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**Situating embodied cognition and its
 relevance to music and dance education**

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Outline

1. Influence of embodied cognition
2. Different versions of embodied cognition
3. Embodied cognition and expertise
4. Implications for music and dance education
5. Some questions

Influence of embodied cognition

- Philosophical traditions of mind-body dualism.
 - Primacy of ideational/intellectual processes
 - Body as irrelevant except for sensory input and motor output
 - Carried over into the (1950-80s) “cognitive revolution”—computational and representational processes “in the head” (mind or brain) = internalism.

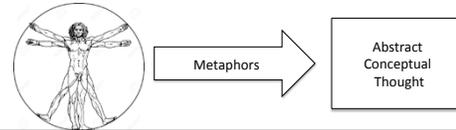



- **The embodied mind** Starting in the 1990’s (Varela, Thompson & Rosch 1991), drawing on phenomenology—in contrast to internalism/cognitivism/computationalism. 
- The body, situated in the surrounding environment (physical and social) plays a constitutive role in cognition.
- Basic cognition and human intersubjectivity are deeply and inextricably embodied, environmentally embedded (situated) closely tied to action, and extended (distributed) into the use of tools, technologies, and other aspects of environment.
- Influence – cognitive science, psychiatry/therapy, more recently humanities, the arts, concepts of expertise, performance.

Different versions of embodied cognition

- General agreement vs. internalism, but still some philosophical disputes within EC and no overall consensus.
- What does ‘embodiment’ or ‘embodied cognition’ mean?
 - Semantic embodiment
 - Biological embodiment
 - Functionalist embodiment (extended mind)
 - Radical embodiment (enactivist approach)

1. **Semantic embodiment:** higher-order cognition begins in spatial and motor behaviors and derives meaning, via metaphoric structures, from bodily experience.
- Metaphors are built on basic and recurring image-schemas such as front-back, in-out, near-far, pushing, pulling, supporting, balance, etc., and the basic image-schemas are built on bodily experience.
- Accordingly, the “peculiar nature of our bodies shapes our very possibilities for conceptualization and categorization” (Lakoff and Johnson 1999; Johnson 2010).



“The concepts of *front* and *back* are body-based. They make sense only for beings with fronts and back. If all beings on this planet were uniform stationary spheres floating in some medium and perceiving equally in all directions, they would have no concepts of *front* and *back*” (Lakoff & Johnson 1999, p. 34).



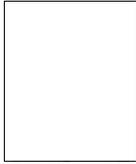
- Basic image-schemas
 - Justice = balance
 - Virtue = being upright;
 - Planning for the future = framed as up and forward – “What’s up?”
“What’s coming up this week?”
 - *In-out*: From concrete to abstract
 - ‘John went out of the room’
 - ‘She finally came out of her depression’
 - ‘I don’t want to leave out any relevant data’



2. Biological embodiment: anatomy, chemistry, and movement -- extra-neural structural features of the body shape our cognitive experience

– two eyes, positioned as they are, deliver binocular vision and allows us to see the relative depth of things

“The point is not perceptual processes that
Perceptual processes include bodily structures (2004)
– Motor response determined at brain level, their degrees of flexibility, their muscles and joints, and their prior history of activation.



• Hormonal changes – changes in body chemistry – as well as visceral and musculoskeletal processes, can bias perception, memory, attention, and decision-making.

• Regulation of body chemistry is not autonomous from cognitive processes, and vice versa. “Body regulation, survival, and mind are intimately interwoven” (Damasio, 1994, p. 123).

• E.g., Affect, Hunger (Danziger 2011)
“The percentage of favorable rulings drops gradually from ≈65% to nearly zero within each decision session [e.g., between breakfast and lunch] and returns abruptly to ≈65% after a [food] break. Our findings suggest that judicial rulings can be swayed by extraneous variables that should have no bearing on legal decisions.”



3. The functionalist body

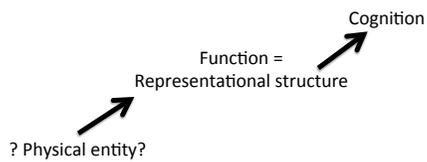
- The extended mind hypothesis (Clark and Chalmers 1998; Clark 2008).
- Extended mind: the mechanisms (vehicles) of cognition include pieces of the environment – the tools and technologies that we use to accomplish cognitive tasks (e.g., pencil and paper to do math, notebooks or PDAs for memory) – some of which might be incorporated into the body – prosthetics, cognitive enhancements, etc.



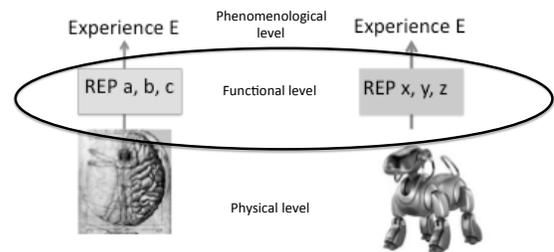
Hands and feet, apparatus and appliances of all kinds are as much a part of it [thinking] as changes in the brain. Since these physical operations (including the cerebral events) and equipment are a part of thinking, thinking is mental, not because of a peculiar stuff which enters into it or of peculiar non-natural activities which constitute it, but because of what physical acts and appliances do: the distinctive purpose for which they are employed and the distinctive results which they accomplish. (Dewey 1916, 8-9).



- Functionalism: it's not the biology but the function that matters for cognition (software vs hardware)
- Body substitutes: a prosthetic hook might substitute for a hand; bodily enhancements might do more than the biological body alone; a sophisticated robot may be equivalent to a human body in this regard.



- Higher representational processes of the cognitive system will provide “compensatory adjustments” that would even out differences in the experiential aspects that accompany cognition (Clark 2007).



4. Radical enactive embodiment

- Building on the phenomenology of Merleau-Ponty, *enactivist* views on embodied cognition emphasize the idea that perception is “for action” – *action oriented* – and that this action-orientation shapes most cognitive processes.
- Perception is pragmatic
- Body-relative affordances (Gibson)



- Like the extended mind idea – the mind is not simply “in the head” or reducible to brain processes; rather, it is distributed across body and environment, to the extent that body and environment dynamically scaffold or take over some of the cognitive load.
 - Brain-body-environment
- Unlike the extended mind, enactivists claim that bodily processes, as well as environmental factors, shape and contribute to the constitution of consciousness and cognition in an irreducible and irreplaceable way – i.e., the human body as a whole is essential for human cognition.

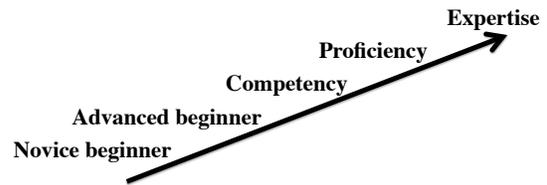
- Biological aspects of bodily life, including autonomic, peripheral, affective/emotion systems, have a permeating effect on cognition, as do processes of dynamic sensory-motor coupling between organism and environment.
- Radical enactivist approach opposes functionalist and representationalist conceptions of cognition, defending non-representational and emphasize environmental affordances.
- Sensory-motor contingencies (Noë 2004) – the nature of bodily interaction with the environment.

~~Representations~~ Affordances
Sensory-motor contingencies

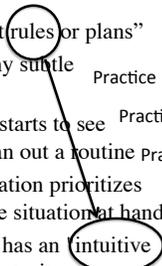


Embodied cognition and expertise

- Notions of embodied cognition have been useful for defining expertise – a good bridge to issues of music and dance education.
- Dreyfus, drawing on ideas from Merleau-Ponty defines a set of stages in accomplishing expertise modeled on embodied coping (the body interacting with the environment).



1. **Novice** "rigid adherence to taught rules or plans"
2. **Advanced beginner** – lacking any subtle discrimination
3. **Competent** – more information; starts to see different applications and can plan out a routine
4. **Proficient** -- holistic view of situation prioritizes important features -- adapts to the situation at hand
5. **Expertise** – transcends rules and has an intuitive grasp of situations based on deep, tacit understanding."



- Engagement in embodied practice leads to habit formation where doing becomes automatic, without the necessity of reflection or thought.
- Sian Beilock (2010): "highly practiced skills become automatic, so performance may actually be damaged by introspection, which is characteristic of an earlier, consciously-mediated stage."
- Expert performance is mindless.
- E.g., the down-hill skier in the flow.



- Dreyfus misinterprets Merleau-Ponty.
- Although Dreyfus points to M-P as his inspiration for the notion of a mindless absorbed coping, M-P defends the idea of a *minded* coping where the notion of mind is not the traditional disembodied notion, but rather an embodied mind.
- Mind and reason are not excluded from movement, but redefined as the expression of an embodied intelligence.
- “I have tried, first of all, to re-establish the roots of mind in its body and in its world, going against doctrines that treat perception as a simple result of the action of external things on our body as well as those which insist on the autonomy of consciousness.”

(Merleau-Ponty 1964)



- Dreyfus and others *over*-emphasize the lack of reflection, thought, or mindedness in expert performance.
- A number of critiques based on the study of sport-, dance- and music-performance.
 - **Athletics:** John Sutton et al.
 - **Dance:** Barbara Montero, Dorothee Legrand, Susanne Ravn
 - **Music:** Simon Høffding

Athletics

John Sutton’s AIR model: “applying intelligence to the reflexes” (Sutton et al. 2011) – expertise is not without some sort of reflection.

- A player of cricket, with less than half a second to execute hitting a hard fast traveling at 140 km/h, draws not only on smoothly-practiced batting, but also on context and conditions relevant to the game, in order to hit a shot with extraordinary precision through a slim gap in the field.

“It’s fast enough to be a reflex, yet it is perfectly context-sensitive. This kind of context-sensitivity, we suggest, requires some forms of mindedness. We are interested in the interpenetration of thought and action exemplified in such open skills. (Sutton et al. 2011, 80)



- The expert cricket player is not on automatic pilot – he has trained up his body-schematic control of movement, but what he needs to do in the context of a game is not automatic.
- **Body schema:** a system of (generally non-conscious) processes that constantly regulate posture and movement – sensory-motor processes that function without reflective awareness or the necessity of perceptual monitoring.
- **Body image:** a system of (sometimes conscious) perceptions, attitudes, and beliefs pertaining to one’s own body.
- On the Dreyfus model, a finely attuned body schema is all the expert needs.

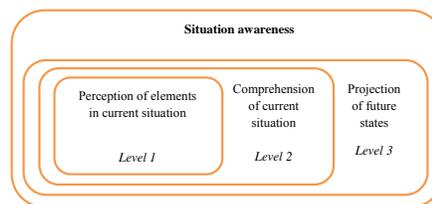
Skill is not a matter of bypassing explicit thought, to let habitual actions run entirely on their own, but of building and accessing flexible links between knowing and doing. The forms of thinking and remembering which can, in some circumstances, reach in to animate the subtle kinaesthetic mechanisms of skilled performance must themselves be redescribed as active and dynamic.

Thought, again, is not an inner realm behind practical skill, but an intrinsic and worldly aspect of our real-time engagement in complex physical and cultural activities....

So expert performers precisely counteract automaticity, because it limits their ability to make specific adjustments on the fly....

Just because skillful action is usually pre-reflective, it does not have to be mindless. (Sutton et al. 2011, 95)

- Automatic control has limited ability to cope with variability; skill requires the flexibility provided by cognitive processes (Christensen, Sutton et al 2013, 2).
- The cognitive processes at stake are not heavy reflective processes, but awareness of the situation and meta-performance awareness.



Endsley's model of situation awareness (Endsley 2011, 15)

- Procedural or performative know-how – not an awareness of detailed motoric processes (these are trained into body schema), but selective “target control for some features, such as goal, one or more parameters of execution, like timing, force, a variation in the sequence, and so on” (Christensen et al 2013., 50).
- Consolidation of fine motoric details in body schema allows for this type of minimal and targeted reflective awareness.
- The cricket player can see the potential shot in the situation and can “can ‘feel’ when her motor system has the right configuration” (Christensen et al 2013)
- A “meshed” architecture – integrates perceptual and cognitive elements with body-schematic control.

From Sport to Dance

- Barbara Montero (CUNY) also offers a critique of Dreyfus (Montero 2012; and a forthcoming book: *The Myth of ‘Just do it’: Thought and Effort in Expert Action*).
- Montero, drawing on her own experience as a former professional ballet-dancer rejects the idea that expert performance somehow is effortless or thoughtless.
- She argues that although certain types of bodily awareness may interfere with well-developed skills, it is typically not detrimental to the skills of expert athletes or performing artists.

In expert-level athletic performance thinking is generally better than not thinking (2015)



- Montero examines a number of scientific studies that purport to show that paying attention to certain bodily aspects of performance will interfere with performance.
- She contends that the studies are not ecological – that is, they introduce types of cognitive efforts that are simply not found in usual practice – e.g., pay constant attention to your feet as you dribble a football (e.g., Ford et al. 2005)
- She also cites qualitative studies that indicate that certain types of conscious monitoring (different in different performances) improved performance.

- Reports from experts confirm this.
- Timothy Gallwey, a pro-tennis player:
 . . . when you increase your stroke speed to normal and begin hitting, you may be particularly aware of certain muscles. For instance, when I hit my backhands, I am aware that my shoulder muscle rather than my forearm is pulling my arm through Similarly, on my forehand I am particularly aware of my triceps when my racket is below the ball (p. 90).



- How precisely is one conscious of such things?
- Legrand (2007) distinguishes between three types of attention focused on the body:
 - **Opaque:** thematic, reflective and objectifying – characterizes a novice performance when someone is learning to move in dance or music.
 - **Transparent:** the body is experienced nonthematically, prereflectively and as an aspect of the acting subject – as in everyday walking.
 - **Performative:** (in expert dancers) “A dancer is very concerned with his body and while dancing he is intensively attending to it. But he is not attending to it reflectively as an object. Rather, his awareness of his body as subject is heightened.”

Expertise (with one’s body as in dance, or with one’s mind as in some meditative states) can put this subjective character of experience “at the front” of one’s experience without turning it into a mere intentional object. (Legrand 2007, 512)

- Legrand and Ravn (2009) clarify performative attention as a heightened *prereflective* awareness.

From dance to musical performance

- The cellist Ingal Segev emphasizes the importance of keeping one's actions in the conscious mind:



“my teacher [Bernard Greenhouse], would say, ‘don’t let the music lead you; you need to direct it.’”

- Montero interprets:

The idea that you should get lost in the music and simply let it lead you was mistaken, she thinks, as it proscribes thought. If being in the zone for a musical performance means performing at one's best, being in the zone according to Ingal means, it seems, extensive conscious thought about what to do and when to do it.

- Montero allows for the possibility that high performers occasionally enter a mindless zone when engaged in optimal performance.
- She also allows for the possibility that it is generally true that optimal performance coincides with thoughtful performance.
- This view is reinforced by a recent study of expert music performance by Simon Høffding.

- Simon Høffding (University of Copenhagen), worked with the Danish String Quartet, conducting phenomenological interviews – interviews that focus on the precise experiences the musicians have while playing their best.



- Each member of the quartet had different experiences while playing, but all of them reported that they could be thinking of or experiencing different things – [...] expert musicians can undergo a wide range of different experiences while playing, from thinking about where to go for beers after the performance, to worrying whether one's facial expression looks interesting to the audience, to enjoying the fact that the playing seems to be unfolding smoothly, and finally to a deep absorption in which one experiences a profound transformation of consciousness. (Høffding 2015).

- Høffding distinguishes between four different states of awareness in expert performance:
- **Standard expert playing** (where the performer may be thinking of different things)
 1. *Absent-minded playing* (automatic performance)
 2. *Playing under stress* (e.g., after interruption) and striving to get back – “just barely keeping up without missing the notes, yet coping nevertheless, managing to perform without mistakes.
- **Deep absorption**
 3. *Blackout*: Lack of self-awareness
 4. *Heightened awareness* of self and surroundings

- Note that the fact of different possible conscious states while engaged in performance goes against Dreyfus.
- Focusing on absorption, Høffding’s musicians suggest modulations in the sense of agency:
 - Diminished sense of agency in blackout
 - Increased sense of agency in heightened awareness
- More precisely, in both states of absorption there is a certain *letting go* that involves *passivity*
 - Even with increased sense of control in heightened awareness, the performer doesn’t intervene in the process, but lets it happen.

- Høffding points to four factors that account for the performance being carried along in a way that involves passivity.
 - Body schema
 - Affect (Emotion)
 } Enactively embodied

 }
 - The music itself
 - The other players
 } Extended to physical and social environment

- **Body schema**: attuned by practice – “playing from the body schema” allows you to forget about many details but thereby gives you a freedom to focus on selective target control.
 - “You let the body function on its own”.
 - “You’re surprised about how much the fingers remember themselves. Let the fingers play.... Let go and think about something else.”
- But body-schematic attunement is not sufficient for expert performance
 - Affect (Emotion)
 - The music itself
 - The other players

- **Affect/emotion** in relation to music goes two ways (Krueger 2014)
 1. Music allows us to explore or develop or regulate emotion in a new way
 2. We “offload” some of the power of emotion in the playing of music.
 - Distinguish between instrumental (primarily body-schematic control) and expressive movement (like emotion works like gesture and language).

If musical passivity could be reduced to the functioning of a body schema, it would follow that absorbed musicianship shouldn't be phenomenologically different from absorption in other arts or in sports. With the work above on the emotions, however, *prima facie*, we have reason to differentiate the phenomenology of artistic absorption from athletic absorption. (Høffding 2015).

- **The music itself**
- **The other players**
- Høffding takes these two factors as interrelated, citing work on intersubjective interaction by Trevarthen.
- Music as our very first way of communicating – our earliest interactions with others are characterized by communicative musicality.
- We get caught up in the music itself and in contexts of making music together, we get caught up in a special form of interaction.

Music moves us because we hear human intentions, thoughts and feelings moving in it, and because we appreciate their urgency and harmony. It excites motives and thoughts that animate our conscious acting and appraising of reality. It appeals to emotions that measure the effort and satisfactions, advantages and dangers of moving in intricate repetitive ways. Evidently a feeling for music is part of the adaptations of the human species for acting in a human-made world; part, too, of how cultural symbols and languages are fabricated and learned. (Trevarthen, Delafield-Butt, and Schögler 2011, 12)

In lieu of a conclusion

- In the spirit of a workshop – questions for you.
- Education in dance and music may have many different objectives, but if one aim is to educate to the point of expertise, then
 - (1) how do you resolve the tension between having the performer direct the music, and allowing the performer to be directed by the music?
 - (2) is there a way to teach control that facilitates the possibility of giving up control?
 - (3) is there a correct balance between reflective mindedness (cognitive awareness) and mindlessness – and is there a way to teach it?