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## Exploring Embodiment

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Exploring embodiment may yet have an answer to the question about the extent of the mind-body interaction. Despite this how we decide to go about studying phenomena in this paradigm will affect the kinds of answers we get. One part of the solution

may be to break the study of embodiment into four questions: how does the body type/condition affect mind, how does mind affect bodies, how does biological motion advertise mind, and how does biological motion affect mind. From this point the methodologies used will

decide the types of answers we get. This essay aims to suggest methodologies that we can explore embodiment under this framework in order to more fully understand the mind-body interaction.

Within each of these four broad domains, we may have to focus on more specific factors that influence this interaction. Factors that shape the body that are mediated by the mind may include personality, sexual orientation, mood, exercise, expectations, education and surgery, and each of these could have a place in research on embodiment. Embodiment is evident everywhere in that each individual may have an individual mind along with a particular posture, way of walking, moving, smiling, expressing emotions and a particular diet. These things may advertise who we are and others may use this information to decide how they will interact. Furthermore the choices we make about how we embody can bring different outcomes in the world. Experimental evidence cited in this essay seems to suggest that the body is “plastic” or shaped by mind. It is then suggested that more experiments need to be done in order to develop our understanding of how and to what extent. When these things are embodied they give us something that is directly observable to compare with the internal or to possibly replace self report. This essay will give examples of how embodiment has been explored through use of self report combined with using various objective measures based on the body.

### **Biological motion advertising mind**

An individual’s sexual orientation is not necessarily unknowable without their explicit declaration (Ambady, Hallahan et al. 1999; Johnson, Gill et al. 2007). Biological motion, and in particular the way we walk is not homogenous across all people, but instead it may be influenced by sex and/or sexual orientation. Heterosexual men tend to walk with a greater degree of “shoulder swagger” and heterosexual women tend to walk with a greater degree of “hip

sway”. Studies show that asexual cues predict both actual and perceived sexual orientation (Johnson, Gill et al. 2007). This means that we may be embodying these traits in such a way so as to make it recognisable to someone else. The fact that we have identified this cue and been able to reduce it to something quantifiable is promising. In this particular study by Johnson, Gill et al. three methodologies were used; in the first computer generated animations of “walkers” were rated for gender and perceived sexual orientation. These walkers varied statically in Waist to hip ratio and dynamically in terms of 5 levels of motion from extreme shoulder swagger to extreme hip sway. This was an objective way of measuring and controlling the IVs gait and morphology, and eliminating confounding variables so that we could be sure that these were responsible for the perceived change in sexual orientation. The other methodologies of using dynamic outlines of actual heterosexual and homosexual people ensured ecological validity. However sexual orientation may not be the only thing that can be embodied in gait and hence not the only thing that could be explored by similar experimental means. Animators study how to represent mood, age, wealth etc in a manner of walking. As such animators are able to represent such qualities through scenes depicting nondescript stick figures walking (Williams 2001). We can consider these artists as masters of the study of embodiment, and it seems likely that knowledge from their study could inform scientific studies. Books on animation such as “the animators survival kit (Williams 2001) have many observations about walks that could be turned into hypothesis about how and when we perceive embodied states and then these could be tested using methods similar to the study by Johnson, Gill et al.

### **Mind, body and health: mind affecting body.**

As interesting as it may be to measure embodied traits, theory around embodiment should not simply be a matter of exploring these simple curiosities

of how we advertise who we are, but should also explore the issue of health. There is some experimental evidence to suggest that if one is neurotic, as assessed by a personality scale, one is more susceptible to health problems (Goodwin, Cox et al. 2006). In this way it can be said that this ill health is quite literally an embodiment of the neuroticism. However this study cannot argue direction of causation as it is not strictly experimental. Similarly in other non experimental studies it has been suggested that the health decline of cancer patients often has less to do with the actual course of the illness and more to do with their negative expectations regarding the disease (Langer, 1989; as cited by Crum and Langer 2007). This mind-body interaction may then have serious implications, indeed Goodwin, Cox et al. suggest that neuroticism was associated with increased odds of arthritis, diabetes, kidney/liver disease, stomach/gallbladder problems, and ulcer. Both of these studies suggest that neuroticism and negative expectations are embodied and have physical effects but we do not know if the embodiment of our personality stops here or continues. The study by Goodwin, Cox et al. illustrates how current records on medical and psychological data can be utilised in the study of how these two factors interact. The study drew from the national comorbidity survey and used multiple logistic regression analyses on the data to examine the relationship between neuroticism and physical disorders controlling for demographic differences and mental illness differences. It might be interesting to see if controlled studies could go further from this point and see if interventions on neurotic traits can help improve health status.

In other areas it has shown that pain relief from placebos is the result of activated endogenous opioids that are only released in patients with some positive expectations, and not with those with Alzheimer's disease who's ability to expect has been disrupted (Benedetti, Arduino et al. 2006). Vase (2006) suggests that it would be interesting to test whether

psychological mediators, such as expectancy, relate to changes in the magnitude of placebo analgesia effects over time. It may also be the case that positive expectations like those in a clinical setting can be embodied in the form of health benefits in other forms too. Of course the placebo effect has been seen to have objective benefits and can treat more than pain (for a review see Benson and Friedman 1996; or Kirsch 2006). To the same extent we also that the health benefits of exercise are believed to be moderated by mindset (Crum and Langer 2007). Crum et al. were able to contribute to this debate by using an experimental study and showing a reduction of body fat and lower blood pressure in room attendants informed about how the exercise they were getting at work met the surgeon general's requirements. The control group did not show signs of this benefit, and because there was no difference in the workload between the groups it is inferred that the benefit was gained as a result of the psychological state of the workers. One way of looking at this is that they have embodied their expectations. These study demonstrated in a measurable and objective way that there may be a degree to which we embody what we expect in terms of health and fitness suggesting that these phenomena can be investigated empirically. We could further learn about embodied experience if we tested in a similar manner other questions such as: are there greater fitness gains in the gym when people are more aware of what they should expect from their work out? In the Crum and Langer study participants were told about how much energy was burned for each activity and this was used to lead them to have more accurate (and greater expectations) from their work. A similar study might ask do benefits increase when people are misinformed to have expect more than they should, as well as is there something in the way that these people move/behavioural that is changing and leading to these benefits- recording and analysing video tape surveillance as in the earlier cited study by Johnson et al. (2007).

### Body affecting mind: facial feedback, Diet and transplants

As much as can currently be said for how we embody our personality, more needs to be said for whether our mind changes when our body is altered. James (1980) proposed that subjective feeling was the result of peripheral bodily changes that directly follow the perception of the eliciting event (Soussignan 2002). There has also been much research to date of how the body can affect the mind in the examination of the facial feedback hypothesis (Strack, Martin et al. 1988; Zajonc, Murphy et al. 1989; Ekman 1993; Soussignan 2002; Ito, Chiao et al. 2006; Sigall and Johnson 2006). In the original study by Strack et al. participants were asked to either balance a pencil between their lips and nose by pressing their lips forward or putting a pencil biting down on the pencil. Participants watched a humorous film while holding either one of these positions and then rated the film for humour. Specifically in these types of studies it has been indicated that when people holding different types of facial positions during the same activity may change the emotional experience of doing that same activity (Soussignan 2002). Of course as discussed earlier even a walk may express an emotion, and it would be interesting to know whether changing the way one holds one's body or walks can influence the way a situation is experienced.

Studying the psychological outcomes of patients who undergo plastic surgery and/or transplants may also improve our understanding of how the body affects the mind. By looking at these cases we may be able to directly compare psychological measures before and after their treatment. The result of such comparisons may inform our knowledge of how the mind changes with the body. The first partial face allograft has already taken place (Devauchelle, Badet et al. 2006). This transplant was for a recipient who had suffered amputation of nose, lips, chin and adjacent parts of the cheeks. The recipient had the central and

lower face area of a brain-dead beating heart donor transplanted onto her. Regarding this issue it would be interesting to know if what such changes of her physical identity meant for her psychologically. Despite such psychological questions, the recently published 18 month follow up admits that to date the patient has not undergone formal psychological testing (Dubernard, Lengele et al. 2007). While we know that the patient's body is trying to reject the transplanted tissue and that increasingly potent drugs are being administered to the patient to try and stop this, we do not have a good enough idea of how the patient's psyche is coping or if it is changing. An operation several years earlier led by the same Doctor saw the first "successful" attempt at performing a hand allograft (Dubernard, Owen et al. 1999). Worryingly the recipient demanded amputation and had the hand removed in 2001 (Dubernard, Owen et al. 2001). It seemed that not only was the body trying to reject the organ, but the mind was too. There are many questions as to what changing one's physical identity means for the mind. Many of these questions may be best answered by following up people who undergo a range of different transplants under different life circumstances. This may be particularly interesting for the organs that have a large amount of social and psychological meaning like the face etc, but also internal organs to see if the extent of their impact on psychological factors. There is even consideration of brain tissue transplants for the treatment of neurodegenerative diseases such as Parkinson's or Alzheimer's disease (Northoff 1996).

There is of course a much more basic level at which we alter our bodies, and this is through our diet. Most people will be familiar with the old adage "you are what you eat" and while most people will have an understanding that this is true on some basic level, in that protein may be required to gain muscle and eating too much may make you fat, but there is also some scientific evidence to suggest that diet may affect personality too (Moore, Karom et al. 2004; Simon,

Kaplan et al. 2004; Kipp 2005). Many serious implications can come from considering single food products, for example soya. Previous studies with animals have shown that aggressiveness can be increased and social behaviours decreased by soya diets (Moore, Karom et al. 2004; Simon, Kaplan et al. 2004). Of course it may require a value judgement to say whether these things are good or bad for an individual, for whom such traits may be function as a productive personality. It would be interesting then to see to what extent we embody our diets and what direction this can take us. Just as our personality can be reflected in our health, it is also true that our personality and health may sometimes be reflected in our diet.

By bringing a psychological perspective to the study of these areas from medicine to animation we may gain much greater insight into embodiment. Thus this essay suggests transplants or cosmetic surgery may affect mind; personality and expectations can affect our body's health; how biological motion in gait may express mind; and how facial/whole-body feedback may help us understand how body influences mind. Right now we have patients who are undergoing new types of surgery with possibly new psychological effects that are not yet being examined; we have the technology to create

animations that control for variables so we can test perceptions of embodiment more accurately than before; we have technology can be used to measure and analyse movement in live models who embody traits much easier than before; and we have theories regarding expectancy and personality that may affect the body but very little knowledge of to what extent the body is affected. As such there are new ways of exploring embodiment and many gaps in the literature to be filled. These topics offer utility outside of psychology to which the informed science could offer an authority relative to alternatives. Furthermore a science that can, for example, quantify, recreate and/or recognise the physical expression of subjective feelings or traits through body position would most definitely be a science for this technological era; and a science that understands the importance of the mental attitude and personality of a human in relation to their physical health may lead us to the next era of health care. The ways in which we can explore embodiment are broad and brilliant.

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