

‘Practice without theory’: a neuroanthropological perspective on embodied learning

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Apprentices of the Afro-Brazilian danced martial art capoeira – an art said also to develop practitioners’ cunning and savvy – learn primarily through imitation, along with bodily exercises and physical experimentation. They copy the movements of veteran players, haltingly at first, but with increasing animation and integrity. Teaching is primarily mimetic rather than analytic or explicit. If a novice asks too many questions, more than an instructor believes helpful (the threshold is usually quite low), a teacher will remind the student to be silent, watch closely, and imitate. During my field research in Brazil, if we interrupted *Mestre* (‘Teacher’) Moraes with too much questioning, he shouted, *Embora!* (‘Get on with it!’); or, if feeling generous, he might stop us: *Olhe* (‘Look here’). He demonstrated more slowly for those who had failed to catch a technique, punctuating his motions for emphasis at crucial moments with meaningless syllables, *Au ... au ... au ...*

With its acrobatic kicks, sly headbutts, low-to-the-ground dodges, and flamboyant ornamental moves, or *floreios*, capoeira stands out as an especially demanding form of embodied knowledge, apprenticeship necessitating not simply the acquiring of techniques or skills but a whole body transformation in strength, flexibility, mobility, perhaps even personality. Pursued intentionally through specialized training in adolescence or adulthood, the art contrasts in many ways with the (to the practitioner, at least) unremarkable daily habits and gestures that make up the habitus, as discussed by Pierre Bourdieu. Nevertheless, the shared mimetic forms of learning in both capoeira and more mundane corporeal techniques, and the influence of bodily training on capoeiristas’ perceptions, suggest that the confrontation between the style of movement taught in capoeira and the everyday habitus might highlight how embodied knowledge shapes the subject. Practitioners repeatedly asserted that learning capoeira movements affected a person’s kinaesthetic style, social interactions, and perceptions outside of the game (see Downey 2005b).

This chapter specifically explores how imitative learning occurs in capoeira, and sports, dance, and bodily practice more generally, and the psychological, neurological, and physical consequences of acquiring bodily knowledge. Although capoeira may be

an extreme example, the art illustrates how enculturation entails biological development, and demonstrates the neurological complexity of imitative learning. Recent research in psychology and neurosciences allows us to attempt a neuroanthropological account of the cultural tuning of imitative learning. This biocultural study of corporeal mimesis helps to place anthropological accounts of enculturation on a more certain footing, but it also demands that we modify our portrayal of habitus or embodied knowledge (or whatever we call the product of bodily enculturation), allowing that the habitus might not be as consistent, simple, or transferable as some accounts, including Bourdieu's own, might suggest. A neuroanthropological account of mimesis, however, opens up an opportunity to converse across boundaries between anthropology and such disciplines as psychology, cognitive science, and neurology, both to integrate new findings and to assert our interest in cultural particularity and diversity.

Bourdieu argued that practical, bodily action instilled, and was guided by, a socially generated habitus, a 'structuring structure' internalized through interaction with people and the physical environment. In *The logic of practice*, Bourdieu writes: 'The conditionings associated with a particular class of conditions of existence produce the habitus, systems of durable, transposable dispositions, structured structures predisposed to function as structuring structures, that is, as principles which generate and organize practices and representations' (1990a: 53; see also 1977). The habitus, in Bourdieu's model, is history made flesh, a corporeal enculturation that assures social and symbolic continuity while underwriting an individual's sense of autonomy.¹

With the habitus, Bourdieu attempts to overcome the dichotomy between objectivism and subjectivism in social theory, 'the scholastic dilemma of determinism and freedom' (2000: 131). For anthropologists struggling to reconcile a tradition of conceptualizing both society and culture as structure with a growing disciplinary interest in individual agency, the habitus has offered an attractive way to operationalize structure, to suggest that everyday action is both strategic and yet imprinted with the actor's past, and thus society's history (see Ortner 1984). The habitus offers an alternative to concepts like 'culture', 'ideology', 'hegemony', or 'cognitive structure', an alternative grounded more in corporeality and quotidian activity.

Yet, when we look more closely, the habitus concept as articulated by Bourdieu leaves certain key questions about embodied knowledge unexplored. Whereas Bourdieu was primarily concerned with bridging problems of scale – between the individual and social structures, history, or culture – the close analysis of bodily enculturation requires that we also consider the gap between biology and culture, to explore links between experience and our organic nature. Joseph Margolis (1999: 69), for example, criticizes Bourdieu for failing to identify the 'microstructure' of habitus. Margolis warns that there is 'a certain slackness' in Bourdieu's discussion (1999: 68): 'But if we ask *what* the *habitus* is, what the telling features of its functioning structures are, what we get from Bourdieu is a kind of holist characterization that never comes to terms with its operative substructures' (1999: 69, original emphasis). A vague psychology at the centre of the subject may unnecessarily undermine a practice-based account of socialization; as Anthony King describes, '[T]he overwhelming bulk of Bourdieu's work is informed directly by the habitus' (2000: 418).

On closer examination, everyday practices, dispositions, skills, and perceptual systems do not behave precisely like some of the more simplistic models of the habitus,

specifically those that assume bodily activities arise from a set of structural oppositions or are coherent across a range of activities. Ironically, one obstacle to the study of embodied knowledge can be an overarching concept like the habitus, if it leads researchers to consider corporeality only as a theoretical solution to other social and political questions rather than as a site for close examination. The advantage to close biocultural study, however, is that it also tends to buttress the concept of the habitus against the criticism that it is overly deterministic, fails to explain change, or cannot account for variation.

I begin by discussing virtuoso imitation in my field research on capoeira. The example suggests that to ground the habitus psychologically and biologically, we must not just describe what the embodied knowledge *does* but seek to understand how it *comes to be* through an apprenticeship in bodily practices. Because the ethnographic case is an intercultural setting – capoeira in New York City – it highlights that imitation is a ‘significant bottleneck’ in cultural transmission, as Oliver Goodenough (2002: 573) argues. Imitative learning can race ahead of other forms of understanding, so we need better to understand its role in shaping perception and cognition, as the body’s ability to imitate limits the type of learning that occurs in mimesis. The observed developmental trajectories of capoeira expertise clash with any deterministic concept of habitus by undermining the assumption that practice progresses uniformly, as if generated by a single structure. Capoeira apprenticeship, instead, chips away at areas of bodily movement style or *hexis*, sometimes without changing overall attitudes, but other times as part of a gradual, but ultimately profound transformation. Taken as a whole, this neuroanthropological consideration of skill-learning compellingly demonstrates that the area can be a departure point for integrative research on the consequences of enculturation.

Virtuoso imitation in New York

When I moved to New York City, I looked forward to practising capoeira in the academy of Mestre João Grande, a legendary teacher, the *mestre* of my *mestre* in Brazil. Since the 1970s, capoeira has spread from Salvador throughout Brazil and internationally, with teachers now working in nearly every major North American and European city, and in places as far flung as Finland, Israel, Japan, Australia, Argentina, Mozambique, South Korea, and Singapore. Ironically, owing to the art’s globalization, moving from Salvador, my primary field site and the symbolic cradle of capoeira, to Manhattan actually brought me closer to the living embodiment of Afro-Brazilian tradition, climbing the genealogy of master-disciple transmission.

João Grande spoke little English; Brazilians reported that, on occasion, his terse, deeply accented rural dialect of Portuguese was difficult even for native speakers to understand. The taciturn *mestre* taught primarily through demonstration, gesturing and physically manipulating his students’ bodies directly with delicate tugs on their trouser cuffs or wrists. Students watched closely and did their best to copy his intricate combinations, some of which he communicated only with idiosyncratic hand gestures.

Deep cultural divides complicated the transmission of embodied knowledge. João Grande had Brazilian students, but he also taught African Americans, white Americans, Europeans, recent immigrants from the Caribbean, Latin America, and Africa, and even a contingent of devoted Japanese practitioners, some of whom spoke virtually no English or Portuguese. Mimetic channels in João Grande’s classes were often isolated

from other modes of learning; players simply dived into the practice, following the examples offered by more experienced players, at times barely grasping even the names of movements let alone any more detailed explanation.

One young American, however, posed the paradox of mimesis most sharply. James² had become astonishingly proficient in a few short years, developing a subtle ‘old school’ style, something other practitioners labour unsuccessfully for much longer to acquire, even in Brazil. James spoke only a handful of Portuguese words, although he spent many hours with the *mestre*. In spite of the obstacles, James had not merely learned capoeira; he had adopted João Grande’s odd head bobs, distinctive straight-legged steps, sudden jerky movements and shoulder wobbles, a hoarse, tight-throated singing style, even elements of the *mestre*’s dress, such as wearing leather work shoes and a fisherman’s cap when he played. Whether intentionally or not, James had acquired the kinaesthetic quirks and signature gestures of his teacher.³ All the idiosyncratic traits made James’s discipleship instantly legible to a knowledgeable observer; he was a kind of motor reincarnation of his teacher. Through virtuoso mimesis, James had incorporated forms of moving, gestures, and habits across all practical, linguistic, and cultural obstacles.

Mimetic learning and imitation

Bourdieu clearly posts that the acquisition of embodied knowledge – skills, habits, and a ‘sense of the game’ (1977) – is a central issue in his agenda for the sociology of sports:

The problems raised by the teaching of a bodily practice seem to me to involve a set of theoretical questions of the greatest importance, in so far as the social sciences endeavour to theorize the behaviour that occurs, in the greatest degree, outside the field of conscious awareness, that is learnt by a silent and practical communication, from body to body one might say (1990b: 166).

Bourdieu repeatedly argues that behaviour in activities like sports is learned through mimesis, that this learning is ‘silent and practical’, unconscious and purely mimetic, without awareness or other channels of communication.⁴ He often seems to focus predominantly on the question of consciousness. In a convoluted section of *The logic of practice*, Bourdieu elaborates a distinction between ‘imitation’ and ‘mimesis’ on the basis of conscious intention:

[T]he process of acquisition [of habitus] – a practical *mimesis* (or mimeticism) which implies an overall relation of identification and has nothing in common with an *imitation* that would presuppose a conscious effort to reproduce a gesture, an utterance or an object explicitly constituted as a model – and the process of reproduction – a practical reactivation which is opposed to both memory and knowledge – tend to take place below the level of consciousness, expression and the reflexive distance which these presuppose. The body believes in what it plays at: it weeps if it mimes grief. It does not represent what it performs, it does not memorize the past, it *enacts* the past, bringing it back to life. What is ‘learned by body’ is not something that one has, like knowledge that can be brandished, but something that one is (Bourdieu 1990a: 73, original emphasis).

In this passage, Bourdieu alludes to the profound transformation of bodily learning, that what is ‘learned by the body’ is ‘something that one is’. Although he does not use biological language, this chapter argues that, in fact, embodied knowledge can involve forms of material change to the body, an avenue in which past training becomes corporeal condition. Bourdieu even rehearses non-dualistic forms of thinking about

embodiment when he rejects bodily 'representation' and describes the transformative power of training, a way in which we might explore the biocultural mangle of development. But in trying to characterize the distinctiveness of corporeal learning, contrasting conscious and non-conscious forms of imitation, Bourdieu insists upon a pernicious hard division between propositional and embodied learning, one that, ironically, paints practice theorists into a corner when observing skill education.

Bourdieu repeatedly insists that habitus is necessarily non-conscious and inarticulable, in marked contrast to declarative memory, and that bodily knowledge is acquired without intention or awareness. I have elsewhere argued that many forms of physical education, like capoeira, are neither so quiet nor closed to reflection; in fact, capoeira classes can be quite raucous, and the best teachers 'scaffold' students' imitation with diverse techniques that reveal sophisticated practical awareness of how to facilitate mimesis (Downey 2008).⁵ By Bourdieu's definition, if they are conscious, learned movements cannot be part of the habitus, even though they may confront, even transform, key habits, postures, or characteristics of habitus.

Bourdieu's insistence on non-consciousness is in keeping with the more widespread observation in studies of motor learning that, even with the overt intention to learn, skill *itself* cannot be rendered as explicit, declarative knowledge. As Bourdieu writes, 'There are heaps of things that we understand only with our bodies, outside conscious awareness, without being able to put our understanding into words ... Very often, all you can do is say: "Look, do what I'm doing"' (1990*b*: 166). Because he represents imitative learning as a non-conscious 'silent and practical communication, from body to body', Bourdieu suggests that mimesis is related to 'practice without theory', a phrase he borrows from Émile Durkheim (in Prendergast 1986: 7). But why is he so emphatic that transmission must not be conscious when we can observe in many forms of bodily training that the body must be brought into and out of consciousness in order to focus upon a technique before it becomes automatized (see Leder 1990)?

The portrait of mimesis 'without theory' or conscious intention is a hallmark of 'practice theory'. Practice theorists, following on the example of Bourdieu (1990*a*: 74), assert that a kind of practical mimesis allows a set of corporeal schemes 'to pass directly from practice to practice without moving through discourse and consciousness', so that they are liable neither to mistaken transmission nor to principled or practical opposition (see, e.g., Kraus 1993). The habits acquired through mimesis are essential to accounts of embodied socialization because they are typically treated as the foundation for an agent's perceptions, strategies, and 'common sense' (see also Throop & Murphy 2002: 188). So, although it is 'without theory', the habitus serves to inculcate subconscious intellectual values, systems of categorization, and perceptual schemas, all very 'theoretical'; Bourdieu 'overcomes' the dichotomy between structure and agency by insisting that the agent is non-consciously structured.

Although I single out Bourdieu's model of the habitus, models of practical mimesis serve as a channel of socialization throughout much of social thought. Stephen Turner (2002: 61-4; see also 1994: 44) highlights how Max Weber, Gabriel Tarde, James Mark Baldwin, and George Herbert Mead all employed imitation in social theory. Turner identifies a broad stream of theorists deploying 'practice' theory, including Oakeshott, Polanyi, Ryle, Gadamer, and Rorty (Turner 1994: 2-3). Imitation even figures prominently in evolutionary theories of behaviour, such as Richard

Dawkins's (1976: 206) notion of 'memes', with bits of culture treated as if self-replicating through imitation.

The turn in contemporary anthropological theory toward bodily practice, away from culture as social rules, or purely cognitive or semiotic structure, is a salutary development for those interested in apprenticeship, skill, and practical knowledge, but it has not always been accompanied by careful attention to physical education or physiological change. The under-theorization of mimesis is part of a tendency to neglect enculturation, as Robert LeVine (1999) suggests, perhaps because of aversion to psychology or person-centred theoretical models. What we find in capoeira is that bodily learning can bring to conscious light some of the movement traits, postures, and tendencies that may have once been unconscious, but become problematized in transformative apprenticeship. As the novice seeks to imitate new styles of moving, one of the central obstacles he or she must confront is unconscious patterning, unexamined inhibition, and corporeal reservations that are only apparent when challenged by new kinaesthetics. When we examine the biological consequences of training, we can recognize other forms of embodied learning that may not involve passing subconscious cognitive structures; rather, training may demonstrably affect physiological change in the brain, nervous system, bones, joints, sensory organs, even endocrine and autonomic systems. Transformation of the habitus is not simply changing an underlying 'structure' but altering the organic architecture of the subject.

Imitation without intention

One of the reasons that imitation is under-explored is that the ability is so pervasive and unproblematic for humans; as Michael Tomasello (1999: 159) describes, children are 'imitation machines', seeming to imitate without difficulty. In their studies of infants, psychologists Andrew Meltzoff and Keith Moore (1977; 1983; 1989) documented basic forms of imitation within hours of birth. Richard Byrne and Anne Russon (1998: 667) point out that imitation was long considered an intellectual 'cheap trick', characteristic of animals, children, savages, and the mentally deficient. Something so effortless needs little explanation.

Although we seem to be well suited for it, however, the ethological evidence suggests that imitation is anything but easy. More than a century ago, Edward Thorndike (1898) observed that many species learn by inductive trial-and-error processes; virtually no animals other than humans, however, do so by extensive imitation. Aside from certain birds talented in vocal mimicry (perhaps easier because one hears both the model and one's own calls), and a few limited cases with primates and social animals, over a century of research on imitation has borne out Thorndike's observations. Ethologists disagree about what constitutes imitation (or what distinguishes it from 'emulation') and to what extent other animals demonstrate some potential. All researchers agree, however, that no other species even approaches humans' ability (see, e.g., Caldwell & Whiten 2002; Galef 1988; Heyes & Galef 1996; Hurley & Chater 2005; see also Donald 1991).

Psychologists studying imitation identify the 'correspondence problem' as the challenge of matching a visual image of what someone else does with a pattern of motor control (see Brass & Heyes 2005; Bruner 1972). Any animal that copies an action must somehow figure out which muscles to use and how, translating visual perception of another into a kinaesthetic formula for acting. At the same time, the animal must

recognize what another intends to do and ascertain relevant input from the environment. Judging from other species, the correspondence problem is more daunting than we realize.

In capoeira instruction, teachers are aware that imitation is a challenge and use a wide range of techniques to scaffold students' imitation. A partial list includes: slowing down the model movement; parsing the target technique into component gestures; shifting between facing-toward and facing-away models; offering verbal formulae to aid sequence recall; physically manipulating the students' bodies; artificially limiting a student's degrees of freedom; abstracting parts of a technique; creating meaningless movement drills to teach basic component gestures; making an interacting player's actions fixed in drills, and many more, some invented on the spot (see Downey 2008). The more difficulty a student has, the more resourceful a skilled instructor can be. As psychologists David Wood, Jerome Bruner, and Gail Ross (1976: 89) recognize, our species' remarkable ability to learn derives not merely from our intelligence as learners, but also from our skill as teachers.

Even so, the remarkable mimetic ability of our species demands greater explanation. How do humans learn by imitation so readily when so few other species seem to do so? Social, developmental, perceptual, and even motor factors contribute to our ability to imitate, but humans' extraordinary imitative ability also appears to be facilitated by our neural architecture, specifically the strong likelihood that one's own actions, the perceived actions of others, and imagined actions are all represented in the brain in similar fashion, using neural systems that substantially overlap. That is, we may perceive others' actions as meaningful by converting them into first-person simulations, with significant consequences for intersubjective relations among people. Mimetic learning may be 'without theory', at least in part, because we perceive using neural resources that substantially overlap with those used to act, shortening significantly the leap from seeing to doing, 'reading' other people's actions at least in part with our own sense of movement. In other words, motor perception is inherently, neuroarchitecturally, intersubjective.

The neural 'common coding' of action and perceived action was hypothesized by William James (1890), but increasingly evidence from a range of fields, including brain imaging studies, neuropathology, behavioural psychology, and child development, is converging to support his hypothesis. For example, studies of 'chameleon behavior' in psychology find that people are 'primed' to act by simply observing another act, and that they sometimes unconsciously mimic actions that they observe (see Bargh, Chen & Burrows 1996; Chartrand & Bargh 1999). Likewise, 'interference' between observed and attempted actions, the chance that seeing someone do an action will confuse a person doing another, different action, also suggests that these two functions share a common form of representation in the brain (Brass, Bekkering & Prinz 2001; see also Blakemore & Frith 2005).

Theories of common motor and perceptual coding are sometimes referred to as 'ideomotor' (James) or 'simulation' (Gallese) approaches to motor perception (see Gallese 2005; James 1890; Jeannerod 1994; Prinz 1990). The plausibility of ideomotor or simulation neural theories of imitation received a substantial boost in the 1990s with the discovery of 'mirror neurons', specific individual neurons in macaques that are active when both performing and seeing an action (see Rizzolatti & Craighero 2004). Later neuroimaging data strongly indicate that similar systems exist in humans and are involved in imitation (see Iacoboni 2005; Iacoboni *et al.* 1999). Although controversy

dogs some of the more sweeping generalizations about the functions of mirror neurons, imitative learning seems to be one of the most convincingly demonstrated spheres of their activity (see, e.g., Buccino *et al.* 2004).

If the neural mechanisms underlying imitative learning involve the common coding of action with perception of action, this severely undermines the plausibility of an overarching global habitus either generating action or being engendered by practice. As Wolfgang Prinz (1990) asserts in his discussion of the common coding hypothesis, the competing, standard model of perception and action, dominant since Descartes (and opposed to the ideomotor theory), is that perception and action are fundamentally separate, with the necessity of some overarching framework – what Jerry Fodor (1975; 1987) has called a ‘language of thought’ – or an intervening, separate level of mental representations to translate between them.

According to Bourdieu, the habitus, although embodied and unconscious, is a constellation of ‘cognitive structures which social agents implement in their practical knowledge of the social world as internalized, embodied social structures’ (1984: 468, cited in King 2000: 423). In other words, they are one’s social position internalized cognitively as dispositions to act in status-appropriate ways. In *Pascalian meditations*, Bourdieu explains that ‘[t]he specific logic of a field is established in the incorporated state in the form of a specific habitus, or, more precisely, a sense of the game, ordinarily described as a “spirit” or “sense” ... which is practically never set out or imposed in an explicit way’ (2000: 11). The ‘most characteristic operations’ of the habitus are ‘movements of the body, turning to the right or left, putting things upside down, going in, coming out, cutting, typing’ (1977: 116) – simple everyday movements and actions. And yet the habitus is a system of dispositions that categorizes and divides things ‘into logical classes which organiz[e] the perception of the social world’ (1984: 170); or, as Bourdieu elsewhere puts it, the ‘schemes of habitus’ are ‘very generally applicable principles of vision and division’ (1990a: 139).

Although he insists it is a ‘practical systematicity’ (and ‘without theory’), Bourdieu keeps lapsing, even if only metaphorically, into abstract terms because he seeks to describe this generative system as removed from and superordinate to the actual practices. As he writes, borrowing the linguist concept, ‘[H]abitus is a generative grammar’ (2002: 30). In summary, although Bourdieu repeatedly asserts that the habitus is embodied and unconscious, a system of socially arranged learned instincts developed through bodily practice, the habitus behaves in many of his metaphorical discussions as an implicit cognitive structure or system of categories; this mode of description suggests a model of perception and action in which the two are not commonly coded, but rather linked by a separate, unifying cognitive structure (other than the body or nervous system itself). I would argue that the use of theory-like metaphors to talk about practices that are ‘without theory’ may result from the simple lack of an alternative language; incorporating more biology may simply clean up a distinction that Bourdieu clearly wants to make.

Ideomotor theories argue that imitation is achieved easily because perceptions of motor activity are accomplished by simulating the same motion with minimal intervening complexity or superordinate cognitive structure. Vittorio Gallese and George Lakoff (2005: 456) describe how, in contrast, classical models of cognition draw a sharp distinction between perceptual input and active output in the brain. Similarly, the model of the habitus suggests that some *other*, higher-order abstraction must be involved in generating action, and this structure must be inculcated through mimetic

training. If motor activities are perceived directly by the same parts of the brain used to execute motor action, and in the same 'language', as ideomotor models suggest, they have no need for any sort of other unconscious ideational or cognitive structure; we have true 'practice without theory'. The only problem is that the habitus from this perspective is not nearly so globally unified or easily characterized; it may be liable to partial change; and it may be susceptible to conscious examination. The ideomotor perspective does not detract from the importance of mimetic learning, but from the assumption that there must be a simple categorization-like structure expressed in practice.

Ironically, Oliver Goodenough argues, the ease with which humans learn by imitation indicates that imitation is likely a 'significant bottleneck in what can be passed on culturally' (2002: 573). Imitation may be easy, but it is 'superficial', consisting of action itself. Psychologist Cecilia Heyes reports that recent behavioural experiments and neurological evidence suggest that 'symbolic mediation is unnecessary ... for imitation learning' (2005: 172-3). Since action is perceived *as* action and reproduced without translation into some other, abstracted neural representation, imitation is likely not a good channel to transmit implicit structures, hidden premises, or shared presuppositions (see also Turner 1994). Goodenough explains: 'This action-to-action step in the transmission process creates a very narrow doorway through which human culture must pass, a true bottleneck' (2002: 575-6).⁶ Heyes goes so far as to conclude that the evidence of ideomotor supports for imitation makes mimesis 'unlikely to provide a basis for cultural exchange' (1993: 999).

If practice is learned through imitation – if it is truly 'without theory' – then we likely neither incorporate an underlying cognitive structure when we perceive movement, nor do we need one to execute action. This argument takes us to the biocultural heart of the habitus, what it is, how it could come to be, and how it might help us to explain human activity.

Habitus as embodied knowledge

The 'imitation bottleneck' is a formidable ontological and developmental obstacle for any account of the habitus, but the concept is certainly worth salvaging with a more robust model of enculturation, one including other channels of communication, even the conscious ones that Bourdieu is at such great pains to deny. However, we are still confronted with the problem of systematicity, a trait that I find inconsistent with neurological evidence of how motor learning occurs and the complexity of neural perceptual-motor processes. Ironically, Bourdieu has come under criticism for asserting the homogeneity of the habitus from a range of other perspectives, even though he resolutely defended his position.

For example, Bourdieu highlights the unity and systematicity of the habitus, insisting that it is radically simpler than the behaviour and strategies it engenders, in one of his last accounts of the concept:

[T]he habitus of a determinate person – or of a group of persons occupying a similar or neighbouring position in social space – is in a sense very systematic: all the elements of his or her behaviour have something in common, a kind of affinity of *style*, like the works of the same painter or, to take an example from Maurice Merleau-Ponty, like the handwriting of a person who keeps her style, immediately recognizable, when she writes with instruments as diverse as a pencil, a pen or a piece of chalk and on media as different as a sheet of paper and blackboard. To this example gives a concrete intuition of this systematicity. It is not a logical systematicity; it is a practical systematicity (2002: 28, original emphasis).

He goes on to offer as an example the unified ‘lifestyle’ of the bourgeoisie, in which speech, finances, and love all follow the same principle (2002: 29). In his ethnographic writing about Algeria, Bourdieu argues that the habitus is ‘a system of durable, transposable dispositions which functions as the generative basis of *structured, objectively unified* practices’ (1979: vii, emphasis added). An agent’s actions are made by the habitus, which is not merely a haphazard assemblage of dispositions, but rather a coherent system. When Bourdieu uses the habitus concept to analyse sociological and ethnographic data – for example, in his discussion of the Kabyle house (e.g. 1990a: 271-83) – the simplicity of the habitus and its ability to generate an utterly systematized dualistic worldview of male and female, light and dark, east and west, closely resembles a structural analysis (as other critics have pointed out).

In my ethnographic research, capoeira practitioners described something very much like the habitus in the art, an implicit ‘sense of the game’ that practitioners allegedly develop through apprenticeship. Although practitioners disagreed about many things, they were relatively unanimous in arguing that the *fundamento*, or ‘secret foundational matter’, of capoeira is *malícia*, or ‘cunning’.⁷ *Malícia* is a kind of streetwise savvy, an opportunistic eye, a gift for evasion and trickery, and a playful ability to overcome dangers in everyday life (see Downey 2005b: 123-5ff.; Lewis 1992: 49). One could very easily call it a capoeira ‘lifestyle’, an attitude used to confront many dimensions of life. When Mestre Nestor Capoeira describes *malícia*, like Bourdieu, he claims it is practical, learned mimetically, and unified: Nestor calls *malícia* ‘non-rational, lived, experiential knowledge’ (2002: 24).

Its basic theme is: within this ‘valley of tears,’ inside this cruel jungle that is our world, the capoeira player has an inner psychological structure and a vision of life, as well as the practical means for his economic survival ... that will permit him to take and enjoy the best that life has to offer (2002: 20).

The acquisition of *malícia* also resembles Bourdieu’s account of the habitus. Over the course of apprenticeship, according to Nestor, the player ‘begins to accept’ *malícia* as a guiding principle, even though non-conscious,

in the roda [ring] when playing with his colleagues, in his relationship with his teacher, and in his daily life ‘outside’ capoeira. He begins to feel (and I mean ‘to feel’ and not ‘to think rationally’) all of that as a part of the reality of life (which he did not see, or did not want to see or accept before) (2002: 19).

Malícia is neither explicitly taught nor learned, according to Nestor, although the movements and playing techniques themselves are intentionally acquired:

It is realized by playing the game with different players, inside the roda to the sound of the berimbau [the principal musical instrument in capoeira], over the years. It’s not something that can be rationalized. It’s not something that can be understood by the mind, although it is, itself, a form of understanding. It is, yes, a living, experiencing, absorbing, digesting, incarnating (1992: 121-2).

Other Brazilian observers have also noted links between comportment, class position, and worldview in capoeira, much like the habitus, even describing the practitioners’ distinctive swaying gait as a sign of an opportunistic flair for living among *malandros*, cunning ‘rogues’ of the lumpen-proletariat who survived on their wits (see Downey

2005b: 127-33). *Malícia* would seem to be an ideal analogy to the habitus, even if it is learned later in life than everyday movements: class-based, embodied, flexible, social opportunities internalized, and admittedly opaque or immune to articulation as a philosophy even if practitioners were eloquently evocative.

But, here's the rub. Was James, this prodigious mimic in New York City, becoming more *malicioso*, or cunning, as he developed into a virtuoso physical performer? Of course, an observer cannot say for certain; the best way to conceal one's *malícia* would be to feign innocence. But I did not observe heightened wariness or cunning in anything he said or did outside the capoeira *roda*. The same traits that made him such a quick study and exemplary student – his diligence, patience, dedication, humility, work ethic, and sharp-eyed attention to detail – still shone through.

Even the optimistic, spiritualist Mestre Nestor Capoeira acknowledges that some players become exemplary physical practitioners without developing a *malicioso* outlook on life. Others who have very weak physical techniques and a limited movement repertoire seem to play above their level with extraordinary cunning. During my field research in Brazil, some capoeira *mestres* lamented that their students, who played capoeira only in academies, did not develop the overall outlook on life of practitioners of old, who became savvy and street-smart because they played in dangerous open, public *rodas* and had to survive on their wits.

As I survey my memory of practitioners, I find inconsistency across their achievement: one was good mostly at fast games, lousy at slow; another played solidly but without much flair; another was a sly composer of songs but overly nervous if pressed aggressively during a game; a novice who quickly mastered certain moves struggled with others. Capoeiristas recognize variety and inconsistency in practice. They recognize that some inhibitions give way faster than others, that practice takes hold in fits and starts. Some students simply never got that good, even though they had the same opportunities to learn and train. Proficiency was hardly uniform, nor was it gained at a single gulp, as if generated by a single schema.

In other words, Bourdieu insists that the habitus is a single, simple generative principle that creates practice; the unevenness of learning, the slow pace, inconsistency, and piecemeal acquisition of techniques in capoeira suggests a much more complex, diffuse process, even if it is only that the obstructing unconscious habitus gives way unevenly to attempts at its transformation. Expertise in capoeira was as varied as the experts, never mind the incomplete forms of bodily knowledge owned by those who gave up or stalled along the way. The 'sense of the game' in capoeira is diversified, slowly acquired. This 'sense', or, more accurately, 'senses', includes a range of abilities and tasks: learned reaction patterns to another's movements; visual attention, including during difficult tasks like acrobatic movements; joint mobility and muscular strength; heightened susceptibility to particular stimuli, such as musical rhythms, and the ability to deal with competing stimuli, such as feints or distractions; cardio-vascular endurance, including techniques for self-control, even the ability to surrender control of bodily pacing and tension to the orchestra; and a 'sense' for the dramatic or humour that takes various forms. Players learn in idiosyncratic fashions and fail to learn in equally idiosyncratic fashion. Teachers do things in diverse ways, some of them more effective for some students than others. Mestre Pastinha argued that *cada qual é cada qual*: 'each one is each one', capoeira skill was unique, peculiar to the practitioner.

In summary, the ideomotor theory of movement, neurological evidence, and the ethnographic demonstrations of uneven bodily transformation suggest that a person's habitus is likely composed of a great diversity of motor skills, in places weakly coupled, some of them characteristic of different social positions and learning experiences. 'The' habitus for capoeira is actually a concrete set of perceptual-motor skills and modifications to the organic body. Different practitioners acquire them unevenly. Moreover, many skills take a long time to acquire because they actually necessitate physiological change: stronger muscles, greater flexibility, more acute perceptual-motor ability, and slowly developed, incrementally learned patterns of behaviour. As recent research in neurosciences continues to reveal, perceptual and motor learning entail physiological change (see, e.g., Paz, Wise & Vaadia 2004).

Theories of modularity or modularization in the brain, known principally in anthropology through the work of Noam Chomsky (see 1988), also imply that a unified structure of thought is unlikely (see Fodor 1983; 2000).⁸ When one studies carefully how the brain and body work, one finds organs that do not need to simplify complex processes into generative structures, or require top-down control by overarching schemes to produce emergent consistency. As psychologist Annette Karmiloff-Smith suggests, human 'development does not seem to be a drive for economy' (1992: 23). The notion of a unified structuring structure is elegantly modernist and functional; the human brain and body, however, are baroque, cobbled together by evolution, biological processes, and individual development. The brain has redundant, conflicting structures. Rather than a single structuring structure, the brain appears to be full of what Andy Clark (1989: 69) has called 'kludges', systems that look messy and inefficient from a design perspective. Effort is changed into ability only over time and through gradually accumulating change, and it may have a very narrow range of application.

In an example I have discussed elsewhere (Downey 2007), the visual system consists of several circuits that do not share all the information that they produce, nor do they operate according to the same principles (Jacob & Jeannerod 2003). For example, the dorsal visual pathway for motor control and the ventral visual pathway, which allows for object recognition and conscious visual awareness, do not share all information; this is why a person can duck to avoid a flying object without recognizing what it was. Conversely, the dorsal pathway, although it orientates action, does not provide information for long-term memory as readily as the ventral object recognition system. Training may affect one system more than another, even parts of a system rather than the whole. Some parts of these visual systems only respond to specific sorts of stimuli: for example, mirror neurons only activate when viewing organic movements that one has learned, not when observing robotic simulations of the same actions.

Brain modularization suggests that cognitive schemas, if they do exist, likely cannot affect all motor and perceptual activity. Everyday automatic activity, perceptions, and unconscious dispositions – precisely the sort of activity that the habitus allegedly explains – are among the *poorest* candidates for a unifying treatment (consciousness, in contrast, might be a domain-general function). Therefore, to compile diverse training, skills, and perceptual abilities into a single 'structured structure predisposed to function as a structuring structure' reduces observed complexity and discontinuity. Instead of a unified, abstract habitus, we observe cultural diversity in development, affecting different biological systems in a range of ways. How training would affect our visual

system, for example, with its distinct channels, is an empirical question liable to research; because we are investigating the effects of diverse forms of enculturation, ethnography and careful attention to cross-cultural variation are an essential part of that research.

'Embodied knowledge' in place of 'habitus'

Ian Hunter and David Saunders (1995) offer a fascinating discussion of Claude Lévi-Strauss's introduction to the works of Marcel Mauss. According to Hunter and Saunders, Lévi-Strauss reads Mauss's discussion of bodily techniques as incomplete because Mauss did not find the 'unconscious mental structures' which gave rise to the diversity of techniques (Lévi-Strauss 1987: 49, cited in Hunter and Saunders 1995: 67). Lévi-Strauss thinks that Mauss's work is 'merely a preliminary procedure'; in contrast, Hunter and Saunders recognize that Mauss is 'resolutely non-dialectical'. Flying in the face of later practice theory, Mauss writes that 'those human attributes we call "bodily" and "mental" have no essential relation to each other. No relation of identity or opposition, of unity or difference' (cited in Hunter & Saunders 1995: 69). Not that the 'bodily' and 'mental' have *no* relation, but just that they not *no essential* relation; depending on the bodily technique, they may have quite complex relations, but these are heterogeneous, diverse, reversible, and require empirical study.

Our path forward, if we recognize that the habitus may in fact be incompletely unified and heterogeneous like the brain, is to extend the radical restraint that Mauss exhibited, to patiently work out the connections between individual 'bodily' and 'mental' attributes in greater detail. We will find pockets of continuity, recurring systems that have their own consistency, but they will likely not be on the level of the whole body; they will be issues like the imitation bottleneck, modular systems that tend to do certain sorts of tasks, with greater and lesser degrees of plasticity.

In other words, I do not advocate that we replace the 'habitus' with a better concept; the evidence I cite suggests that embodied knowledge is crucial for all the reasons Bourdieu identified, even though it is not as unified as he sought to argue. Bourdieu overcame the theoretical dualism between subjective action and objective social structure, spanning the gap in scale between the individual's actions and social reproduction. His subtle descriptions of the role of bodily learning avoid body-mind dualism, but he fails to incorporate any evidence of organic or psychological processes, so we are still left with a bloodless, nerveless abstract 'body', a continual problem for exclusively cultural discussions of embodiment. As Tim Ingold has argued, '[S]kills are literally embodied, in the sense that their development entails specific modifications in neurology, musculature, and even in basic features of anatomy' (2000: 375). Close attention to skill acquisition holds out the promise of integrating biological and cultural approaches to enculturation, placing the discussion of habitus on a solid foundation. Far from 'biological determinism', a kind of cultural-biological dynamism prevails when we recognize that gene expression in muscles depends upon their use, that skills training modifies the body's neural systems, and that such basic traits as bone density and composition are affected by behaviour patterns.⁹

Conclusion

Instead of simply asserting that culture is 'embodied', we should engage actively with those disciplines – human biology, functional morphology, neurosciences, cognitive and neuropsychology – that specifically study the human body, its malleability, and the

material dimensions of learning processes. In those fields, we can ally ourselves with scholars who recognize the complexity and dynamism of human organic development, as Marchand suggests in his introduction to this volume. The study of sports, dance, musical apprenticeship, and similar physical practices makes clear that skill is not simply the 'embodiment' of 'knowledge', but rather physical, neurological, perceptual, and behavioural change of the individual subject so that he or she can accomplish tasks that, prior to enskilment, were impossible. If anthropological discussions of 'embodied knowledge' contend with humans' organic nature, we will better integrate social and cognitive theory and may bring anthropological concerns to a much wider audience interested in the social conditioning of the brain. As research in the neurosciences yields abundant evidence of the fine tuning of the nervous system by experience, we find opportunities to enlarge concepts like the habitus to include insights from other disciplines that study the subject from a variety of perspectives. We must be open to the possibility, however, that even key concepts may require significant modification as a result of the exchange.

Unfortunately, this retrenching of theoretical ambitions, the renunciation of generalized structuring structure like 'habitus', may make the resulting analysis appear superficial, the theorizing insufficiently bold. To talk about habitual bodily tension, postural muscle and its relation to stress, looking behaviour such as visual scanning patterns, socialization and forms of social interaction, invites the criticism that the theorizing is shallow, pedestrian, disorderly. As Lévi-Strauss writes about Mauss, his careful analysis of 'miscellaneous' bodily techniques could be transcended: '[I]t was a matter of distinguishing a purely phenomenological given, on which scientific analysis has no hold, from an infrastructure simpler than that given, to which the given owes its whole reality' (Lévi-Strauss 1987: 41, cited in Hunter & Saunders 1995: 67). Relinquishing Lévi-Strauss's assertion of a single infrastructure, however, reveals an immense space of heterogeneous 'operative substructures', some of them neurological, that we might fruitfully study.

In fact, what underlies the diversity of practices is not a cognitive 'infrastructure simpler than that given' but the culturally malleable biological structure that was there all along: the human body itself, including the complicated neural systems that turn experience into physiology and perception. The 'deep structuring' of practice is a deep enculturation of specific bodily systems. For example, training in capoeira shifts the sensory channels that a person draws upon to balance, develops top-down techniques for relaxing muscles and diffusing tension, and fashions behavioural patterns that bring previously unnoticed sensory information to awareness (habits of looking around suspiciously, for instance).

Although Bourdieu's theory of the habitus focuses attention on bodily habits, skills, and non-discursive modes of knowing, it does so in service to other intellectual ends: to explain social class or dispel the dichotomy between structure and agency, for example. In contrast, the study of embodied knowledge as deep enculturation of the body can take these practices as research objects themselves, bringing together biological and cultural approaches, just as Bourdieu brought together sociological scale processes with individual subjectivity. This requires psychologically plausible accounts of skill development and engagement with those fields that take the body as their object of study (see Downey 2005a).

Anthony King has argued that the habitus is not a satisfactory account of how subjectivity arises, that Bourdieu's discussion of mimesis, as he puts it, casts 'a shroud

of deadening objectivism over living interactions between virtuosic individuals' (2000: 429). If we do not seek to expand the account of enculturation beyond the brief discussions by Bourdieu, King is right; we satisfy ourselves with a cursory account of motor learning, skill acquisition, perceptual training, social interaction and other subtle forms of cultural learning. Moreover, we assume that mimesis happens – unconsciously, invariably, unproblematically, and without error. Automatic and unexamined mimesis as a social theory rules out the possibility of error, failure, idiosyncrasy, or unintentional innovation in the process of each novice's guided discovery of skills. In fact, these occur all the time in our ethnographic research.

To return to Bourdieu's discussion of mimetic learning, and to the notion of 'practice without theory', in *The logic of practice*, he writes: 'What is "learned by body" is not something that one has, like knowledge that can be brandished, but something that one is' (1990a: 73). 'Embodied knowledge' is the body, the organic entity modified by behaviour, training, and experience, deeply encultured. Bourdieu did not realize how revolutionary his formulation was for biocultural approaches to enculturation; his attention was focused elsewhere. Calling this transformation 'habitus' or treating it as cognitive structure only postpones this recognition. Skill learning is not the internalization of a shared 'sense' or transmission of a reified cultural structure. Rather, enskilment is the patient transformation of the novice, the change of his or her muscles, attention patterns, motor control, neurological systems, emotional reactions, interaction patterns, and top-down self-management techniques. Opening up the habitus to exploration, recognizing that it is a stand-in for the organic body, filling in some of the substructures, allows us to explore the baroque, diverse, and surprising channels through which culture in training takes hold of us all.

NOTES

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¹ See Anthony King's (2000) discussion of the relation of the habitus concept to Bourdieu's 'practical theory'. This paper leans heavily on readings of King, as well as Crossley (2001), Margolis (1999), and Throop & Murphy (2002) for its discussion of imitation in Bourdieu's work.

² This student's name is a pseudonym. Masters are referred to by their public names (*apelidos*).

³ Some of the movement traits that James adopted were also a result of changes in João Grande's body, such as ongoing problems with arthritis in his knees. Students of João Grande who worked with the *mestre* earlier often did basic techniques differently. James was so capable of imitation that he was acquiring traits of João Grande's body, such as the effects of ageing on his mobility; the communication between the two transformed João Grande's physiology into James's 'embodied culture'. This example highlights the difficulty of treating bodily development and skill training as forms of 'culture' or 'knowledge', as these are typically understood.

⁴ This discussion of imitative learning has very little to do with the discussion of mimesis in the work of such theorists as Walter Benjamin (1968 [1936]; 1986 [1933]), Theodor Adorno (1984), Max Horkheimer (Horkheimer & Adorno 2002), Michael Taussig (1993), Homi Bhabha (1984), and Paul Stoller (1995). For these thinkers, the dominant archetypes for understanding mimesis are theatre, semiosis, sympathetic magic, or mass production rather than imitative learning. Although these innovative discussions of cultural mimesis have inspired significant insights, they leave unexplored the practical and perceptual capacities that lie at the core of human mimesis.

⁵ Although socio-cultural learning theorists typically trace their perspective to the work of Lev Vygotsky (esp. 1978), Wood, Bruner & Ross (1976) were the first to use the term 'scaffolding'. On pedagogic scaffolding, see also Bliss, Askew & Macrae (1996), Downey (2008), and Pea (2004).

⁶ In fact, Goodenough's argument is a much broader one about 'cultural replication'. He insists, "Ideas" as such do not replicate – there is no direct brain to brain link that allows the transmission of the internalized information structure' (2002: 574). However, he does not question whether this might undermine the notion of an 'internalized information structure'.

⁷ This definition of *fundamento* is from Paul Johnson's (2002: 4) discussion of the Afro-Brazilian religion Candomblé.

⁸ Part of the reason modularity is resisted in anthropology is the adoption of the term by evolutionary psychologists (for a critique, see Fodor 2000). Trevor Marchand has been especially helpful in expanding my understanding and awareness of the debate about modularity.

⁹ On gene expression in muscles, see Halayko & Solway (2001) and Vogel (2001); on bone structure and composition, see Fausto-Sterling (2005).

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