The Body in the Mind

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Why does a hill look less steep after you consumed a sugary drink? Why does another person's transgression seem more wrong when you find yourself surrounded by a foul, disgusting smell, but less wrong after you washed your hands? Why does a large box loaded with books feel lighter after you thought back to a time when you had power over other people? These sets of findings from my experiments can be explained by one simple underlying principle: thoughts have a bodily basis.

The complex machinery inside your head, the brain, serves to store and process information, and to accurately reflect the physical and social world around you. Although this seems like an obvious assumption, it unfortunately turns out to be wrong. Indeed, animals mostly *do* things. They search for food, run away from predators, chase after potential mates, and so on. Humans appear to be a special kind of animal: They spend much of their time thinking. About what is, what was, what might be, and what might have been. Such an obsession with thinking might indicate that conscious thought sets humans apart from non-human animals, and that consciousness represents the pinnacle of evolved life. However, emerging research in the field of *Embodied Cognition* suggests that people were never meant to think as much as they do, or at least, thinking did not arise as a goal in itself. Instead, people, just like other creatures, have evolved to deal with the physical and social realities around them.

One finding that illustrates this notion concerns the basic structure of the frog's visual system. A puzzling discovery in the 1970s showed that frogs have two types of neurons in the brain: One to detect small fast-moving objects, another to detect slow-moving large objects. How could such a visual system possibly allow the frog to see his world? The answer is that a frog has no need to see everything around him, or create a mirror image of his surroundings. Instead, what he needs to do on a daily basis is, among other things, find food and run away from predators. Food comes in the form of small, fast-moving critters, and predators come in the form of large birds of prey that loom over head. Therefore, the two surprising aspects of the frog's visual system perfectly prepare him to deal with what is required to survive, namely to capture insects and run away from enemies. Blind spots that happen to arise in the process are not really an issue. Similar findings have been obtained for human vision: People only see what is relevant to whatever goal they have in mind at a given moment, and they can literally be blind to blatant aspects of the world simply because they are not currently of concern.

Picture yourself in the situation of one of my research participants. You are standing at the base of a steep grassy hill and I ask you to tell me how steep the hill is in degrees. If I gave you a heavy backpack to wear, you will say the hill is quite steep. On the other hand, if I gave

you a boost of energy in the form of a sugary drink, the hill will look more manageable to you, and therefore less steep. My findings suggest that depending on your physical condition at a given moment, you will perceive the hill, or the environment in general, very differently. In other words, how ready you are to climb a hill determines whether it looks like a mountain, or a molehill.

However, not only physiological resources change how we see the world, but psychosocial factors also matter, as my work has demonstrated: A hill looks less steep when you have a close friend by your side. Thus, the world looks like a scary, challenging place when one lacks resources, but becomes manageable as one's resources increase. Just like the frog does not see the world as a reflection of actual reality, people do not see the hill in accurate terms as having an invariant slant.

Does this mean that visual perception and the resulting thought processes are biased and irrational? Not at all, because your perception of the hill is a perfectly appropriate readout of your body's ability to put up with the challenge of climbing it: It will be difficult when you are encumbered with a heavy backpack, but comparatively easy when you have a spring in your step because your blood glucose levels are elevated.

Or imagine yourself as a participant in another one of my studies. You come to the lab and sit down on an old chair with a torn and dirty cushion, at a desk that has various stains and is sticky. On the desk you notice a transparent plastic cup with the dried up remnants of a smoothie, and next to you is a trash can overflowing with garbage including greasy pizza boxes and used-looking tissues. The pen you get to complete a survey is all chewed up at its end. If you are like most of my participants, you will probably feel disgusted by this lab situation, which is precisely what was intended. As a results, when you fill out the survey and answer how morally wrong you find transgressions such as falsifying one's resume, or not returning a lost wallet, you are likely to find these behaviors more objectionable than a participant who sat on a regular chair at the same desk when it was covered up with a clean white tablecloth, and none of the disgusting objects were present.

These results suggest that participants' current emotional state, such as a feeling of disgust and repulsion, was transferred onto the decisions they were making. Does this mean that people's moral judgments are completely irrational? Again, not necessarily, but they show that there is a potentially adaptive link between one's bodily states and the situations one encounters in the environment. Disgust normally indicates the presence of potentially harmful substances, such as spoilt food, contaminated surfaces, or in general, things you should avoid ingesting or touching. My research suggests that disgust is not only an important indicator to stay away from bad substances, but it also indicates when to stay away from bad people, and their behaviours.

Another interesting line of investigation is related to the physical ability of one's body. In the animal kingdom size indicates power: The alpha male is usually a big and physically strong individual. In humans, too, tall people are more likely than their shorter counterparts to end up in jobs that involve yielding power over others. But power is not only related to objective body size or height; your subjective sense of power can be influenced by how you carry yourself: Taking on an expansive posture, such as leaning back in a chair and putting your feet on the table, increases feelings of power, and leads to higher levels of testosterone, a "power hormone", and lower levels of cortisol, a stress hormone.

Indeed, relative to experimental manipulations of power that change people's thoughts, manipulations that change people's bodily state (e.g. posture) are literally more powerful. My research suggests that having power changes the perception of objects in the world; for example, powerful people estimate the weight of heavy boxes to be lighter than powerless people. Findings such as these imply that thought processes relate to very basic physical experience. Cognitive scientists studying perception, cognition, action, and language, social psychologists studying emotion and social processes, and neuroscientists studying the human brain now all arrive at the converging conclusion that thoughts have a bodily basis: The body is in the mind, and as Merleau-Ponty suggested, provides the window to our social and physical worlds.