

Embodied Cognition is a Special Type of Movement

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The aim of this paper is to consider cognition as a special type of movement by emphasising the importance of reflecting upon and connecting all scales of movement. Rather than staying comfortably close to the visible scale of the body, often omitting considerations of the micro movements of cognition (thought, feeling, sensation) and the macro movements of the surrounding context (physical environment and social, cultural and historical structures), it is productive for researcher-practitioners to track the filigree effects of movement-within-movement across the boundaries within and between the body and the environment. In the following discussion, I will argue that embodied cognition operates on the smallest scale of movement within the body (neurological, biochemical and micro muscular) that is coupled with but not determined by the environment. Considered in this light the performative nature of our everyday actions becomes more accessible for study and transformation.

Embodied cognition, and perception in particular, consists of movements-within-movement that twist, contort and shift the gross and subtle connections and relationships previously held in place. Cognitive actions (perception as action) have the ability to change value and meaning, and thereby change decision and judgment formations that shape the boundaries of reality. Movement of identity boundaries does not necessitate moving the surfaces that are affected/effectuated by the newly measured relationships. Philosopher of cognitive science Shaun Gallagher observes the way movement shapes cognition noting that, in certain cases, 'even when we are not specifically required to reach for it [an object] or pick it up, "canonical neurons" ... responsible for the motoric encoding of actions such as reaching and grasping are selectively activated' (2005, p. 8). In other words, I may already be reaching for an object before I reach for it, I am possibly already working before I leave home for the studio and perhaps I am already changing as a result of the research I have been conducting. Some performers, using images, emotions and specific intentions create dispositions through micro-

movement in the body that appear in and through all their movements. In this way, cognition is a special type of movement that runs through the body, interacts with the surroundings and feeds back into the micro movements of perception.

It is my assertion that combining the perceptual sensitivities of artists with the experimental ingenuity of scientists makes it possible to dilate awareness of one's own cognitive processes and, *more importantly, practice the perception and the configuration of one's own sensing*. For this inquiry, two tasks arise from attention to movement-within-movement. The first is a contextualising task, which suggests that current research on the 'action in perception' (title of Noe, 2004) emerges from interdisciplinary efforts across the arts and sciences in an attempt to address the explanatory gap between neuroscience and phenomenological understandings of lived experience. These attempts invoke a first-person perspective. The second is a coordinating task, which involves devising a practice that integrates movement-within-movement rather than isolates cognitive processes. My installation work, the *READING ROOM*, will serve as an example of creative research on perception using methods, which join experimental structures from cognitive science and ecological psychology with sensory and experiential strategies from art. This merger allows me to pinpoint the conditions of perception without sacrificing the information gleaned by first-person experience or reducing the complex conditions of experience.

Contextualising action in perception

The first task is to understand the extent to which cognition can be understood as action. Alva Noe observes that 'perceiving is a way of acting' (2004, p. 1) because we enact the content of our world perceptually from the bottom up (2004, pp. 76-90). At any given moment, there are several activities operating concurrently in the body. Professor of Psychology Bill Faw comments on the paradoxical activities that can be operating concurrently in the body. For example, when commands (afferent acetylcholine projections) are sent to the motor neurons to activate muscles to act out a dream, other commands (efferent acetylcholine projections) target areas to drastically lower muscle tone so that the muscles do not make meaningful movements (Faw 2000, p. 65). Even at a more conscious level, we recognise that conflicting activities are in play when, for example, we are daydreaming while driving on the highway. I am always fascinated and amused that I am able to see, hear, feel and respond to the events within the daydream, while at the same time navigating the car and managing to stay on the road. Groups of neurons are multimodal and change over time and subsequently, the micro scales of action in perception, reflection and emotion impact upon movements at larger scales of action.

The term performativity¹ might be used to signal an awareness of participation involved in constructing a common world through selection that happens at the level of cognition (perception and conception). Performativity suggests a reflexive awareness of the possibility to re-enter the embodied operations of perception that augment the existing movements-within-movements and audit the values currently assigned to things. The performative character of re-

evaluation or co-evaluation requires a vigilant practice. Cognitive Science has addressed the changing nature of the embodied inquiry by recognising that a strictly third-person science of observation must accommodate the contributions of a first-person science and reinstitute the value of reflection, introspection, contemplation and intuition. 'First-person science' is a term coined by focus-oriented therapist Eugene Gendlin (2000), who calls for 'a science of subjective experiences interconnected to third person science by virtue of a new science akin to ecology, and the study of complex processes' (2000, p. 109).

Over the last few decades, there has been a range of theorists such as Jane Gallop (1990), Elizabeth Grosz (1994, 1995, 2004), Rosi Braidotti (2006), Maneul De Landa (2002), Dorothea Olkowski (1999), Brian Massumi (2002) and Erin Manning (2009) (to name only a few), whose efforts have been and continue to be concentrated on rethinking the relation of science and philosophy to account for the role of affect, perception and action within biological processes. Over the same period, the relationship of philosophy to science has been reconfigured by cognitive scientists, who have attempted, and continue to attempt, a naturalisation of phenomenology. This has often involved reconsidering the relevance of the work of Husserl (1960, 1964, 1970, 1972) to the study of the organism-environment. A list of these sources may prove useful to an art and humanities audience since the titles themselves are instructive:

- Varela, Thompson and Rosch (1991) *The Embodied Mind: Cognitive science and the human experience*
- Petitot, Varela et al (1999) *Naturalizing Phenomenology: issues in contemporary phenomenology and cognitive science*
- Francisco Varela and Jonathan Shear (2000) *The View from Within: First-person approaches to the study of consciousness*
- Alva Noe (2004) *Action in Perception*
- Shaun Gallagher (2005) *How the Body Shapes the Mind*
- Dan Zahavi (2006). *Subjectivity and Selfhood: Investigating the first person perspective*
- Shaun Gallagher and Dan Zahavi (2008) *The Phenomenological Mind*
- Evan Thompson (2007) *Mind in Life: Biology, phenomenology and the science of mind.*

This is by no means a comprehensive list. While these important contributions indicate a trend towards integrative multidisciplinary research, each is limited by the degree to which it considers sensory awareness as a form of intelligence and the extent to which it continues to isolate the body from the environment. Research in the sciences has not attempted to integrate top-down conceptual processing and bottom-up perceptual learning, or to suggest how a person might act upon and include their research in daily life. Varela, Thompson and Rosch (1991) note 'a growing concern that cognition is not the representation of a pregiven world by a pregiven mind but is rather the enactment of a world and a mind on the basis of a history of the variety of action that a being in the world performs' (1991, p. 9). After decades of discourse that explicitly argues the relationship of phenomenological

experiencing of affect with biological processes is *enactive* (Varela, Thompson & Rosch 1991; Thompson 2007) and must correlate strands of self-organisation and biochemistry with philosophy, psychology and neuroscience (Ellis, 2000, p. 3), researcher-practitioners might be ready to apply performativity to the environment of thoughts and the history of ideas.

The movements of cognition are more difficult to perceive because they must not interfere with the perception of the world. The first step toward a first-person *integrative science* or *embodied practice* is to understand how cognition, and perception in particular, is involved in the formation of identity boundaries. Philosopher of science Hideo Kawamoto (2003) notes that, in self-organising systems, the cooperation of two different (cognitive) actions such as perception and movement *that do not determine one another* is called 'coupling' (2003, p. 89). Kawamoto develops the observation that cognitive activities on different dimensions establish the boundaries of body, other and environment:

Perception involves two operations – cognition and movement – through which it forms a topological space of its own. With respect to cognitive function, sensation produces the boundary that divides the visible and the invisible, the audible and the inaudible, etc. ... [As with the spectrum of light] the range of visible brightness will be reported by sensation ... and we call such a divided space a topological space produced by sensation. At this point, sensation occurs as the movement that forms a boundary and subsequently maintains that boundary through repetition. Both cognition and movement, although they function separately, are indispensable to one another during the formation of *boundary sensation*. Clearly a double operation is also at work in this situation.

(2003, p. 88)

Although Kawamoto does not give specific examples of the topological spaces (shapes or forms) that arise from a shift in boundary sensation, he does suggest that the physical substrate of neural networks and active sensing are inextricably linked through sensation of the environment. This implies that sensory boundaries can be compromised and made tentative, requiring a newly configured selection process to emerge in order to reinforce and maintain the new topology. Under these conditions the forming of forms has been deregulated. Perception links action at the scale of cognition with action at the scale of the body moving within an environment without necessarily moving the surfaces of the body, objects or surroundings.

A quote I often cite, because it has come to operate for me as a kind of emblem of the intensity of interconnectedness and embodied affect,² is from Deleuze and Guattari's (1986) book on Kafka. This quote is potent on many levels because it draws together layers of activity and relationship across scales of action, and invites an activism of the everyday to ensue. For the purposes of this paper, the quote serves as an embodied description of the turbulent and imperceptible movement that changes everything:

As Kafka has the ape in 'A Report to an Academy' say, it isn't a question of a well-formed vertical movement toward the sky or in front of one's self, it is no

longer a question of breaking through the roof, *but of intensely going 'head over heels and away,' no matter where, even without moving*; it isn't a question of liberty as against submission, but only a question of a line of escape or, rather, of a simple way out, 'right, left or in any direction,' as long as it has as little signifying as possible.

(1986, p. 6, my emphasis)

For now, it is necessary to overlook the implications for cognitive linguistics of Deleuze and Guattari's phrase 'as long as it has a little signifying as possible' and concentrate on the moving without moving, or the imperceptible movement-within-movement which spins everything around in place, actualising possibility from the reservoir of infinite potential. When the spinning stops, everything seems to be as it was, except that we must re-establish the relationships between things again. It is as if a new space has been produced – some wiggle room for wriggling within a straitjacket. Momentum is produced from within the imperceptible space of cognition sufficient to generate escape velocity. Awareness of the potential of embodied cognition enables unanticipated distinctions to emerge within the practices of our daily life.

Is it more important to understand 'going head over heels and away even without moving' as a literal process than as a metaphorical description? The question is: How do the events of language prompt embodied processes? For example, I can map Deleuze and Guattari's description directly onto an experience I had exiting the New York City underground subway onto an east-west side street. I was convinced that I was headed west. This was based on an assumption that my inner map corresponded to the city. The tall buildings and cloudy day blocked the direction of the sun as a source of information. Once I realised I was walking east and not west, I felt as though I had been turned inside out or that each part of me had somersaulted in place to be facing in the opposite direction. The experience highlighted for me the inseparability of sensing, bodily awareness and a conceptual organisation of the world. I propose that the micro events involved in perceiving, thinking and feeling are linked to very large movements in the physical environment, social and cultural organisation of space, the history of ideas and evolutionary tendencies through the embodied experience. Researcher-practitioners are in a position to experiment on identity boundaries and re-enter embodied cognition and the turbulence of movement-within-movement to open the world by deregulating modes of connectivity.

Coordinating perceptions

How can first-person experiments that investigate the complexity and richness of experience, performativity and self-awareness be devised? More than a century ago, William James argued that experiences were themselves experientible³ and could not be quarantined when seeking to 'objectively' observe the world. I will discuss my installation work as experiments that attempt to act upon the implications and increased capacities that contemporary multidisciplinary research affords.

The exhibition, *READING ROOM: Experiments In Posture, Movement And Comprehension* (April 2008 at the University of Pennsylvania and Slought

Foundation Gallery, Philadelphia) brought together arts practice, experimental psychology, cognitive science and poetics to explore the complex interactions of the body and the environment. Following the lead of artists-turned-architects Arakawa and Gins,⁴ I was attempting to include rather than evade the research currently available from the life sciences by:

- building research conditions/situations in which the research questions informed the structure of the installation (the relation of body posture and movement to comprehension) and were also the explicit content of the texts used in the experimental installation;
- positioning the research subject (person) as the first-person researcher and integral part and beneficiary of the experiment; and
- refusing to isolate the person from his/her body by separating the texts (the space of thought) from the lived space of experience (feelings, sensation, body orientation and structures of meaning).

Artists, poets, philosophers and dancers are able to offer a wealth of embodied knowledge and experience that would inflect the methods and conditions under which research on the body is conducted. The different types of embodied attentions and connections that artists pursue bring insight and practical suggestions to the way phenomena are observed, interpreted and analysed. The *READING ROOM* represented a different approach to studying events in complex, rather than isolated, conditions. The collaborators of the *READING ROOM* set out to devise installations that would allow persons to encounter the possibility of experiencing their own perception in two ways: conceptually, through top-down cognitive processing; and sensorially, through bottom-up cognitive processing. In this way the micro movements were made perceptible because of the posture constraints of the experiment which accentuated the movement required to read the texts.

As initiator of the *READING ROOM* exhibition, I invited poet and theorist Alan Prohm and philosopher of cognitive science Professor Shaun to form the collaborative team with me (arts practitioner and theorist). We each devised our own experiments with input from the others. The only requirement was that the texts of Arakawa and Gins would be used in the installations. In addition to celebrating the discursive work of Arakawa and Gins, the task of these experiments was to give people a first-hand experience of the relationship of the body to the act of reading, precisely because the space of text and of thinking, so often dissociated from the space of the person doing these things, gets produced through the bodily interaction with an environment. My aim, in particular, was to produce posture and movement-specific reading situations that allowed a person to *realise they were experiencing the sensations that the passages described*, and in that way directly involve automatic and reflective processes.

The experiments were intended to evoke reflection and to make a person aware of processes that link reflection to attending, sensing and perceiving. As an experience, reflection or self-awareness can be jarring as well as instructive. Producing self-awareness is not a sufficient research goal. Reflection must become the catalyst for action and/or change; it must become

a heuristic device, a mode of learning that allows self-experimentation regarding the body-environment relationship. Otherwise, if the reflective moment is not linked to a heuristic possibility and application, the experiment joins the ubiquitous entertainments which stimulate our senses and distract us but do not sustain us. It is for this reason that the *READING ROOM* collaborators emphasised first-person aspects and implemented a strategy coupling conscious awareness with unconscious activity. This was achieved by directing a person's attention to a particular sensation in a specific posture or movement range while reading a text. The text also produced sensation, or more precisely, provided a link between the micro-movement of attention to the posture of the body within the architecturally shaped environment.

There is not sufficient space in this paper to discuss all the works produced by the three collaborators, or the works I produced for the exhibition; therefore I will limit my descriptions and concentrate on the installation-experiment that proved most accessible to participants. I produced three works for three initial posture states: reclining, sitting and standing (see Figure 1).

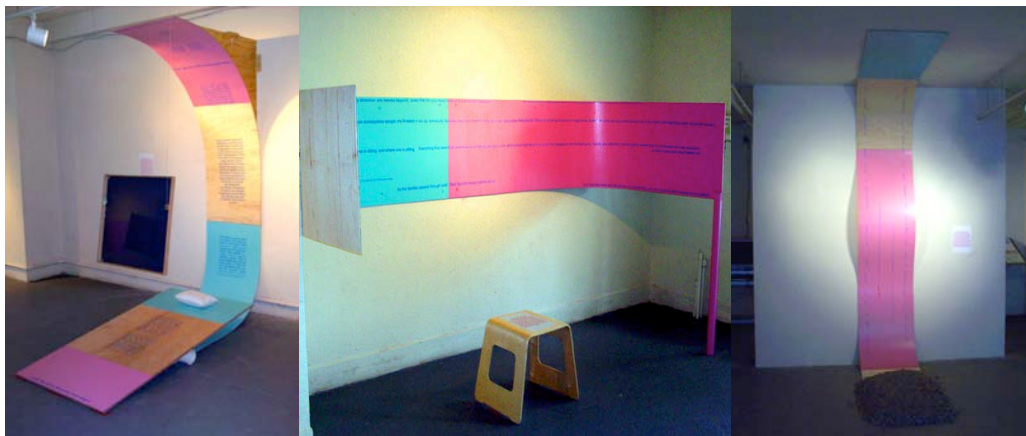


Figure 1. Final installation views of the *READING ROOM* installation-experiments in the Slought Foundation Gallery from left to right: reclining, sitting and standing posture scenarios. Arakawa and Gins' texts made of vinyl-lettering were placed on to the surface of curved plywood and installed into the architecture of the gallery in forwards, backwards and vertical orientations requiring participants to bend, twist, balance and step in order to read (both look at and comprehend) the texts.

Photos by Jondi Keane

The standing installation-experiment scenario proved the most successful in producing an immediate reflective response. The motion required by the sitting installation proved too easy to avoid physical exertion by mentally adjusting the text when reading. For example, while reading the text running left to right, few persons adjusted their body to follow the words as they curved around to run upside down from right to left and performed mental calculations instead. The reclining work proved physically too demanding. While most persons laughed and had fun on the seesaw bed, almost all lacked the core muscle control required to stabilise the seesaw to read and comprehend the backwards text in the mirror provided. A few commented that

they were aware of reading the text but had no idea what it said. The standing installation-experiment provided just the right mix of demanding yet achievable physical effort. The standing work allowed persons to move in a way through which they were more accustomed to making adjustments and enabled them to more readily connect the text with their experience.

The texts for each installation-experiment were carefully chosen to prompt reflexive movement and reflective awareness, and avoid illustrating or literally describing the cognitive process involved. I chose passages from Arakawa and Gins' works that paralleled the participant's situation within the installation and articulated connections between body, ideas and architecture. The participant then had to treat the text as a model of experience, a guide or a set of instructions. The texts were installed in a numbered sequence, which led the reader through a series of movements. The following four sentences are the ones selected for the standing installation were taken from a single passage in Madeline Gins' book *Helen Keller or Arakawa* (1994). I have inserted bracketed comments to indicate the direction and orientation of the installed texts and the movements that participants would have to make. Correlate the text with images of the installation in Figure 2 (below).

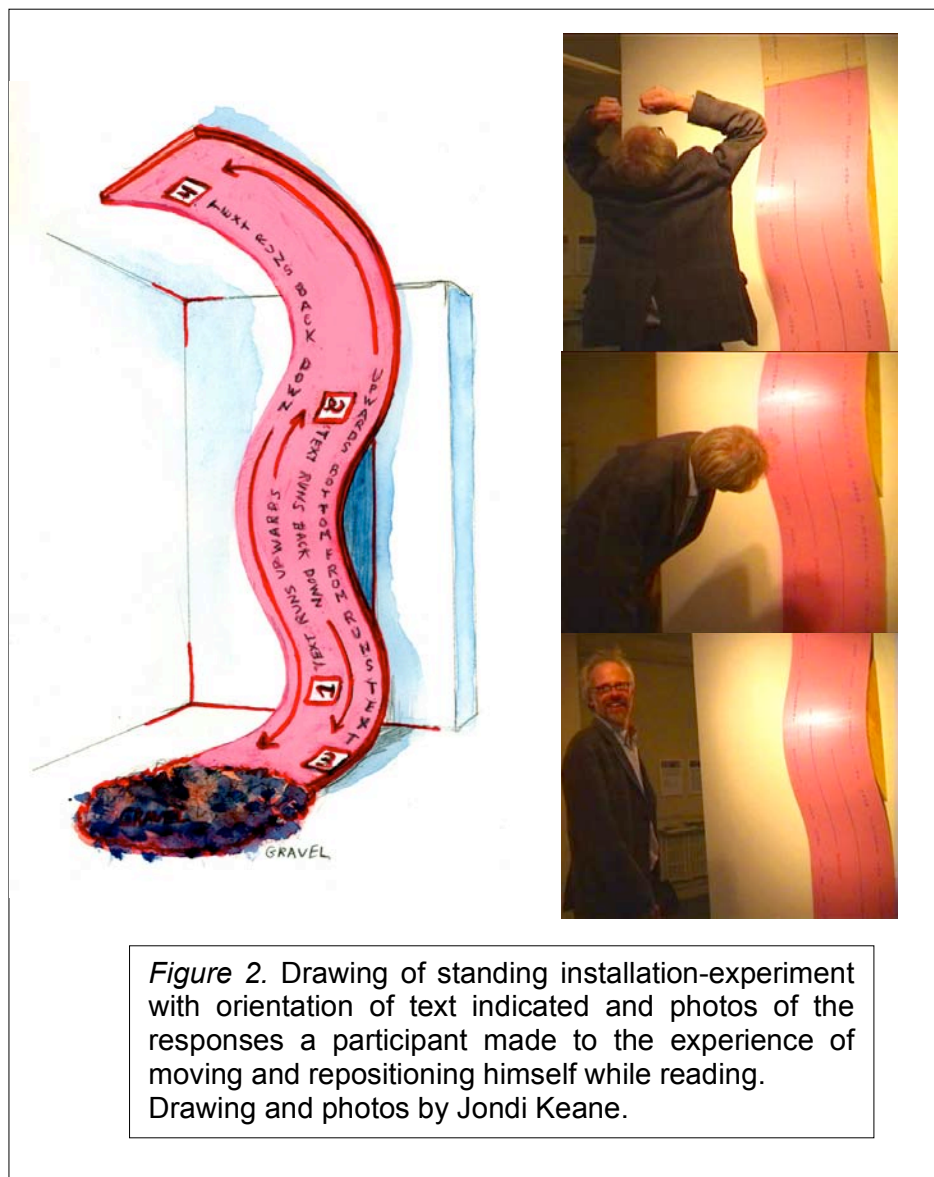
1. A thin-thick sheet of specific distance, that distance which is a texture that lies between the bed and the ceiling. 'Pick it up by what corner,' she wondered. [Text runs HORIZONTALLY UPWARDS – participant must lean body to the left]
2. Upon the paper thickened with distance can be read 'I See the Ceiling from My Bed'. A line is drawn right across this sentence. The line seems to be holding the words back up on the ceiling. [HORIZONTALLY DOWNWARDS – participant leans to the right]
3. But the ceiling, the distance from the ceiling, the words and the line straight across these have all now been brought to the vertical. [VERTICALLY FROM BOTTOM UP – participant must read each word from the top down and jump up to the next word]
4. The viewer stands facing a vertical slice of the view she'd normally see from a horizontal position; she's come to be in two positions at once. [VERTICALLY FROM TOP DOWN – participant reads a large and a small version of this sentence, which lead back to the floor causing the participant to back up on the gravel]

(Gins, 1994, p. 225)

As the expression on philosopher Gordon Bearn's face testifies, the two worlds previously held apart: the private world of comprehension, contemplation and bodily awareness and the public world of architectural space, objects and human movements are drawn into proximity and rub up against each other. In this instance, Gordon has interpreted the collision of and commingling of perceptual and conceptual processing as a pleasurable experience (see Figure 2).

These experiments are works in progress. Structures which study the complex conditions of cognitive processes can benefit from the sensibilities and embodied awareness cultivated in the performing and visual arts. In order to focus on the heuristic aspect of installation-experiments, the context under which the actions are performed must be coordinated with rich sensory

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Summary and conclusion

The reflective artist is alert to the filigree connections of movements, which run across scales of action connecting the micro movements of thought to the macro movements of the physical and social world. I have argued that embodied cognition, which attends to the distribution of awareness throughout the body, is a special kind of movement or movement-within-movement that extends into the environment (physical and historical context) and requires further study. The arts can contribute to this research by bringing knowledge of bodily intelligence and felt experience to bear upon research questions and methods in the life sciences. The reflective abilities cultivated by artists can offer new perspectives and procedures to attempts to naturalise phenomenology and forge a first-person science.

The context for turning reflective movement into heuristic tools can be seen in the current trends in cognitive science, experimental and developmental psychology, philosophy and the arts. Noe (2004) and Faw (2000) remind us that there are several concurrent cognitive activities that operate in different dimensions. Kawamoto (2003) instructs us that cognition is already a movement between cognitive activities and this movement produces the parameters of sensation and the boundaries of identity. Deleuze and Guattari point to the possibilities for self-experimentation through affect. When applied to first-person science these methods provide a more inclusive form of experimentation and research. The response to the *READING ROOM* installation-experiments suggests that by activating perception of movement-within-movement and by tying it to a form of action, a productive performativity ensues and acts as a constant impetus for learning and further action.

Artists thrive on changing conditions and on the production of increased possibilities each time the field of knowing is re-entered. Although all researchers will continue to look for the chain of causal events, I propose that non-causal or indirect connections are produced by concurrent and coupling activities. The reflective artist who is constantly performing re-evaluated relationships is also able to attend to and experiment with subtle movements-within-movements. Arakawa and Gins describe this cumulative 'indirectness', which occurs within a single person and across a community. In 'Vital Contextualising Information', they assert that:

Indirectness dilates time so that no matter how much time has elapsed one finds that it has in the end been just the amount of time that was necessary for a cumulative effort – be it that of one performer or many – to have taken care of the problem ... The more coordinating skills that are mastered, the more complexly can indirect means be put to a direct purpose – the parlaying of indirectness.

(Arakawa & Gins, 2003, pp. 20-21)

The complexity of concurrence, whether it is called movement-within-movement, embodied cognition or parlaying indirectness, can be coupled with the rigorous examination of causes and effects as long as we do not limit our inquiry to a single scale of action. First-person science or the practice of

embodied cognition proposes to integrate reflection and observation to optimise the performative process of making.

Notes

¹ From Austin's 'performative utterance' (1976) to Butler's discursive performance of gendered identity (1990, 1997) to Bolt's suggestion (2004) that images do not solely represent but perform our relationship with the world, the terms 'performance' and 'performativity' signal an implicit and reflective awareness that accompanies action.

² Keane, Jondi, 'Hyperconnectivity through Deleuze: Indices of affect'. In D. Smith, E. Holland & C. Stivale (Eds.) (2009), *Deleuze: Image and Text* (London: Continuum), and – 'A Bioscleave report: Constructing the perceiver'. In F. Kral and J-J. Lecercle (Eds.), *Arakawa and Gins: Philosophy and architecture* (Paris: Rodopi Press forthcoming).

³ William James' notion of radical empiricism is discussed by Harry Heft as part of the lineage of ecological psychology (James 1912/1976, p. 14 in Heft 2001, p. 30).

⁴ The *READING ROOM* project was an exhibition produced specifically for the Second International Arakawa and Gins: Architecture and Philosophy Conference held at University of Pennsylvania and the Slought Foundation in Philadelphia, PA in April 2008.

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Biographical statement

Dr Jondi Keane is an arts practitioner, critical thinker and senior lecturer at Griffith University. Over the last 25 years he has exhibited and performed in the USA, UK, Europe and Aus, most recently he produced the *READING ROOM* exhibition at the Slought Foundation, Philadelphia (April 2008) and *Tuning Fork: Shopfront* at the Judith Wright Centre for Contemporary Art (Nov 2008). He has published on embodiment, experimental architecture and practice-led research in a range of journals including *Ecological Psychology*, *Janus Head*, *Interfaces*, *Text* as well as in Gilles Deleuze: *Image and Text* (2009) from Continuum Press and a volume on Arakawa and Gins from Rodopi Press.