospheres are “the shared reality of the perceiver and the perceived,” in a formulation that gets extremely close to a famous passage from Gibson's (1979, p. 129) last book claiming essentially the same thing about affordances. According to Wolf (2018, p. 218), a teacher can work on the atmosphere on at least three levels: (1) the physical design of the environment, (2) the cultivation of the social situation and (3) by negotiating “the mood in the class and to develop activities that balance the climate out.” From this vantage, a classroom atmosphere has to do with everything from the interior design to the way people fill the space. On the one hand, linear desks, and stultifying content delivery modulate the outward comportment of students and inflect their bodily-social (dis)coordination, doing so in (multistable) ways that can flood the prettiest classroom with a dull atmosphere (Crippen, 2022; also see Crippen, 2021a). On the other, interactive lively teaching and student participation – perhaps combined with natural light, plants, colors, wood plank porcelain flooring and flexible seating – afford more stimulating atmospheres.

Scaffolding is another widely used term in educational circles, especially among those adopting embodied standpoints or promoting inclusive education and differentiated instruction (see Bickhard, 1992). The notion of scaffolding parallels Vygotsky's (1986, p. 187) idea that learning takes place in the child's zone of proximal development (ZPD), defined by what the child is capable of with the help of adults (or more skilled peers). That said,

it is not up to the individual, the teachers or peers alone to decide which avenues will open up since these possibilities are co-created, often in “just-in-time” ways, when agents are concretely in the midst of here-and-now challenges and trying new ways of acting. From this standpoint, it is hopeless and arguably essentialist to try to figure out in advance all the affordances at play in an upcoming lesson or excursion. This is partly because the affordance view on teaching holds that obstacles and opportunities are not solely brought forth by the educational materials, the individual student, the mood of the teacher, or the social dynamics of the class, but constructed through the interaction of all of these factors during real-time engagements. At the same time, teachers can seek student cooperation in constructing inclusive scaffolding atmospheres. One literal possibility is to have them weigh in on interior design choices or participate in building furniture. Other options are for them to lend a hand in designing subject matter and for teachers to simply make adjustments “on the go” when warranted.

The next point has to do with how context makes alternative development trajectories available to different students. We do not necessarily recommend jettisoning evaluations about whether the student is motivated, has the appropriate prior knowledge or adequate self-control (all part and parcel to conventional institutionalized perspectives). But we do suggest that teachers be attentive to scaffolding atmospheres and especially what affordances are present (positive or negative) and how situations can be adjusted in enabling ways. We have repeatedly mentioned using circular arrangements to close protective affordances that introverted students would otherwise use to camouflage themselves at the back of classrooms. But sensitive flexibility is wise. For instance, some of our students with anxiety challenges have reported that sitting at the front of a more standard seating arrangement eases stress by generating a less crowded atmosphere for them since they cannot see most of the class. This relates to the repeated assertion that what happens in class situations is often not determinable in advance. In planning, the teacher can think about affordances as scaffolding properties of the environment. For example, most teachers have had well-planned lessons generate an atmosphere of boredom that cuts off a portion of students. Here, one can stick to the plan or spontaneously adjust things in order to open new participatory avenues.

A last point is for the teacher to be aware that affordances in a learning situation can be a fit for some students and a non-fit for others. But teachers can make this productive. One suggestion is to create normative guidelines about what sorts of questions students should ask each other when solving new problems in groups (e.g., Rasmussen & Schmidt, 2022). Compared to completely free conversation, the norms can steer participants toward more intellectually productive interactions while engendering implicitly differentiated instruction that makes the environment responsive to multiple

learning trajectories. Fortunately, students also self-organize to handle non-fit challenges. As teachers, we have observed students helping a peer negotiate negative affordances brought out by anxiety challenges, ensuring their friend gets to class, providing various supports there. Similarly, we have seen students opening learning avenues by assisting one another with different languages. Students can also actively scaffold atmospheres with their individual cultural perspectives, which can highlight how certain things are multistable and selectively permeable. To this end, students might contemplate the part of the 1942 film, *Casablanca*, where characters sing *La Marseillaise*. Most students and especially French ones, along with other Europeans and Americans, find this part emotionally moving. North Africans may not have this experience because the movie is set before French colonialism ended. Even if one does not have North Africans in a class, this selectively moving scene may help students grasp how marginalizing grammars (in the vein of the political affordances mentioned at the outset) are present to some but invisible to most, which is useful in cultivating inclusivity.<sup>4</sup>

These are some suggestions for how to set up learning situations based on an affordance approach to teaching. Teachers probably already follow at least some of our suggestions. Thus, what we propose here is a theoretically founded way of systematizing an approach to teaching that many in that field hopefully will at least partly recognize in their own practices.

## Conclusion

Understanding the dynamics in processes of exclusion and inclusion is one of the holy grails of educational practice, theory and policy. In this article, we have suggested potential use of affordance theory in this area, as a way of getting hold of some of the complex practices called for by even more complex social realities.

Our case was that the concept of selective permeability gives us a way of understanding some of the processes by which individual students are included and excluded from education. One way we did this was by showing that selective permeable environments are multistable. Here, we specifically drew in cultural insights from historical, neurobiological, perceptual, social psychological and embodied perspectives to show that people literally encounter different openings and closures in environments, which are also registered by the brain and perceived differently. A key implication here is that teaching people by the same methods introduces inequalities. This does not necessarily mean jettisoning achievement levels, but rather allowing pluralistic means of reaching them.

Besides that, we argued for a layered approach to affordances in education. This layered approach allows for a fine-grained analysis of

how situated inequalities are produced in educational settings. This stance toward inclusive education shows how various elements in the learning milieu contribute to situations being selectively permeable and multistable. All this makes room for a practice-oriented approach that accommodates the student's individual differences, abilities, developmental and cultural histories. While these can to some extent be considered in advance, a lot of good classroom work from the side of students and teachers occurs as “joint-ventures” and “on the go,” in the same way that affordance negotiation does. By observing how the educational setting affords distinct actions as well as developmental and participatory paths depending on individual backgrounds, teachers can help cultivate new and inclusive avenues of participation and learning.

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2. Supporting the above-cited, Ekawati and colleagues (2022) found weather affects slant perception and Liu et al. (2018) report that thinking about debts makes hills look steeper and more distant – effects that can be regarded as non-subjective insofar as they follow from depleted energy levels.
3. The version of realist-constructivism advanced here loosely parallels ideas that C. S. Peirce (1878) developed, though he did not especially highlight constructivist sides.
4. Conversations with Najmat El-Ola Gebril, who has been focusing on special programs for children in North Africa, helped us develop this example and deploy it in teaching.

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No potential conflict of interest was reported by the author(s).

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