

Affective Proprioception

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Proprioception has been considered, within neuroscience, in the context of the control of movement. Here we discuss a possible second role for this 'sixth sense', pleasure in and of movement, homologous with the recently described affective touch. We speculate on its evolution and place in human society and suggest that pleasure in movement may depend not on feedback but also on harmony between intention and action. Examples come from expert movers, dancers and sportsmen, and from those without proprioception due to neurological impairment. Finally we suggest that affective proprioception may help bind our sense of agency with our embodied selves at an emotional level.

1. Introduction

Our nature lies in movement; complete calm is death. Pascal, (1966).

In investigating how and why movement goes wrong, and how it is organized, neurological science has made great progress. Thus we understand something of motor learning and motor memory, the interactions between conscious and non-conscious movements, and how attention to movement enables learning and the improvement of motor programmes. Moreover, we understand much about the role of the sensations of movement and position sense as well as touch and their roles in the guidance of, and control of, movement. All such work seeks to understand how we move. To understand why we need such skilled motor activity we might suggest a Darwinian model and consider how our success will have depended on accurate movement and learning. In this context success might be determined by avoidance of hunger or predation and, in the longer-term, successful reproduction and bringing up offspring, for instance.

Yet movement is not simply for long-term reward in terms of satiation of hunger, thirst, cold etc. It has some reward of itself; movement is affectively rewarding—it can be fun. This was well described by Bell in 1833:

The exercise of the muscular frame is the source of some of our chief enjoyments. The beautiful condition of both body and mind shall result from muscular exertion and the alternations of activity and repose... This activity is followed by weariness, and although

unattended by any describable pleasure or local sensation, there is diffused throughout every part of the frame after fatigue a feeling almost voluptuous.

In this paper we will explore this ‘almost voluptuous’ feeling both phenomenologically and neuroscientifically, with the aim of identifying this rarely discussed phenomenon and explaining its physiological basis. We will speculate on its evolution and place in human society. We suggest both that pleasure in and from movement does not only occur after movement, but during it as well, and that there may be many more sorts of pleasurable feelings associated with movement than Bell mentioned. Movement is not always a means to an end but may contain its end within it. These feelings need not always be associated with moving ourselves; accurate movement is hugely rewarded in contemporary society; in dance and in sport we pay to watch others do it.

If we are correct and some movements are affectively rewarding, then we might divide such movement into those which are aesthetically pleasing to see and those which are pleasant to do, though these are not mutually exclusive. Richard Shusterman (2000) makes a distinction between the awareness of “the body’s external form or representation” and of “lived experience.” On the one hand, we are aware of, and take pleasure in, the way our body looks (body builders, etc.). On the other hand, we are concerned with how our bodies feel in moving. Our primary concern is with the pleasure in movement itself rather than in its look to others. For example, we are less concerned with how a dancer might find pleasure in moving a certain way, because he knows that it looks appealing, than with how a dancer might find pleasure in certain movements regardless of how they look to others or even to herself. Of course, there will be some connection between which movements feel good and which movements look good, but we suggest that feeling good might have preceded looking good, in movement, at least from an evolutionary perspective.

2. Affective touch

Classical sensory neurophysiological work has shown the pathway for touch to involve large myelinated sensory nerves peripherally that project to the sensory cortex via a fast system ascending in the spinal cord to the primary sensory cortex in the brain through the dorsal column-medial

lemniscus system. This underpins the senses of light touch and its localization and tactile discrimination. In parallel with this, and passing through similar sensory pathways, are neurons from muscle and joint receptors that underpin the perceptions of movement and position sense.

It has been known, however, that the large myelinated fibres in a peripheral nerve are a minority, with small myelinated A delta fibres and unmyelinated C fibres making up the remainder. Work has shown that these conduct information that underpins the perceptions of temperature and pain. But there has been speculation for some time that these two perceptions are too limited for the large numbers of smaller fibres seen in a peripheral nerve, though no agreement has been reached as to what other perceptions this system might underlie.

Recent work, however, has suggested the existence of a separate pathway for low threshold touch in small fibres (CT fibres), when touch was previously thought a large myelinated fibre function. Olausson et al (2002) showed in subject GL, with an acquired absence of large myelinated sensory fibres below the face leaving her without the perception of light touch as conventionally tested, that she could sense brushing on her forearm. Though not well localized nor well perceived, she did have a clear feeling of pleasantness. When this was done with MRI scanning they showed that the areas activated were not the conventional sensory areas, S1 and S2, but an area of insula cortex associated with other inputs related to hunger, thirst, air hunger, pain and discomfort and even sexual desire. This area has been suggested to be involved in the elaboration of the monitoring of internal bodily functions that may underlie the somatic self (Damasio, 1999, Craig, 2002, 2003, 2004). In an evolutionary context this pleasant perception of CT fibre mediated brushing might reflect the importance of interpersonal affective touching e.g. stroking or caress.

In non-human primates Dunbar has suggested that activities like grooming play a crucial role in group bonding. He also suggests that being groomed leads to enhanced mood in the recipient (Dunbar, 1997). The social group of humans, however, is so large that there is not time to groom all within it. Dunbar suggests, instead, that language evolved, at least in part, to replace physical grooming with a form of wider social grooming. But this thesis does not preclude a preservation of grooming, or light brushing and caressing, as being pleasant in a more intimate relationship.

3. *A pathway for affective proprioception?*

We propose that just as there is a form of affective touch revealed by Olausson et al, there is also a system of sensory afferents responsible for the intrinsic pleasure involved in moving that we pointed to earlier, what might be called “affective proprioception.”

The afferent pathway for this presumably involves small afferents arising in the muscle and joints. There are small unmyelinated nerve fibres which arise within muscle. Most may be involved in signaling pain, contraction and temperature, but some appear to relay information related to fatigue, (Mense and Stahnke, 1983, Mense and Meyer, 1985, Hayward, Wesselmann and Rymer, 1991). In their original paper Mense and Stahnke wondered if such afferents might reach consciousness and what perception they would produce. This system could signal not only fatigue but also the pleasurable feelings associated with it and thus might account for Bell’s “almost voluptuous” feeling.

It is not essential, however, that there should be a single, specific pathway for this activity. Rarely within the brain or nervous system does one area do one thing alone. It is possible that the sensory pathways for affective proprioception include the same large fibre sensory afferents that conduct information elaborated into movement and position sense. This information is likely to feed to the many subconscious motor programming areas including the cerebellum, and the sensorimotor cortex, as well as to areas which are involved in attention. It might also lead to those parts of the brain involved in affective perception. Our aim in discussing the suggested pathway for pleasurable brushing is that it allows a handle on a system that may have more widespread inputs. In addition, though Bell focused on the experience after exercise, other pleasures associated with movement may occur as we move, and may be relayed through fast and slow pathways.

4. *On the experience of affective proprioception*

To consider the experiences we are concerned with, think of a time when you were absorbed in physical activity, be it running, mountaineering, tennis, dance or something else. One has a sense of satisfaction in experiencing one’s body move precisely and harmoniously. Of course, the accurate description of pleasurable sensations is notoriously difficult; novelists and poets strive for this within contexts and narratives and so to capture them adequately within in a short paper would be impossible. We can, however,

identify a rich variety of such sensations found within physical activity. People walk, hike, jog, run not just to keep fit but because they like to do so. And this is not simply because of an ‘endorphin high’, which in any case has been difficult to measure scientifically except after longer durations of exercise (Dunn et al, 2005). The very act of walking or running, as well as the tiredness afterwards, is pleasurable. Likewise in playing golf, for example, pleasure arises not only from the camaraderie, the walk and being outdoors but also in the feel of the club and the feeling the movements during the swinging of the club. To be sure, part of the pleasure in golf comes from the experience of a successful executed result—the ball in the hole. But pleasure is also found within and during the execution of a good stroke and even, possibly, in the realisation that a successful stroke has been chosen—in the successful translation of intention into action. We frequently overlook a prime element in these forms of exercise: the simple ineffable pleasure of, and of being in, action.

Another example of the phenomenon of pleasure in moving comes from dance. Much of dance involves moving in a way that “feels right,” that gives one a sense of bodily pleasure. What type of pleasure is this? One aspect of a dancer’s pleasure in movement seems to be shared with the athlete, for dancers enjoy that simple ineffable pleasure of movement as well. But professional dancers also seem to enjoy a more cognitively enriched pleasure, a pleasure that arguably could be classified as aesthetic. Perhaps athletes have a similar experience (see Cohen 1991). But the phenomena is perhaps most clear for dancers. Dancers will often claim that they experience pleasure in moving beautifully or gracefully; they seem to apply aesthetic predicates to themselves merely on the basis of the feeling of movement. Of course, such predicates as “beautiful” and “graceful” as well as “fluid,” “strong,” “sharp,” “floating,” etc. also apply to various forms of dance from the third person point of view: the audience at a dance performance can also see graceful movement, for example, and watching such movements is enjoyable. But, we claim, there is also an aesthetic pleasure based on the dancers’ bodily perception of movement. When all is going well, dancers, based on how a movement feels, and not necessarily on how it looks, can identify their movements as graceful, beautiful, strong, flowing, etc. It may even be that, sometimes, we call certain movements beautiful, and aesthetically pleasing, because from a visual perspective (at least in part) we sense that when performed they feel good. Perhaps one way to describe what the professional dancer identifies is a feeling that everything is working in harmony, or to borrow Anthony Saville’s description of aesthetic experience,

that “everything...is in place” (1982).

One significant aspect of this experience is the feeling of effortless-ness, of the body moving almost on its own without any need of conscious direction. When absorbed in movement there may even be what might be described as a loss of self, a feeling that, at least as a locus of thought, one hardly exists at all. And of course the best performances are those where one is not thinking about the steps at all but is rather fully immersed in the experience of moving itself. (Indeed, thinking about the steps may lead to “blank out” and forgetting of the steps.) A similar dissolving of the self into movement occurs when running. During a relaxed, harmonious run, one’s consciousness is so absorbed by and completely within the run that one may feel that one scarcely exists at all. Paradoxically during a hard race one can be concentrating so much on the demands of the race, and on overcoming pain, that afterwards one remembers little; there was a short gap in one’s autobiographical memory.

Again, this is not to say that all pleasure of movement is entirely dependent on the feeling of movement, on the “lived experience” and thus independent of how the movement looks. A dancer may take in information about how a movement feels to determine how a movement looks, and pleasure in such situations may be derived from how the movement is imagined to look. But at other times the experience of beauty or grace appears to be quite immediate; one aesthetically appreciates the movement in itself. Indeed, it is likely that one of the reasons dancers pursue their art with such fervour, in what can be a painful and financially risky profession, is that the reward of movement is worth the hardships.

We might make a distinction between sports and other activities in which the mind imposes itself on the body, e.g. endurance sports where an aim is to push further than is comfortable and feedback from the periphery is relatively ignored, or at least controlled, with others sports and movement arts in which an aim is to listen to the body more and which look inward, e.g. yoga. Though some activities involve more listening and less imposition, it would seem that most, if not all, involve both to an extent. To some movement is a means, e.g. football, whilst in others it is the aim, e.g. Alexander Technique. Movement that is a means to an end might ignore internal signals more, but even in Yoga, for instance, a goal may be to hold a pose while some pain is ignored. Equally well, a long distance runner cannot ignore pain that might reflect injury rather than just overuse. One of the pleasures of physical activity is to be immersed in and closer to the body.

It is often said that the body is phenomenologically absent, (Gallagher 1986, Leder 1990), and for much of our lives this is the case¹. We walk, move and eat with little focus on the body's movement to facilitate these aims for most of the time. As one of the founders of neuroscience, Sherrington, said, "our minds are not concerned with the act but with the aim" (Sherrington, 1906, 1947). More recently this has been investigated and amplified by Wolfgang Prinz and colleagues (see Prinz, 2003). But sometimes we are concerned with the means as much as with the end, for instance in the Alexander Technique. Even when we are concerned with the aim, this does not imply that we cannot derive pleasure from the means. For example, there is a deep pleasure in endurance athletics in concentrating in order to make the body do more than it would like to, whilst in more skillful sports the relation between thought and act, and the awareness of the act itself, are part of the process and of the affective experience. Differing affective experiences may result from the differing relations between intention, movement and our bodies during different movements.

This type of pleasure is not only experienced during sport, dance or exercise. Charles Rosen, a philosopher as well as professional musician, highlights this in his book *Piano Notes* (2002). He claims that one cannot even become a professional pianist if one does not deeply enjoy the physical movements of one's fingers on the keys:

Pianists do not devote their lives to their instrument simply because they like music: that would not be enough to justify a dreary existence of stuffy airplanes, uncomfortable hotel rooms, and the hours spent trying to get the local piano technician to adjust the soft pedal. There has to be a genuine love simply of the mechanics and difficulties of playing, a physical need to contact with the keyboard, a love and need which may be connected with a love of music but are not by any means totally coincident with it.²

He also says something relevant to the question of awareness of bodily movement, and that is that:

pianists—and keyboard players in general—are perhaps the only musicians who do not have to listen to what they are doing. They often know from a sense of touch alone that they have hit a wrong note. In fact, in my experience one knows that a note will be wrong a split second before striking it, too late to change the movement of the hand or arm.

While, as he explains later, other musicians need to hear what they are doing to make sure they are really in tune, “in general pianists neither have to look at nor listen to themselves.” Note that he suggests that it is not from touching the piano key that the perception arises, but almost before that. Our awareness of our actual movements made may be less than we intuitively think. Recent work on the perception of action (see Haggard, 2004, for review) has suggested, in Marcel’s words, that, “awareness of voluntary action appears to derive from a stage later than intention but earlier than movement itself” (Marcel 2002). If this is so, awareness of the accuracy of movement may precede feedback of that movement’s accuracy and, then, some of the harmonious feelings associated with accurate movement may derive from its accurate elaboration and selection within the brain as well as, or even rather than, from peripheral sensory feedback resulting from the movement.

5. ‘Uses’ of affective proprioception

In addition to the immediate pleasureable feelings associated with movement there may be more enduring effects on health. Quantitative evidence of movement and exercise having a long-term benefit is not easy to find in control subjects; and anecdotes, though useful, are hardly firm data. There is, however, evidence for an effect of anaerobic moderate exercise on depression (Dunn et al, 2005). Perhaps of more interest in a cross sectional study of elderly women and the effect of potentially modifiable life style choices associated with well being, it was found that physical exercise was inversely related to depression. Physically active women were half as likely to be depressed and anxious when compared to their physically inactive counterparts (Cassidy et al, 2004). It seems that we may not only feel good during exercise but that it does us good, psychologically as well as physically.

6. We like to watch

Of course we do not all take endurance exercise or train ourselves in skilled movements. Most of us, however, have some appreciation of those that do. So much so, that in the last century we have elevated those especially gifted in these areas to positions of huge wealth and fame. Ball games particularly command huge TV receipts because they are watched by so many. In part this is about tribal loyalties, national pride and a social construct

to allow guys to talk to each other. Yet buried to various extents within the experience of sport is an appreciation of talent to run or hit further or faster, or more accurately.³

Movements in others therefore appear to be able to please us. Over recent years it has become more apparent that just as mental rehearsal activates similar areas of the brain to those involved in movement itself (Jeannerod, 1999), so watching movement leads to activation of brain areas involved in movement and its rehearsal, through the mirror neuron system (Gallese et al, 1996). A mirroring system might help explain why our judgements of other's movements are aesthetically pleasing: if in watching a dancer, for example, we internally "mirror" his movements, the pleasure that arises in such mirroring may be part of the basis of our judging the dancer's movement as graceful, beautiful, or in some other way, aesthetically pleasing, (Montero, forthcoming).⁴ In addition, in some sports the level of identification with the action can be large, as people become immersed in a soccer match and grown men in the crowd find themselves making heading movements of the ball in time with the players.

Of course, one would like to know what sorts of movements (or anything at all) are thought aesthetically pleasing, and, moreover, what it is to be aesthetically pleasing at all. While these are big philosophical questions that we certainly cannot hope to answer here, a few words are in order. We have been talking of the pleasure of movement and we find it plausible that some of this pleasure should count as aesthetic, in as much as it seems analogous in certain respects to pleasures that are traditionally thought of as aesthetic, such as the pleasure of listening to great music. Importantly, it seems distinct from a mere sensual bodily pleasure that one experiences in having a good backrub (what Kant thought of as the "mere agreeable"). While this sort of pleasure in moving is probably not universal, we think that judgments about whether a certain movement is pleasurable in this particular way, i.e. aesthetically, are not entirely subjective as perhaps would be judgments about whether, say, chocolate is better than vanilla (and as perhaps would be other judgments about the pleasure of movement). Of course, as with other aesthetic judgments, what counts as aesthetically pleasing varies to a degree amongst individuals. For some, ballet exemplifies the epitome of aesthetically pleasing movement, as ballet dancers almost personify grace and beauty, but equally well for others boxing is considered aesthetically appealing. Nonetheless, it might make sense to talk of someone making a mistake as to whether a certain dance movement aesthetically pleasurable.

Clearly, it is not easy to isolate an underlying structure (if any) which allows such a judgment. But it does seem that these judgments relate, among other things, to pleasure based on the intrinsic feeling of movement either when performed oneself or sympathetically appreciated in watching others. If it is certainly not clear to what extent we are hard-wired, for instance, to enjoy certain types of visual art and to what degree this is something we are trained to appreciate, it is also not clear to what degree we are hard-wired to enjoy movement—though given its universal appeal it would seem to be to some degree—and to what degree this is something that one learns to appreciate.

One underlying judgment in sport might be how a given movement is related to success in that sport. Since we find success appealing, we may find the successful move/act is aesthetically satisfying. But there may be other factors. Some people seem to have more grace within their sport than others over and above their success. Within cricket many would prefer to watch an elegant batsman such as David Gower score a century than a more pugnacious and severe hitter of the ball. Within running supreme stylists such as Ron Clarke or, more recently, Haile Gebrselassie or Derartu Tulu may be remembered for the way they ran as well as the titles and records they won.⁵

7. The why of affective proprioception

Any system of reward, and an affective reward from exercise, or by extension, from watching it in others, must have evolved for a reason. It is relatively easy to suggest that there was a good evolutionary pressure to reward exercise of the body (in the sense of controlled movement⁶). In hunting, often over long distances and periods of time, those with endurance would obtain the kill. Similarly avoidance of predation presumably required accurate and skilled movement. Fitness in movement may also be associated with fitness in general and so fitness to reproduce. It is not too difficult to suggest that those who were physically strong and good movers were in some situations at a selective advantage (without suggesting that other abilities, e.g. intelligence, were not also a selection pressure).

Just as facial symmetry and attractiveness may be a marker of biological marker of fitness, so might be the physicality expressed through movement and poise. Certainly it is possible to consider that the absence of these, associated with the diseased and old, were less attractive to others.

Until recently and the rise of Masters' events, sport and ballet, for instance, were largely the preserve of the young. Some dance and sports are still only possible when young, though this does not mean they only appeal to the young. In contrast musicianship is independent of age since it does not take such physical strength and because it can reflect qualities of poise and depth more associated with age than youth.

We have been focusing on the affective effects of movement and of poise. Some may claim that we have over-emphasized this. But, more significantly, others might simply fail to identify any phenomenally pleasurable feeling associated with movement at all. Furthermore, some might object to our focus on the experience of movement by claiming that in the very act of focusing on it, we hinder it.

Let us address this last point first. True enough, when one focuses on proprioceptive input, one's movements sometimes falter; the dancer who all of a sudden on stage starts thinking about how to do a jump or a turn is headed for trouble. This may happen with other senses also, so that someone trained to identify certain visual features on x-rays might do very well if it is done somewhat automatically but falter otherwise. However with awareness of movement this seems especially true. But, as we have already suggested, it may be, rather ironically, that some of the immediate and continuing pleasure in and during movement occurs when not focusing on the movement itself. This might explain why, as we have discussed, we are submerged in dance or running when it goes well and why, then, the effort dissolves as we become as one with the movement. Some of the pleasure may arise from a balance between the movement commands we are making and an understanding that they will take place just as we intend, without unexpected mismatches interrupting their flow and snagging their way to our attention. Perhaps part of this pleasure in movement arises from a perfect match between intentions and feed forward motor commands. This is not to say that peripheral sensations have no role but that these sensations are complementary to, and predictable, from the intention (see Frith et al, 2000).

As for those who claim to not be able to identify the phenomenon at issue, this may, in part, be simply lack of practice.⁶ We may have developed vision as a dominant sense in movement, and so look outwards rather than concentrate on our inner embodied lives. And as we have become more intelligent and live in larger groups, the factors reflecting success and what might be rewarded have become more and more social. We now value a confident, outgoing, socially sophisticated individual hugely; success for

many of us lies in this arena rather than in the physical or bodily. Perhaps our rewarding of sportsmen harks back to a period when physical proficiency was more important for our existence. Moreover, many of us have parceled these affective aspects of movement off from other areas of life. So we study, or work in an office, and then go off to play sport or dance as recreation. For much of our waking lives we seem to divorce ourselves from our physicality. Intense cognitive work does seem to require extended periods of sitting, and during this one's bodily self tends to become unimportant. Throughout the Western world, slumping at chairs and desks may be a cause of many physical aches and pains; to alleviate these problem one hears much about newfangled chairs, but little about listening to one's body. Even some of those who think and write about embodiment philosophically are not in tune with their bodies; they have even intellectualized embodied movement.

Though we value movement in select areas, whether in sport or art, some have almost privatized it, employing others to show it to us, and so are in danger of losing its presence in our own daily life. But this is no reason to think that for those professional athletes, dancers and others deeply immersed in movement, there is no "what it is like" to move. Rather, for those who fail to identify the pleasure of movement, we hope that this paper serves as motivation to become reacquainted with their physicality, with their moving bodies.⁷

8. Living without affective embodiment

If we are correct in suggesting that there is pleasure in movement, with differing pleasures from the loose limbed abandon of a child, exploring carefree movements, and the controlled coordinated learnt repetitions of a pianist playing Bach, then what of those without movement? How do those without it, due to stroke or spinal injury, reflect on their bodies? This is a difficult area, for neurological impairment may lead to losses in walking, feeding and independent living which must dominant the subject's perspective. And yet there are some clues.

Ian Waterman who, at the age of nineteen, lost the senses of touch and movement and position sense relearned, over 2 years, to move by thought and by visual supervision. He managed to return to work and live independently, preferring to tell colleagues that he had a bad back rather than explain the extraordinary loss he had to a large degree overcome. But he was aware that though he had imposed movement once more on his body,

he no longer could enjoy it in the way he had previously. He would go to a nearby forest to watch wild deer, consciously seeking out their grace in movement (Cole 1991, 1995).

One man who became paralysed from the neck down reflected thus, 30 years later. He was a perfectionist and seeing others doing things only intensified the frustration and anger since he had loved sport.

“You just cannot substitute for the experience of being able to use this wonderful piece of equipment, the body, be it running, riding or shagging. My greatest passion was horse riding. The sheer enjoyment and freedom of being able to go hell for leather across the forest on the back of this living being with communication and some measure of control, but not too much. It was awe-inspiring and wonderful and something that I cannot ever experience again. People say why not go to “Riding for the Disabled.” I don’t want to sit on a horse and be led round a fucking paddock. That’s nothing compared to what I was doing.

I enjoyed contact with a whole body experience, like rugby. It is the sheer total involvement and the physical contact. I play basketball or table tennis, but it is not the same, not an experience which is satisfying because it is done on a restrictive basis, and you cannot throw yourself into it.

I can never forget that I am in a chair. I am devastated by my body now. It was wonderful... I used to go to rugby circuit training—20 minutes of intense effort. I used to crawl out the gym on my hands and knees and puke. But then I felt great that I could do these things. Now I get none of this. (Cole, 2004)

Robert Murphy, a professor of social anthropology, who became quadriplegic later in life, expressed a slightly different perspective on this in more temperate language,

a quadriplegic’s body can no longer speak a ‘silent language’... the thinking activity can no longer be dissolved into motion, and the mind can no longer be lost in an internal dialogue with physical movement. (Murphy, 1987).

Here Murphy is expressing, perhaps, in his state of absence, the seamless relation between intention, action and sensory return, which we discussed above. In it, one's mind—in the sense of oneself as a reflexive thinking agent—does dissolve in the movement, and this does seem to be an important part of the pleasure of movement. If so, this suggests that this pleasure is not solely from attention to the movement, but from intention and movement becoming one. Perhaps it is reliant on such a close coupling of these two, and the predictable sensory return, that one can rely on the free flow of the movement as it unfolds in time so that attention can be moved from the specifics of the movement to its overall feel. Paradoxically, it seems that this pleasure in action and movement results from sufficient skill and prediction of action that attention to movement is no longer required at all even though movement continues. Release of successful motor programmes allows relaxation, without need to attend to their genesis or construction. Then, perhaps also the mind is dissolved so that it is no longer thinking about that which can be expressed in propositional language, but gets lost in the language of movement.⁹

Those without the ability to move effortlessly and accurately may lose this affective relationship between intention and action, and so between their bodies and their minds. Murphy again,

Consciousness is overtaken and devoured in contemplation, meditation, ratiocination, and reflection without end, relieved only by one's remaining movements and sleep...My thoughts and sense of being alive have been driven back into my brain, where I now reside. More than ever it is the base from which I reach out and grasp the world... many say they are no longer attached to their bodies.

It is reasonable to question whether those that can no longer move can enjoy the movement of others. The answer to this seems, from clinical cases at least, to be mixed. One man who has been quadriplegic for 30 years was asked if he was engaged at a soccer match. He said that,

I cannot get involved in the same way. If you go to a football match you are standing up and down, waving and cheering. I cannot do that. I feel that loss of involvement and engagement desperately. There is a huge barrier between me and other people. I cannot gain from others. I merely watch sport or an erotic movie as a voyeur. You are in some

way participating, but I do not feel that. Yet others in a similar position told me that they still kicked every ball when they saw a match or watched their sons playing in the garden. Why there should be these differences is far from clear, but the latter response may go with a degree of successful adaptation to their new bodies and new lives.

9. Conclusions

We have suggested that there is a sense of affective proprioception, of pleasure within movement. This may be a sensation of pleasurable tiredness after exercise as Bell suggested, but there may be many other types of pleasure with movement. The affective pleasure after endurance sports is likely to be very different from the pleasurable experiences during piano playing or unleashing of a drive in golf. Affective pleasure also arises when we watch others move in various ways, suggesting that these affective aspects of movement do not necessarily require our own peripheral movement at all. Lastly we go on to speculate that in some movements pleasure may derive from harmony between intention, action and sensory return.

Though we have mentioned only briefly the experience of those with physical impairments, the lack of affective proprioception and pleasure and pride in one's body which can be present after physical losses (though it may be submerged in the other more practical and social aspects of their impairment) may allow us all to see its worth and purpose.

This purpose may be related to two areas of recent work. Bud Craig, (2003) after Damasio, has developed a theory of the development in humans of the awareness of interoceptive sensations, of pain, temperature, itch, sensual touch etc, which may be found in the insula cortex, and which might be related to the emergence of the representation of the feeling self. Conscious awareness of this interoceptive self might allow an image of the physical self as a feeling entity and allow this to be maintained optimally. In grafting a conscious affective dimension onto the body it might also allow for the development of affective empathy (see Gallese, 2005). That affective proprioception might be part of this system seems entirely plausible. Secondly, and within another context, Patrick Haggard (2004) and Daniel Wegner (2002) independently have suggested that a close binding between the awareness of intention and of action helps calibrate our sense of self—what we intend to move, do move and obtain feedback of moving, is us. This is persuasive but is, arguably, a rather cognitive view of self and non-self.

Perhaps one of the most important purposes of affective proprioception is that it enables us to bind with our sense of agency and embodied movement selves at a more emotional level.¹⁰

Notes

¹ It is not only the body that can be phenomenologically absent. Much of the input from our other senses is phenomenologically absent as well. There is a vast array of visual information before our eyes, but typically we focus on little if any of it. Walking down a crowded street at noon, numerous faces may cross one's visual field, but one's attention might be on nothing else but on what to eat for lunch. How our awareness of our movement is different from other senses remains to be determined.

² Going a little beyond a consideration of affective proprioception, he goes on to talk about how appreciation of the aesthetic qualities of a piece of music sometimes, in part, depend upon how it feels to play the piece and the use certain composers have made of this: "Played as the composer wrote it, it both sounds and looks like a grand and daring leap, and the sense of courage and excitement is communicated aurally and visually. Played with two hands it looks easy, and is easy—and consequently it sounds easy as well."

³ We are concerned to emphasize the appreciation of movement for its intrinsic feel, and are aware that some of those who don't engage in sports might not appreciate watching sports for reasons related to this, though there may be other reasons they enjoy it. Part of the reason why sports are so much more popular than dance is that many more people have had some training in sports than in dance. Anecdotally, one of us (BM) knows someone diagnosed with 'degraded proprioception' who claims to have little appreciation of dance; he just does not get what is supposed to be interesting, and indeed, claims to not appreciate most sports either, except for baseball which he loves because he is able to appreciate the rules of the game. (Perhaps more people might appreciate ballet in this way if its underlying structures were better known.) We wonder about the experience of watching sports or dance of those, say, with Asperger's Syndrome, where a person might not know the rules but see the movements.

⁴ Whether one experiences pleasure in watching someone else move, however, might depend on one's background. Calvo-Merino et al (2005) asked expert ballet dancers, experts in capoeira, and inexpert control subjects to watch videos of ballet and capoeira whilst fMRI was performed. They found that when watching the ballet video, there was a significant increase in activity in various motor areas in the ballet dancers, though not in the other two groups, and that when watching the capoeira video there was a significant increase in activity in various motor areas in the capoeira dancers though not in the other two groups. Given that there are significant similarities between capoeira and ballet, it seems unlikely that this difference would be innate and thus it does seem, as the authors claim, that training in a specific type of movement affects the way we respond to, and heightens our appreciation of, it.

⁵ Changes in technology have altered some sports and not always improved their aesthetic aspect. The replacement of long skis by shorter ones has favoured the short and powerful performers over the more languid taller competitors, and altered the aesthetic of Nordic skiing. At present the reverse may be occurring in rowing. As equipment becomes lighter the sport may be favouring those with technique and long levers over the sheer

strength of the muscle bound jocks. Might similar factors be at play in ballet with new high tech pointe shoes?

⁶ Exercise for its own sake is a recent phenomenon. For most of our history any movements have been for a more prosaic reason, whether hunting, gathering or growing. Some years ago one of us stayed with a friend in Nova Scotia whose father was a fisherman by winter and hired hand by summer. This man was amazed that I should waste time and effort running purely for the fun of it. In discussing affective proprioception in relation to sport we are aware that we have taken a position which may only have emerged in the last few decades. But by doing this we would suggest that the appreciation of, and need for, sport reveals a pre-existing phenomenon. (For an early paper exalting the benefits of exercise for its own sake see Montero, J. 1966.)

⁷ Richard Shusterman (2000) has made the same point and called for a change, arguing that in order to think about the body, one needs to also use one's body.

⁸ Music that one is really inside does have that self annihilating effect, we are at one with and yet not present in it. Might this be behind Kant's idea that the beliefs involved in aesthetic experience are somehow contentless and Schopenhauer's view that in aesthetic experience the self loses its sense of self?

⁹ Perhaps one reason why so many professional dancers had quite troubled youths is that they found in dance a good way to lose the self. Consider the popularity of street dancing and sports amongst the troubled poor.

¹⁰ In Capgras Syndrome people presume their loved ones are imposters. One plausible explanation of this is that there is a disconnection between the areas of the brain responsible for recognition of others and those involved in an emotional response to them (Anderson, 1988). The subject sees his wife or child and recognizes them, but does not feel anything and so in some way interprets that lack of emotional valence as being due to the 'wife' or 'child' being played by an imposter. Perhaps we need to calibrate our selves emotionally through affective proprioception to have a homologous emotional valence of embodied self

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