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Fleshing Out Perception: A Comparative Study of Representational and Embodied Approaches in Cognitive Psychology

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Introduction

In the quest for understanding the human mind, psychology has faced numerous challenges, philosophical traps, and conceptual ambiguities. Eager to carve out its niche as a rigorous science, the field has navigated through myriad approaches and frameworks. Among the most promising is cognitivism, with its computational models and systematic methodologies. Yet even as it aspires to scientific rigour, psychology must tread carefully; murky concepts and lingering dualistic notions threaten to pull it into abstract quandaries that are, ultimately, scientifically unresolvable. It is against this backdrop that I turn my focus to the radical embodied cognitive science (RECS) program—a framework that, in my estimation, moves farthest from the pitfalls of dualism and the conceptual mazes of consciousness, self, and representations.

I argue that RECS offers a fresh, substantive approach to understanding human cognition that bypasses many of the problems that have bedevilled other paradigms. It places the body at the centre of cognitive processes, thereby providing a grounding that many other theories lack. Perception stands at the heart of this exploration. Not only does it represent one of the most empirically robust areas within psychology, but it also may hold the keys to broader, deeper understandings of human nature. RECS offers a dynamic, flesh-and-bones approach to perception—an understanding that is not just mechanistic but fully embodied. Furthermore, it takes seriously our evolutionary origins, adding an additional layer of explanatory power to its framework.

Through the lens of RECS, this exploration will delve into the empirically robust area of perception, tackling its complexity from an evolutionary and embodied standpoint. By closely examining bodily illusions, evolutionary narratives, and our nuanced sense of self, we aim to gain deeper insights into the questions that have long fascinated both psychologists and philosophers alike. In doing so, we hope to illuminate promising avenues for understanding not just perception, but also the broader landscape of human nature and consciousness.

Although this thesis does not directly delve into the intricacies of consciousness, it inadvertently sheds light on this concept through a detailed analysis of perception. While representational and embodied cognitive science may not view consciousness as a central issue, the exploration within this thesis enhances our understanding of it.

This work does not overlook other approaches in the field; in fact, it acknowledges the profound impact of individual experiences and the inherent desire to seek explanations that preserve their enchantment and personal significance. Nevertheless, the thesis proposes that RECS, in its alignment with our current scientific understanding and evolutionary perspective, possesses a unique explanatory strength. This approach is posited as being most congruent with our nature as human beings, offering a well-founded explanatory superiority in the landscape of cognitive science.

I conclude with that this thesis, situated at the intersection of psychology and philosophy, embarks on an exploration that transcends mere empirical analysis, venturing into the philosophical underpinnings and implications of cognitive processes. While the primary focus is on the representational and embodied cognitive science approach to understanding perception, this inquiry is deeply rooted in philosophical inquiry. It examines not only the cognitive mechanisms but also delves into the existential dimensions of perception and the mind.

This philosophical perspective is essential, as it elevates our understanding from the domain of observable phenomena to the realm of conceptual interpretation and analysis, which is characteristic of philosophical discourse. By aligning this investigation with the rich traditions and critical thinking inherent to philosophy, the thesis aims to contribute not just to the scientific understanding of cognitive processes, but also to the broader philosophical discourse on the nature of perception, consciousness, and the self.

Psychology as science

In the pursuit of seeking to establish itself as science, psychology has changed its course a few times regarding its object of study to be made predominantly about the mind, or the behaviour. Ultimately the cognitive movement came along and it promised to be the unifying scientific theory of linguistics, neuroscience, philosophy, engineering, computer science, AI, information processing theories, and so on. Despite the changes it has been going through internally, its presiding relevance has been persistent: it seems that cognitive science will continue to exist for decades to come (Snoeyenbos and Putney, 1980).

Debate has it if psychology ever earned to become scientific, to the extent that some may even argue that any attempts to present psychology as science is genuinely misguided

(Finkelman, 1978). Psychology has long been criticised for lacking rigour; debates over nebulous theories in areas like evolutionary psychology, murky concepts such as the self and personality, notoriously non-replicable experiments actively serve to exacerbate the issue. Ethically dubious, theoretically unfounded and again, virtually non-replicable attempts to experiment on human beings under the aegis of social psychology, and in the name of science has given psychology a bad name both among scientists and the in the general public's eye (Lilienfeld, 2012). Scientific misconducts of the unethical kind may no longer be ubiquitous due to the presence of ethical boards and higher ethical standards being introduced to the practical psychological research, still, the likes of the *Milgram shock experiment*, or the infamous *Stanford prison experiment*[1] have left a stubborn stain on the reputation of psychology as a whole, and as an emerging scientific filed of study.

Chequered past aside, natural scientists usually dismiss psychology—and to be fair, the other social sciences as well—as real science on the grounds of methodology and for simply not satisfying all the criteria to proclaim itself a field of science (Michell, 1999). While philosophers often denounce it for the lack of clearly defined terminology. Even though it is not a pure science like physics or chemistry—and very likely never going to be—one may ask why should those be the standard by which to assess the degree of scientific rigour in various fields. Although I believe these standards or criteria are deficient and overly strict, I do believe too that they serve as a good yardstick for psychology to assess its own shortcomings and objectives. Philosophy is right about pushing for greater conceptual clarity and rigour in psychology. They may rightfully scrutinise the definitions of key concepts like 'mind,' 'consciousness,' 'emotion,' 'intelligence,' and 'mental representations (or content),' and challenge psychologists to refine these concepts.

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[1] Both the Milgram shock experiment and the Stanford prison experiment are seminal in psychological research, yet they are equally notorious for their ethical and methodological shortcomings. The Milgram experiment, conducted by Stanley Milgram in 1961, sought to understand obedience to authority figures, compelling participants to administer what they believed were painful electric shocks to others. This experiment raised serious ethical questions regarding the psychological harm inflicted on participants, as well as concerns about informed consent. Similarly, the Stanford prison experiment, led by Philip Zimbardo in 1971, aimed to investigate the psychological effects of perceived power by simulating a prison environment. Participants were assigned roles as either 'guards' or 'prisoners,' leading to abusive behaviours by the 'guards' and psychological distress among the 'prisoners.' This experiment was criticised for its lack of ethical oversight, the extreme psychological stress endured by participants, and methodological issues, including Zimbardo's own involvement in the experiment. Both experiments, while influential, are pivotal examples of the ethical evolution in psychological research, underscoring the necessity for stringent ethical standards in experimental design and conduct.

Psychology as science faces particular complexities and challenges, particularly in bridging the gap between physical processes and psychological experiences. In reflecting on my own experiences growing up, I have observed a fundamental aspect of how science often challenges our intuitive understandings. A key lesson from scientific discovery is that things are not always as they appear. Naive theories about the workings of the world are frequently contradicted by scientific explanations, which tend to be counterintuitive and, in some cases, strip away the perceived 'magic' of phenomena. For instance, consider the phenomenon of a rainbow. Intuitively, it might be seen as a magical or mystical event. Scientifically, however, it is explained as the refraction, reflection, and dispersion of light in water droplets, resulting in a spectrum of light appearing in the sky. While this explanation may seem to take away the 'magic,' it also opens up a new dimension of wonder in understanding the intricate workings of nature. Contrastingly, folk psychology often reinforces the idea that things are exactly as they seem. This aligns with our everyday experiences and intuitive understanding of human behaviour. However, when psychology adopts a scientific approach, it encounters what is often referred to as the 'explanatory gap.' This gap arises from the challenge of establishing a direct, causal relationship between material processes, such as neuronal activity, and overt, observable behaviour. Scientific psychology endeavours to bridge this gap, seeking to explain how complex mental processes and behaviours arise from the physical brain.

This dichotomy—between the everyday, intuitive understanding of human behaviour and the scientific, often counterintuitive explanations offered by psychology—captures the unique position of psychology as a science. It also underscores the challenges faced by the field in reconciling these two perspectives. As we delve deeper into the scientific aspects of psychology, we navigate this cavity of the explanatory gap, striving to link the material with the observable in a way that is both scientifically rigorous and true to the complexity of human experience.

In the realm of cognitive science, a fusion of philosophical concepts about the mind occurs alongside research in psychology, neuroscience, and artificial intelligence. It is within this interdisciplinary nexus that cognitive psychology finds its strongest alignment with the scientific method. This stands in contrast to other branches of psychology, such as clinical, applied, or social psychology, which may not adhere as closely to the rigorous empirical frameworks characteristic of the natural sciences. However, suggesting that cognitive

psychology is the most scientifically oriented branch of psychology does not imply that it is a mere stepping stone or temporary placeholder within the broader scientific landscape. Psychology is far from being dead[2] and cognitive psychology is far from being a discipline on the brink of extinction or one that must dissolve into neuroscience or other related fields to maintain its relevance.

Contrary to Howard Gardner's prediction in his 1985 book on the cognitive revolution, cognitive psychology has not faded into the background of these disciplines. Instead, it holds a well-deserved, distinct place within the scientific study of the mind. It represents psychology's most promising avenue towards achieving a level of scientific rigour comparable to the natural sciences. Thus, cognitive psychology stands as a testament to the vitality and ongoing evolution of psychology as a scientific discipline.

Psychology's contribution to cognitive research has been predominantly about its methods (from laboratory experiments, where variables are strongly under control), and the large database it has gathered and documented on perception and thinking, based on controlled observations. In fact, experimental psychology's strongest suit is probably the body of scientific work itself done on cognition, and especially perception (Stanovich, 2012). In return, cognitive science provides models for psychology to scaffold its own theories. Without the explanatory power of this theoretical framework, experimental psychology would be no more but a vague mass of correlational studies. But then again, psychology can feed its experimental results back into cognitive research, so as to make the collaborative efforts worthwhile.

Cognitivism stands as psychology's foremost opportunity to be acknowledged as a scientific discipline. However, the versatility of cognitivism as a theoretical framework poses both a challenge and an opportunity as well. Psychology must not only be thoroughly informed about the diverse aspects of cognitivism but also strategically position itself,

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[2] "Psychology itself is dead." Declares Michael Gazzaniga in his book, *The Mind's Past* from 1998 referring to the current state of affairs at his own Dartmouth College. He argues that psychology as the scientific study of the mind has long been dissolved in neuroscience, evolutionary biology, computer science, and so on. More than twenty years have passed since this statement was made public and psychology still looks fresh for a zombie. Embodied sensorimotor approaches, predictive processing, interoception are a few of the more recent areas where experimental psychology has shone since with a remarkably innovative body of studies. Although I have personally noticed some antagonism between scholars of classical psychological subjects and the cognitive department in terms of who is more deserving of the name 'psychology' (and therefore, who should get more funding), so, I suppose psychology may bisect sometime soon, one part might lose or willingly give up on the denomination, but almost certainly, neither part will be dispelled.

grounding its methods and theories in those facets that most effectively advance its scientific aspirations. When these elements align — a deep understanding of cognitivism, strategic positioning, and robust grounding — cognitive psychology can then flourish as a fully-fledged scientific and experimental discipline. It is this alignment that transforms cognitive psychology from a theoretical pursuit into an empirical science, replete with the rigour and precision characteristic of the natural sciences.

The age of cognition also marks a renewed covenant between psychology and philosophy, to give a fresh outlook on the philosophy of mind, including the mind-body problem, which outside of the usual ontological and epistemological questions barely receives a functional treatment.

Behaviourism was dominant in the first half of the 20th century, especially in the United States. Behaviourists such as B.F. Skinner advocated for the study of observable behaviours and their relations to environmental stimuli, avoiding reference to any sort of internal mental states or processes[3]. With the emergence of cognitivism, psychology underwent a significant shift, turning its attention towards the exploration of internal mental processes. This transition naturally bridged the gap with philosophy, a discipline that has steadfastly maintained its focus on the intricacies of mental phenomena. By prioritising the study of cognition, psychology rekindled its dialogue with philosophical inquiries into the mind, thereby reestablishing a vital connection with its philosophical roots.

The relationship between philosophy and cognitive psychology is characterised by a broadly positive and collaborative spirit, reflecting a shared interest in the intricacies of the mind. Philosophy recognises cognitive science as a crucial interdisciplinary ally that enriches philosophical debates with empirical insights. However, this partnership is not devoid of tension or disagreement, a situation that is to be expected in such intellectually diverse fields. These disciplines house a variety of sub-disciplines and intellectual traditions, each with its

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[3] Behaviourism emerged in the early 20th century as a reaction against the introspective methods prevalent in psychology at the time. Central to behaviourism is the outright rejection of conscious experience as a legitimate subject of scientific inquiry. They did not dispute the existence of consciousness per se, but behaviourists like John B. Watson and B.F. Skinner argued that psychology should focus exclusively on observable behaviours, which can be objectively measured and studied, rather than internal mental states, which they viewed as subjective and unquantifiable, or even a threat to the scientific integrity of psychology. This stance allowed for a more consistent and empirically verifiable approach to studying human and (mostly) animal behaviour, though it also led to criticisms for oversimplifying the complexity of mental processes, especially human mental processes.

own perspectives and priorities, making disagreements inevitable. Yet, amid these debates, one fact remains indisputable: the psychological study of the mind—historically referred to as the soul or psyche—finds its intellectual origins in philosophical thought. This enduring connection underscores the deep, foundational ties between philosophy and the psychological sciences, affirming their shared quest to unravel the complexities of human cognition

The emergence of experimental psychology at the dawn of its scientific journey did not signify a clear divergence from philosophy. Instead, the intricate interplay between these two domains suggests that psychology may never fully extricate itself from philosophical roots; conversely, philosophy might perpetually find psychology within its embrace. This interdependence is evident in the ongoing debate within psychology about its identity: whether to remain contemplative, akin to traditional philosophical discourse, or to assert itself at the forefront of empirical science. Central to this discourse is the recognition that psychology, unlike disciplines such as chemistry, may not currently, and perhaps never will, attain a similar status as a pure science. This unique positioning of psychology is not a sign of indecision but rather the crux of the debate about its nature and future trajectory.

Natural philosophy served as the foundation for all contemporary scientific disciplines as we know them today. In this sense psychology is not at all unique. Since then, fields like physics, biology, and physiology have developed into independent sciences with little to no connection to philosophy. It is worth noting that even the ‘hard’ natural sciences are not completely devoid of philosophical considerations. Questions about the interpretation of quantum mechanics in physics, or the nature of genes and inheritance in biology for instance, are deeply philosophical ones. However, the role of philosophy in these disciplines might be less overt. Cognitive science on the other hand is inherently interdisciplinary, drawing from psychology, neuroscience, artificial intelligence, linguistics, anthropology, and philosophy. This integration necessitates philosophical reflection to ensure that the various disciplines are coherently speaking about the same phenomena and to reconcile potential conceptual conflicts. The concepts with which cognitive psychology deals are inherently philosophical and therefore require clarification, analysis, and occasionally, redefinition.

Compared to the other scientific disciplines, psychology was somewhat slow to self-identify as an experimental science (Boring, 1950). It was supposed to become the scientific study of the human mind, behaviour, and mental processes, evolving from the study of the

psyche, or soul. Now, this is a major difference between the rest of the natural sciences and psychology. While natural sciences focus typically on understanding the fundamental principles that govern the universe and everything in it, including matter, energy, space, time, and life, psychology deals with the inner mental workings, and outer behaviour of the enquirer, the humans themselves. In addition, the natural sciences tend to have a more clearly defined body of knowledge and established theories, while psychology is still a relatively young field with many competing theories and ideas. While both natural sciences and psychology are fundamentally empirical disciplines, psychology focuses on the subjective experiences of individuals, which can make it more complex and difficult to study compared to the natural sciences. Since people are not single particles or single neurones, it is incredibly challenging to conduct an experiment on humans and consistently produce the same findings (Stanovich, 2012).

Psychology relies extensively on statistical methods to discern whether observed variations in research results are mere products of chance or if they signify genuine differences between samples. This reliance on statistical analysis is a fundamental aspect of the discipline, serving as a critical tool in validating psychological research. Indeed, this dependency on statistical interpretation is an inherent constraint of psychology, reflecting its commitment to empirical rigour despite the complexities and variabilities inherent in human behaviour and mental processes. While psychology heavily employs statistics to mitigate the inherent uncertainties in studying complex human phenomena, this statistical reliance also marks a significant methodological evolution from its earlier introspective roots too.

Initially, psychology as a science was deeply entwined with introspection, relying on the subjective examination of one's own thoughts and feelings as a primary method of inquiry (Danziger, 1980). However, recognising the limitations and lack of empirical rigour in introspective methods, the field has consciously shifted towards more objective, quantifiable approaches. This transition is particularly crucial given the unique challenges of psychological experiments, which often involve human subjects whose behaviours and mental processes cannot be reduced to simplistic models akin to those single particles or neurones. Therefore, psychology's methodological journey from introspection to a more statistical and empirical framework reflects its ongoing endeavour to balance the complexity of human subjects with the scientific rigour of its investigations.

Modern psychology therefore utilises a range of scientific methods, including experiments, surveys, observations, and neuroimaging techniques to study human behaviour, cognition, and emotions. These methods often involve external measures, such as physiological responses or behavioural observations, rather than relying solely on introspection. That being said, some branches of psychology—and even experimental psychology—do incorporate introspection to some degree. In clinical psychological settings, therapists may use introspection as a tool to help clients become more aware of their thoughts and emotions. However, this approach is not the primary focus of psychology as a scientific field. An individual's own subjective experience and self-report can be difficult to verify and replicate, therefore it is generally not considered a reliable or rigorous method of investigation on its own.

Some researchers within cognitive psychology may still use introspection as one tool among many for understanding cognitive processes. They may ask participants to report their thoughts or experiences during a task, but they will also use other methods to gather data and test hypotheses. For illustration, when we used the rubber hand illusion experimental paradigm[4] in order to investigate the brain's ability to integrate multisensory information and construct a coherent sense of body ownership, we employed a self-report questionnaire as well in order to gather introspective reports on the subjective experience of the participants. We can learn more about each person's unique experience with the illusion by using a standardised questionnaire. In fact, there might be other, more reliable methods to observe one's behaviour or read their emotions, still, in order to gain insight into the experiences of others', introspection remains a method of strong consideration. In certain psychological research paradigms, introspection and introspective elements play a critical role, despite potential challenges to the validity and reliability typically demanded in scientific experiments. Historically, reliance on introspection could be seen as conflicting with the objective standards of scientific rigour, simply because introspective methods rely on subjective self-reports, which can vary significantly between individuals and are hard to verify independently. However, as technology advances and new methods for data analysis

[4] The rubber hand illusion experimental paradigm, employed here to explore the brain's ability to integrate multisensory input and construct a sense of body ownership, will be examined in greater detail later in this thesis. This further discussion will delve into the specifics of the paradigm, including its methodological implications and the insights it provides into our understanding of perception and body ownership.

emerge, the value of introspection in psychological experiments may possibly increase. These advancements could potentially mitigate some of the traditional limitations of introspective methods, making them not only more viable but also more valuable for gaining deeper insights into the human psyche.

Therefore, the scientific scrutiny remaining open to mixing introspective tools into the apparatus is a welcome act generally, however one has to always consider the liabilities that the deployment of such method in experimental settings may bring about. For instance, the questionnaire used in the rubber hand illusion paradigm, in contrast with physiological or behavioural responses, is delayed. While behavioural observation or physiological data collection typically take place in real time, the questionnaire itself frequently evokes memories of earlier events. In addition, when the subject is asked to recall how the illusion made them feel, their account likely speaks more of their introspective, rather than their perceptual experience.

From a methodological standpoint, experimental psychology may strive to uphold the highest standards of scientific rigour. This pursuit, however, is complicated by the field of cognitivism, which centres on the study of internal mental processes. Cognitive psychology inherently grapples with the role of introspection—the self-examination of one's thoughts and feelings. This leads to a fundamental question: can we truly have direct knowledge of our own thoughts? This query is not just psychological but also a deeply philosophical one, having been a subject of debate for centuries. Consequently, the convergence of experimental methodologies with philosophical inquiry becomes crucial. Such an interplay is essential for effectively navigating the complexities presented by introspective elements within psychological research.

It should be clearer by now how cognitive psychology and philosophy intersect in myriad ways. In this rich field where cognitive psychology and philosophy intertwine, we find ourselves navigating through a landscape dotted with age-old philosophical conundrums, now armed with the empirical toolkit of cognitive psychology. This arsenal equips us to revisit these enduring puzzles with fresh perspectives, offering the potential not only to approach them from novel angles but also to empirically test and potentially verify some of the philosophical speculations that have intrigued thinkers for centuries. Reflecting on this intricate interplay, one might be reminded of classical philosophical quandaries such as the

mind-body problem, which cognitive psychology now approaches with its trademark empirical rigour. Philosophical inquisitions—such as probing the essence of consciousness and the interplay between perception and actuality—have in turn shaped the cognitive field. Fundamental questions about how we perceive the world and our awareness of it are questions that straddle the disciplines of philosophy and psychology. Philosophical inquisitions into these areas challenge and enrich our understanding, pushing cognitive psychology to explore these themes not just theoretically, but with empirical methods as well.

This symbiotic relationship suggests that cognitive psychology has been profoundly shaped by philosophical debates, which have provided a rich soil for its questions, methodologies, and ultimate growth. Consider, for instance, the scholarly investigations into false memories[5] and optical illusions. The realm of optical illusions has been meticulously documented by philosophers, tracing a lineage from the ancients, through the meditations of thinkers like Plato with his allegory of the cave, to Descartes's reflections on the deceiving senses, and further into the modern exploration of the boundaries of perception. On the other hand, the concept of false memories represents a novel contribution by psychology, offering fresh insights into the malleable nature of human memory and how it contrasts with the longstanding philosophical intrigue with perceptual deception. Both phenomena demonstrate the brain's interpretation and sometimes misinterpretation of sensory input, wether visual (in the case of optical illusions) or memory-based (in the case of false memories). Also, this juxtaposition of the ancient and the modern—of optical illusions, a topic of philosophical speculation for millennia, against false memories, a relatively recent psychological discovery —illustrates the enduring quest to understand the human mind.

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[5] The concept of 'false memories' refers to the psychological phenomenon where a person recalls something that did not happen or in fact recalls it differently from the way it actually happened. This is a significantly robust, and exceedingly intriguing area of study in cognitive psychology, particularly in understanding how memory works and how it can be influenced or distorted. False memories are often studied through various methods, including suggestive questioning techniques and the manipulation of contextual information, which are to illustrate the malleability and fallibility of human memory. Not only is this phenomenon crucial for understanding cognitive processes but also has important implications in legal settings and therapeutic practices, where the accuracy of memory recall can have significant consequences. A seminal study in this field is Elizabeth Loftus' work on the malleability of human memory, particularly her experiment involving the 'Lost in the Mall' technique. This study and others by Loftus have significantly advanced our understanding of how suggestion can lead to fabricated or altered memories. For those interested in a comprehensive overview of research in this area, Loftus and Katherine Ketcham's book T*he Myth of Repressed Memory* and the collection *False Memories: A Psychological Perspective* edited by Martin Conway are highly recommended.

Philosophy provides a rich historical context that invites us to question the reliability of our senses and the nature of reality, cognitive psychology introduces empirical methods to investigate these questions, offering measurable insights into how we perceive, remember, and interpret our world.

Psychological research can also provide empirical insights into questions raised by philosophical thought experiments[6]. This empirical data can help refine, support, or challenge philosophical arguments. In many cases, the results from experimental psychology do not resolve the philosophical issues (which often hinge on deeper conceptual matters), but they provide valuable data on how humans think and feel about these issues, and can sometimes reveal biases, patterns, or cognitive mechanisms that were not initially apparent in the philosophical discussions. This process of bringing thought experiments from the realm of philosophical speculation into the empirical testing ground of psychology represents a fascinating evolution of inquiry. What was once purely hypothetical can now be examined through the lens of scientific methodology, transforming abstract philosophical puzzles into tangible research questions.

Given this rich interplay between empirical findings and philosophical inquiry, one might then wonder: why not direct all intellectual effort towards an experimental approach in philosophy instead? This could also potentially enrich philosophical debates with data-driven insights, leading to a more grounded and comprehensive understanding of the human mind and its intricacies. I personally find experimental philosophy one of the most intriguing recent interdisciplinary approaches, and collaboration between experimental philosophy and cognitive psychology should be evident, as there are indeed scholars proficient in both realms. But the two tend to approach experiments with different hearts; experimental philosophy pursues answers to questions more associated with traditional philosophy, while cognitive psychology is still more focused on studying the underlying mental processes such as perception, memory, attention, and problem-solving. Furthermore, there is indeed a more subtle, but relevant distinction in the methodologies and objectives of philosophy and psychology when addressing the nature of human beings and our evolutionary development.

At its core, philosophy tends to favour a deductive approach, where conclusions are

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[6] In subsequent chapters, we will delve into a series of thought experiments designed to illuminate key concepts and theoretical debates within our discussion.

posited first, followed by the extraction of reasoning or principles that support them. This method can often smuggle a subtle teleology into its analysis, suggesting a sense of purpose or directionality to human existence and evolution. It tends to take the dynamism of evolution away, and puts us, humans, on top. Conversely, psychology, rooted in empirical observations, adopts a more inductive stance, drawing broad generalisations from specific observations, thus portraying evolution as a dynamic, non-teleological process.

This distinction in approach carries implications for how each discipline interprets human nature. While philosophy might risk placing humanity atop an evolutionary pedestal, viewing our existence as an outcome with intrinsic meaning or purpose, psychology, when done right, maintains a grounded perspective, seeing human evolution as an ongoing, adaptive process without a predetermined endpoint. It is this dichotomy that underlines a critical difference in their treatment of human nature: one searching for an inherent essence and the other understanding humans as products of dynamic interactions and adaptions. However, the two fields can complement each other in several ways. For instance, cognitive psychology can help experimental philosophers understand the cognitive processes that underlie philosophical reasoning, and how these processes are influenced by factors such as emotion, perception, and attention and the given environment. Both experimental and traditional philosophy can benefit from cognitive psychology in expanding their fields of study in order to achieve a more comprehensive understanding of the human mind.

The historical relationship between psychology and philosophy is marked by deep mutual influence and collaboration, shaping the evolution of key concepts and theories within both fields. Embodied cognition represents a contemporary development in this ongoing dialogue, emphasising the significance of bodily interactions with the environment in understanding cognitive processes. However, this theoretical advancement faces challenges from persistent dualistic perspectives within psychology, which threaten to undermine its scientific credibility. While philosophers might entertain dualistic postulations (although hardly anyone claims to be a Cartesian dualist nowadays) as a product of speculative exercises—an act they are duly entitled to—it is a rather unsightly garb for psychology to adorn. For psychology, a discipline yearning for empirical grounding and scientific legitimacy, to be entrapped in this dualistic quagmire is not just antithetical to its goals but might be seen as a retrogressive misstep.

Where does this resurgence of dualism in contemporary psychology come from? As one delves into the emerging frameworks mimicking embodied cognition, an astute observer may detect a paradoxical reinforcement of Cartesian dualism. Gabor Maté's[7] exposition, a representative example, highlights the notion that trauma—fundamentally a mental event—could be directly culpable for tangible bodily maladies. At a cursory glance, the embodiment of trauma in physiological disorders feels like a step towards bridging the age-old dichotomy between mind and body. However, the implicit suggestion here is far from reconciliatory. In essence, it reinvigorates the split, implying that mental phenomena wield an almost mystical influence over the corporeal, without an intermediary mechanism. This new trajectory raises questions reminiscent of the age-old philosophical quandary of mental causation. Can pure thought, devoid of any physiological manifestation, truly evoke a physical ailment? While the relationship between psychological stressors and somatic manifestations isn not entirely dismissible, a wholesale acceptance of direct causation—without mechanistic elucidation—seems to float on shaky ground. Sadly, this indicative lack of critical thinking within pockets of the psychological community undermines the credibility of genuinely embodied cognitive approaches. It is imperative, for the sanctity of the discipline, to approach these topics with a rigorous and skeptical lens. To accept, uncritically, that mental events exert direct influence

[7] Gabor Maté, a distinguished physician and author, is renowned for his work on addiction, stress, and childhood development, particularly focusing on the interplay between psychological stress, trauma and physical illness. In my opinion Maté's perspective inadvertently perpetuates the classic mind-body dichotomy. His work, while offering valuable insights into the health implications of psychological factors, inadvertently echoes the age-old philosophical debate on mental causation. This debate centres around how mental phenomena can induce physical changes in the body, and Maté's stance, while progressive, inadvertently reinvigorates this traditional dualistic thinking rather than reconciling the two domains.

on physical disorders risks perpetuating the very dualistic thinking that many modern psychological frameworks strive to dismantle[8].

It is tempting, especially with the sophisticated tools we have today, to fall into the trap of seeing mind and body as two separate dominions. But cognitive psychology, especially when informed by philosophy, should be wary of treading down paths that unintentionally uphold dualistic notions. If anything, the progress of modern science should be pushing us towards a more integrated view of consciousness, one that respects both its intricate physical manifestations and its profound subjective experiences. By emphasising a division, even unintentionally, we risk setting back the efforts of countless scholars who have argued for a more holistic understanding. It is up to our generation to ensure that we advance with both clarity and critical thinking.

In summary, I contend that a scientifically grounded experimental psychology is needed, and cognitive psychology as a framework may be well positioned to contribute something scientifically worthwhile regarding the workings of the human mind, or even the non-human AI, or robotics. It can help better understand the mind-body problem, and the mind-mind problem provided that it reflects on its history, knows its limits, and choses a direction that is suitable for its goals.

This is just a rather schematic, and probably oversimplified description of a multidirectional, intertwined, continuously waxing association cognitive science, psychology, and philosophy has, and it only serves here as a tidbit. In the ensuing discourse, I aim to delve deeper into the concept of perception, weaving its exploration with reflections on the expansive, albeit germane, historical and philosophical narratives within the field of

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[8] A recent sojourn to a New York conference—billed as a groundbreaking intersection of philosophy, psychology, and neuroscience—offered a startling revelation. The aim was ambitious as ever: bringing together some of the brightest minds to untangle the enigma of consciousness. Yet, amidst this intellectual panorama, one poster particularly stood out, albeit for unsettling reasons. It brandished the provocative title: "Dementia as a Disorder of Consciousness." The sheer audacity of the claim rendered me momentarily aghast. To liken it to Hungarian parlance, we would call such an idea the ‘veterinarian's horse of a problem’—a proposition so riddled with flaws, it bears every conceivable issue. The premise suggested that dementia, a deeply intricate neurodegenerative condition, could be reduced to a mere anomaly of consciousness. Looking more closely at the paper, there seemed to be a mix-up: the terms 'consciousness' and 'conscious awareness' were used interchangeably. Neuroimaging techniques like fMRI and EEG had been employed when executing the research. It is undeniably tempting—especially with the allure of colour-coded brain scans and precise electrical graphs—to claim we are closer to 'cracking' the mysteries of the mind. But there is a risk here: Are we perhaps missing the broader picture? And it is not just a theoretical concern; the way we understand these terms affects real-world practices and treatments. How do we intend to treat dementia then? By ‘treating’ consciousness?

experimental psychology. I will also endeavour to revive a hitherto overlooked trajectory within this discipline. Furthermore, I present the contention that radical embodied cognitive science posits (RECS) a viable methodological and theoretical approach for advancing empirical research in cognitive psychology.

Another aim of this work is to elucidate and consolidate the terminology set to be utilised in the subsequent sections. The notions under scrutiny, including sensation and perception, perceptual experience, as well as illusions and hallucinations, and the concept of mental representations may be practically apparent yet theoretically could engender ambiguity. While these are fundamental constructs within cognitive psychology, I recognise the necessity for recalibration of their definitions in order to ensure alignment with my forthcoming theoretical propositions, thus adhering to the rigorous conceptual clarity mandated by philosophical discourse.

Sensation and perception

Where would one start an empirical, quantifiable enquiry of the mind? Obviously, where the most feasible, plain to see transition happens form the physical to the internal world: at the doors of perception. Understandably, the first people to premeditatedly call themselves experimental psychologists, beginning with Wilhelm Wundt in Leipzig, Germany, did not think otherwise. Building upon the foundations psychophysicists such as Weber and Fechner[9] had laid, they got out of the armchair and moved into the laboratory to give a radical empiricist account of consciousness (Boring, 1950). But how was it going to be any different form the previous, purely physiological undertakings? In other words the question is, how does it all become psychology.

Wundt's answer was methodological: putting a special variant of self-observation, namely introspection, in the centre of investigation. It was not however just some everyday self-observation, but a methodological, highly controlled one, including measurements of

[9] Ernst Heinrich Weber (1795-1878) and Gustav Theodor Fechner (1801-1887) are pivotal figures in the field of psychophysics, a discipline that bridges the gap between physical stimuli and their psychological effects. Weber is best known for identifying the just-noticeable difference (JND) as a proportion of stimulus intensity, laying the groundwork for Weber's Law. Fechner built upon Weber's findings to develop Fechner's Law, which quantifies the relationship between the intensity of physical stimuli and the magnitude of sensory experience. For further reading see Michael Heidelberg's book, Nature from Within: *Gustav Theodor Fechner and His Psychophysical Worldview* which contains references to Weber as well.

reaction times, word associations, and descriptions of sensations, yet again, in a strictly controlled manner. Participants therefore were not just any undirected people haphazardly recruited to undergo the scrutiny, but highly trained individuals, consisting mostly of Wundt's own students.

Wundt was a dualist, likely not in the usual mind-body dichotomy sense, but he certainly had no interest in experimental psychology converting to psychophysiology in the effort of becoming scientific either. It does not mean that he believed in an immaterial soul of sorts either, in fact he was probably trying to protect psychology as a science from the then fashionable practices of hypnotism, spiritualism, and even the unconscious. What he did believe instead was that neurophysiological events and mental events were different. They run parallel but they are not comparable to one another, and consequently, there is no causal relationship between the two. But is it not that nervous stimulation that gives rise to sensory experience after all? According to Wundt's (1902) account, this is only how it appears to us. In reality, the same conditions give rise to both the physical and the psychological. Wundt believed that both the physical and the psychological emerge under the same conditions, but they manifest differently. Psychology has to study the manifest, conscious processes by breaking them down to their elements, and then to see what connections, driven by what laws are there between them. In his view, rather than the psychological being merely dependent on the physical, they mirror each other.

The common misinterpretation of Wundt's perspective categorises him as a dualist, but this is not accurate, especially not in the Cartesian context. Rather than subscribing to the traditional dualist view, where mind and body are seen as distinct and separate entities (substance dualism), Wundt actually championed a version of *dual-aspect monism*. In this framework, mind and body are not separate substances; instead, they represent two different aspects of the same underlying reality. For Wundt, psychological processes and physiological processes were two sides of the same coin; one could not be reduced to the other, but they were also not separate entities.

Given Wundt's dual-aspect monism, the problem of mental causation does not present itself in the usual way either. Since mind and matter are seen as two aspects of a unified reality, there is not a stark divide between them that would make causation problematic. This kind of dualist, elementist approach of his was commendably respectful to the body of

knowledge available at the time, and the extent to which one can stretch the ambitions of the newly formed experimental psychology in studying the human mind. Some may see it as myopic, an unnecessary dwindling of the field, but those may forget that Wundt was a self-proclaimed first, and as such he had to be cautious, rather than charging bravely ahead with some unfounded ideas. However, the trajectory that Wundt and his followers had charted for psychology ultimately proved to be short-lived and was eventually abandoned.

Through Edward B. Titchener, a student of Wundt's, his ideas—although in a somewhat simplified form—were imported to the United States, but they did not find prosperous grounds there either. American psychology—led by William James—had already been unfolding on its own mostly traditionally naturalistic, and evolutionarily functional terms. James, never being a keen experimenter himself, allowed scientists imported form Germany, such as Hugo Münsterberg, to work in the laboratory, meanwhile he could focus on his theoretical, functional explanations for the workings of the mind. But American psychology, with its headquarters at Harvard University, did not follow through this path either, as behaviourism had already moved into the basement—in a very literal sense[10], and was about to take over its laboratories. Additionally, James had already resigned from experimental psychology, and was about to resign from psychology as a whole, and retreat to philosophy completely. In 1890 *The Principles of Psychology* was published, having spent 12 years in the making, and as James in his famously self-deprecatory letter to his publisher Henry Holt writes: "… [Principles of Psychology is] testifying to nothing but two facts: 1st, that there is no such thing as a science of psychology, and 2nd, that W. J. is an incapable" (1926). Be that as it may, the 'Principles' turned out to be a great success and it continues to be influential, despite the disheartened James leaving experimental psychology for the generations to follow. As for his remark about the science of psychology, he successfully

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[10] Between 1895 and 97 E. L. Thorndike continued his studies at Harvard where he was very much influenced by James, but driven by his own scientifically strict experimental ambitions, he intended to use animals in his experiments. He had chosen chickens, as they were easy to breed, but his landlady forbade him from keeping the animals in his rented room. Eventually, James offered the basement of his house to be transformed into a laboratory, where he could carry on with his experiments. As for Thorndike's later career, he continued on at Columbia under Cattell, where he brought two of his best-trained chicks with him, and there they were offered a laboratory to study animal-intelligence. Later he turned entirely towards educational psychology and the measurement of intelligence. In terms of the future of scientific psychology his work is remarkable for two reasons specifically: Bringing animals into the laboratory for comparative studies, and being the forerunner for the behaviourist movement to follow, providing an early version for operant conditioning, namely the trial and error learning paradigm.

defended the idea that psychology can indeed be a genuine, real science, and that there could indeed be a science of the mind.

Embarking on an in-depth exploration of perception, my admiration for James had already been well-established. Here was an individual who seamlessly integrated the roles of a philosopher, physiologist, and psychologist. Concurrently, my affinity for the works of another James, specifically James J. Gibson—the renowned American ecological psychologist—grew significantly. Heft's assertions suggest that Gibson drew heavily from William James' theories in his research (Chemero, 2003). Indeed, the undercurrent of James' neutral monism seems to have influenced Gibson's perspectives.

However, the definitions of 'perception' from these two scholars do not fully align. Yet, the clarity of thought and practical nature of James, combined with the intricate and dynamic perspective on perception by Gibson, resonates closest with the vocabulary I would employ to decode such intricate processes. As I delved deeper into the interconnected web of philosophical thought and empirical study, an articulated lineage became evident. Originating from the foundational work of James, it extended through Gibson's ecological psychology. The continuum of this trajectory was captured aptly in Heft's 2001 paper, which then led me to the contemporary dialogues of embodied cognition, and enactivism, and later on RECS.

This genealogical connection between these thinkers and theories unfolded with clarity as my exploration progressed.[11] Gibson (1979), just as much as Wundt, and many of the early experimental psychologists for that matter, thought that perception should be the primary focus of experimental psychology, because it was crucial to understanding the human mind. I have the intuition too that through understanding perception we can indeed gain insight into the workings of the mind, but first and foremost we need to establish what we mean by perception and the related concepts. As I was starting to give more serious thoughts to the matter, the first observation to strike me as a problem was the distinction conventionally established between sensation and perception. The conventional

[11] At the beginning I took only a liking to the works of William James and James Gibson. Very little did I realise how much they challenged the classically cognitive approach to perception which I had been used to. As I was following through their thoughts, I could gradually see the continuation between the two scholars' ideas, meanwhile drifting further and further away from the classical cognitive approach. I had the intuition that this might be the right way to understand the perceptual experience. The work of Dember (1990) then made me see more clearly the connections between James and the ecological psychology. At this time I had not yet heard about the prolific scholar on this matter, Anthony Chemero. A chance meeting with him at a conference in Berlin drew my attention to his work on radical embodied cognitive science.

understanding of the process is that there are raw sensations, in which specified receptors directly receive physical stimulus form the environment, which will be processed by the brain, so that eventually we can have a meaningful experience to help us interact with the people and the objects in our environment. Even though they do not seem to occur without one another, in most cases it is indeed hard to tell where exactly sensation ends, and perception begins. Once I started pondering this question, I felt I had been swallowed whole into the rabbit's hole, head first. I broke the problem down to two further questions which I attempt to answer in the next paragraph: Is sensation eventually part of the perceptual experience? If so, to what extent; what qualities are present in our experience?

According to James(1890), from an analytical point of view, while sensation and perception are still inseparable and only represent different functions in cognition (different sates of mind), they are different regarding their object or content. Sensation is therefore the registration of the simple qualities of the object cognised, such as: cold, blue, pain, noise. The simpler these qualities are, the closer we get to pure sensation. If the object is more than just qualities, but occur in relations, such as being located, assigned, organised, etc., then the corresponding state of mind is called perception. Consequently, there is no perception without sensation, but in an adult human's life we cannot talk about pure sensation either, as adults hardly process anything as simple qualities.

Perception involves learning, establishing (knowing) those relations in objects, therefore if ever pure sensation can occur it has to be in early childhood. This early experience though—such as seeing light for the first time—is greatly important, as it will always be the base of whatever knowledge it will be replaced by in the functional sense. Hence James' sensations are close to the sensations (simple ideas of sensations) described by Locke as being "the whole materials of our knowledge" and they represent the first step toward the conscious awareness of material things present to the senses (which is perception). Following that, while sensation still remains as a portion of perception, its contribution is only relative, proportionate to the content of perception. We perceive things as a whole regardless what sensory inputs are available or to which ones we attend at any given instance. Whether it has a *richer* content or a *barer* one is a matter of associations.

James' tangible example is of a horse-car that we hear approach. We may recognise that this must be a horse-car, drawing closer and closer, by the sound of it, but the auditory

experience alone is not even a more distinguishable character of it, let alone the car itself. As soon as I attend to the sound, as a readily available single quality (although there are no such things past the early childhood), it is already a lot more than that. My imagination of a horse-car is called up based upon the memory images I have of such vehicle, and I may even have expectations about who rides it. These distal, associative processes enrich the experience. The content of the experience is made up of both the sensational processes and the reproductivity of my imagination, but what makes perception different from sensation is that is has conscious access to distal facts associated with the object. There are already associations in the more direct consciousness (such as directly hearing the sound the car makes), but they are fewer. Every object is a flow of sensory qualities, and if it still appears so, that there are essential qualities as building blocks of the experience, it is only created by a more familiar acquaintance with a quality. We pick out these qualities based on, for instance, practical importance, general interest, or permanence.

James' description distinguishes between the two mental states only through their function, while presenting their seamless continuity, and denying their traditional distinction. The most important takeaways form James' theory of perception is that it is indeed direct. And that we tend to see things as a whole, part of which comes form sensation, but a larger part comes from our mental processes. Sensation and perception are hardly distinguishable, if at all, therefore it is futile to isolate sensations for empirical enquiry.

James approaches the concept of perception by starting from basic sensations and building up to the full perceptual experience. However, it is crucial to recognise his holistic perspective, emphasising that the perceiver is deeply embedded in their ecological context. James notably rejects the atomistic model, which posits that complex mental states are merely combinations of discrete mental elements.

Similarly, Gibson prioritises the broader context, focusing on the interplay between the environment, behaviour, and evolutionary processes. In both James' and Gibson's theories, perception is an active, unfolding process, not a static given. A key commonality between them is the belief in direct access to the world through perception, underscoring a more immediate and integrated understanding of how we experience our surroundings. This notion is called direct realism, also known as naive realism. Similarly to James, but expressed more comprehensibly in his theory, perceiving in Gibson's view is not a passive process, but

an active information-seeking one which invites the whole body and its movements into the process[12].

Gibson(1966) begins his book called *The Senses Considered as Perceptual System*s with his account of the *senses*, and as the title reveals he is about to give them an unusual function, discontinuing the long-standing dogma of theories of perception which had taken the perception's dependance on sensations for granted. The external senses, he argues, have a "double province" [13] ; (1.)they channel sensation (they make us feel), and they (2.)give rise to perception. If senses are understood as in the first meaning, however interesting it my seem that some of our sensory inputs arouse sense impressions, it is only incidental and they are no way instrumental in our contact with the world. After all, animals and children do not seem to care how perceiving feels. In the second meaning, senses are understood as active *perceptual systems*, which means that they are interrelated systems, rather than exclusive channels equipped with specific receptors. Their function is to pick up information form the environment, which is a constant source of stimulus information. Knowledge can be obtained through these perceptual systems, in contrast with the conscious qualities which tend to arise through the channels of sensation. We may conclude that there can be *perceptual experiences* without receptor specific sensory qualities, but never without information picked up form the environment. There is nothing intellectual in the process of sorting through information from the environment, but it is the mere detection of the given environment from invariant properties (such as gravity) in the flux of energy by the working perceptual system.

> "We perceive the environment in order to do things" as Chemero(2009) explains in plain English how perception guides action in Gibson' theory,

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[12] Gibson, James, and several contemporary psychological theories, including some forms of behaviourism, and they idea of the embodied mind share a common thread: the idea that perceptual experience is intrinsically linked to our interaction with the world. This idea is called direct realism. From its perspective, perceptual experience is fundamentally about being disposed to act upon worldly objects and properties in certain ways. It posits that our experiences are relational and dependent on our active engagement with the *real*, physical world. This approach of course challenges the notion that perceptual experiences could be identical in disembodied entities like brains in vats, which are isolated from the physical world and therefore lack the same experiential context.

[13] Gibson borrows the expression form Reid (p. 1, 312) which I borrow form him. See Thomas Reid (1785) Essays on the Intellectual Powers of Man, II, p. 17.

> then he continues "…all the information necessary for guiding adaptive behaviour must be available in the environment to be perceived". (p. 23)

The environment provides opportunities to the perceptual systems for behaviour, which Gibson calls 'affordances'. Affordances are offerings by the environment, which the animal (more broadly, the organism), equipped with the matching perceptual system can perceive and take advantage of. The most basic, for instance, being food.

An affordance is a relationship between an animal and its environment that refers to the potential actions that the animal can take in that environment. This also implies that the affordance has to be meaningful for the animal. Intriguingly, it means that meaning has to be present in both the environment and in the nervous system.

Let us take an example closer to humans; the act of tasting. There are a number of actions involved, and pieces of information available in the process: the opening of the mouth if the temperature of the food is right, chewing which involves the movement of the tongue for the food to find the taste buds, the crushing of food by the jaw and the teeth for the aromas to be freed. We can no longer call this perceptual system a chemical sense, since it is so much more. Therefore it cannot be studied by chemistry alone. Its purpose is not chemical by the physical sense, but an affordance, a value. In this particular instance, a gastronomic one.

Gibson claims to have coined the word 'affordance' in substitution for 'value,' the latter being a loaded term philosophically, but technically they mean the same. There is a sense of equilibrium which the perceptual system aims to achieve —again, it is entirely physical— and it is the process of perceptual learning through which one obtains the capacity of differentiating within this flux of energy, as opposed to the sensation-based views (see James as for one) where the meaningless sensory input gets enriched through the process of perception.

Affordances are not just physical properties of objects or the environment, but are also related to the abilities and goals of the organism. Gibson's concept of affordances is important in understanding how perception and action are linked in the natural world. It suggests that perception is not just a passive process of receiving information about the environment, but

an active process of exploring and interacting with the environment in order to achieve one's goals.

Human affordances and animal affordances are similar in that they both involve the potential for action in the given environment. However, there are also some differences between them as human affordances seem to be much more 'internalised'. Given our previous example of the taste, humans seem to be more driven by pleasure as opposed to nutritional value, animal affordances seem to be more concrete and tied to the immediate needs and survival of the organism. Furthermore, human affordances are often shaped by cultural and social factors, and can be modified or extended through learning, tools, and technology. Human creativity can also make human affordances more flexible and adaptable.

Another very tangible and also special example of a working perceptual system is proprioception. Proprioception is the activity—which was once thought to be awareness, or attention—which scouts out there, reaching out and extracting information form the environment. Proprioception is not a single sense either, but an overall function which rides with all other perceptual systems. For instance in the act of seeing, when something visually captures our attention, our head and eye movements instantly follow the source of information. Gibson therefore does not talk about vision, or the auditory sense as separate modalities, but instead the visual system of *seeing*, and the auditory system of *listening*.

As unconventional as Gibson's ecological psychology might sound, his theory is not something which is unheard of in the curriculum of psychology, although his findings about visual perception are disproportionately emphasised. Every undergraduate is introduced to the optic flow and the visual cliff[14], but only for their experimental worth, as a part of their initiation to perception and motion, with most of the explanatory framework remaining only parenthetical. I was in for a surprise when I delved into the work of the Gibsons to find its theoretical richness and uniqueness, and incompatibility with classical cognitive science, and computationalism. I enjoyed to see something dynamic and different form the usual sense by sense programme too, and for the most part I was pleased to see an alternative to representationalism, and classical cognitive science.

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[14] The concepts of optic flow and the visual cliff are often attributed to James Gibson, however to be precise at least the visual cliff was proposed by Eleanor J. Gibson, a psychologist known for her work in perception and developmental psychology, and the wife of James Gibson. The two worked together closely and contributed significantly to the field of perception.

With the focus shifting towards the embodied nature of cognition Gibson's ideas are given more attention now, after 50years have passed. Embodied cognitive science (ECS) embraces much of what have been said about embodiment and the necessity of dynamical explanations, but forebears from touching anything suggesting anti-representationalism. It is radical embodied cognitive science (RECS), and its variant, known as enactivism that can be thought the direct descendants of Gibson's (and other's) ideas, as it rejects both representations and computation. As a pivotal element in understanding cognitive processes and perception in particular, and now as we are about to transition towards a deeper exploration of perceptual experience, it becomes imperative to consider the concept of representations in depth.

Navigating the landscape of representations

The Gibsonian approach to perception, especially visual perception, central to radical embodied cognitive science (RECS), marks a significant departure from traditional representational and computational theories in cognitive science, including even some of those that identify as embodied. This distinction is crucial for understanding the radical shift that RECS proposes in how we conceptualise cognition and perception.

As an undergraduate psychology student delving into the realms of cognitive science, I was quickly introduced to the cornerstones of the discipline: *representations* and *computation*. Taught as the 'magic words' of cognitive psychology, these concepts were presented as the bedrock upon which the entire discipline rested. We were to cherish these like the secret sauce of cognition—no questions asked, a perspective I found both intriguing and somewhat unsatisfactory due to the lack of critical engagement with their explanatory power. This approach instilled in me a sense of skepticism, a wariness of accepting such fundamental principles without fully understanding their implications or the breadth of their application. It was a discomfort that lingered, challenging my engagement with cognitive psychology.

This skepticism was partly alleviated when I volunteered to participate in a series of cognitive tasks as part of a cognitive psychological research. One task involved a directed memory task where I was asked to remember and then recall a list of 16 words, multiple times, including after a distraction task. Surprisingly, I was able to remember and accurately

recall the words almost perfectly in order in every instance. My method puzzled the experimenter, who inquired about the strategy I used. I explained that I visualised the words. The experimenter, still intrigued by my strategy, probed further, asking if I had visualised the words themselves. I said, no, I visualised them as objects arranged in a half-circle on a table in front of me. For instance, ‘camion,’ on my very left, appeared as a matchbox truck I once owned, while ‘giraffe' next to it took the shape of a chubby baby toy. Each object, including an ‘onion’ marked with its scent, a tin motorcycle to signify the exact word ‘motorcycle,' and an animated, mischievous ‘cow’ moving between the ‘bookshelf’ and the ‘metro,’ had distinct features that helped me remember them. The idea of ‘writing’ words like 'motorcycle' in my mind's eye seemed almost alien. Each word took on a vivid, tangible form: the 'motorcycle' was not just a word but a tin toy motorcycle, tilted in such a way that it could only be 'motorcycle,' not 'motorbike' or ‘scooter.' Given my dyslexia, accurately spelling 'motorcycle' internally would require several attempts—as it does right now—, a laborious process contrasting sharply with my vivid, effortless imagery. This realisation sparked a broader contemplation: How is it that people think in words at all?

This question ultimately led me to discover that cognitive strategies are as diverse as the minds that employ them, a fact later validated by my deeper dive into the research on imagery and verbal cognitive processes. This exploration into the realm of cognitive strategies, particularly my reliance on visual processing, led me to an intriguing realisation: heavily utilising visual strategies may not be as common as I initially thought. In fact, research suggests that individuals who are predominantly *visual-spatial learners* might represent a minority within the broader population (Silverman, 2002).

Silverman's extensive work in this area also illuminates the unique challenges and strengths of visual-spatial learners, indicating that while powerful, and very colourful indeed, this mode of learning is not universally predominant.[15] The intersection of visual strategies and dyslexia does seem to exist too, and presents an additional layer of complexity. Certain

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[15] One very powerful visual thinker I came across during this research is Temple Grandin, a prominent figure in both the autism community and the field of animal science. Her capacity to think in vivid images rather than in words has significantly influenced her work and advocacy. Oliver Sacks, the noted neurologist and author, was so fascinated by Grandin's visual thinking that he featured her in two of his books: *An Anthropologist on Mars* and *The Mind's Eye*. Grandin herself has authored a book detailing her experiences and the advantages of being a strong visual thinker. *Thinking in Pictures: My Life with Autism* offers a compelling testament to the power and diversity of human thought processes.

studies suggest that individuals with dyslexia may exhibit distinct visual-spatial processing capabilities (Giovagnoli at al., 2016). Furthermore, Silverman's concept of the visual-spatial learner highlights how individuals, including those with dyslexia, can excel in learning environments that leverage their visual-spatial strengths (Silverman and Freed, 1991; Silverman, 2002).

The correlation between dyslexia and enhanced visuo-spatial abilities should not be misconstrued as suggesting that dyslexia is disorderly, or possessing strong visual-spatial skills is inherently a gift or superior in any way. Instead, this association highlights the diversity of cognitive strategies individuals develop in response to their unique neurological profiles. All the other related research papers cited here suggest that individuals with dyslexia often develop stronger visual-spatial skills as a compensatory mechanism to counterbalance challenges encountered in reading and verbal processing. This adaptation aligns with Steven Pinker's (1994) view that language functions as a skill acquired through learning and interaction, rather than being a pre-existing capacity. This perspective implies that individuals facing language learning challenges, such as dyslexia, might naturally develop and refine non-verbal strategies for learning and communication.

In contrast, verbal strategies involve the use of words, whether spoken or written, to process and remember information. Individuals with a preference for verbal strategies might excel in tasks that require listening to lectures, reading, or engaging in discussions. Most people however tend to integrate both strategies to a somewhat balanced extent. Integrating visual and verbal strategies can in fact enhance learning and problem-solving. Dual coding theory, proposed by Allan Paivio (1986), suggests that combining verbal and visual information can improve memory and understanding by creating two distinct but interconnected memory traces.

Within the confines of my own cognitive ecosystem, visual thinking was so seamlessly integrated into my daily functioning that I scarcely considered the possibility of alternative modes of thought. It was not until my participation in that cognitive testing that I was confronted with the stark realisation: people's minds operate in fundamentally different ways. My dyslexia, long perceived as a hindrance, stood in sharp relief against the backdrop of an education system heavily skewed towards verbal learning. This contrast, as illuminated by Linda Silverman's studies, highlighted not a deficiency in my cognitive processing, but

rather the incongruity between my innate learning preferences and the predominant educational methodologies. Compelled mostly by a sense of shame, I developed personal strategies to navigate this verbally dense academic landscape. I became somewhat well-read, albeit slowly, and remained perpetually challenged at the keyboard. This narrative is not unique to those who lean towards visual thinking; verbal thinkers, those who find solace and strength in words, likely cultivate their own adaptive strategies to thrive in environments that may not fully align with their cognitive styles.

What becomes evident through these reflections is the critical role of representations —be they verbal or visual—as formidable components of our cognitive toolkit. Our ability to harness imagination and creativity, to paint with words or visualise the unseen, speaks to the nearly magical capabilities of the human mind. Yet, despite our deepening understanding of cognitive processes, the essence of imagination and creativity, and the substrates from which they spring, our representations, remain largely enigmatic. They are the final frontiers of human cognition, fascinating in their complexity and still elusive in their constitution. The most pivotal question remains: What exactly are representations?

Having explored the pervasive role of verbal and visual representations in shaping our experiences and understanding of the world, we are now compelled to probe deeper into the theoretical frameworks within cognitive science that attempt to elucidate the nature and substance of representations themselves. To introduce the concept in a nutshell, providing a generalised overview, representational theories argue that the mind operates by creating, storing, and manipulating internal representations of the external world. These representations serve as mental models or *symbols* that stand in for objects, events, or states of affairs outside the mind, enabling individuals to think about the world even in the absence of immediate sensory input.

The *Physical Symbol System Hypothesis* (PSSH), primarily associated with Allen Newell and Herbert A. Simon's work, can be considered a foundational or ‘proto’ framework within cognitive science and artificial intelligence in terms of representations. It argues that the manipulation of symbols—essentially, computation—is the basis of cognition (Newell and Simon, 1976). The hypothesis suggests that any system capable of manipulating symbols in a way that mimics human thought processes can exhibit intelligent behaviour, meaning that that a physical symbol system has the *necessary and sufficient means* for general intelligent

action. This hypothesis underlies much of the early thinking in AI and cognitive science, suggesting that intelligence emerges from the manipulation of symbols according to formal rules.

While the PSSH may not explicitly focus on the content of symbols (in terms of their semantic or representational content), it is inherently computational. However, the PSSH is 'proto' in the sense that it lays the groundwork for later theories that delve more deeply into issues of content, representation, and the nature of the symbols being manipulated. Generally, the PSSH provides a high-level abstraction of what constitutes a thinking system without delving into the specifics of how particular cognitive processes (perception, memory, language, etc.) operate. It focuses on the fundamental capability of symbol manipulation as the basis of intelligence, leaving the specifics of implementation and the content of these symbols to be addressed by more detailed theories. Because of its abstract nature, the PSSH allows for a wide range of implementations and interpretations. This flexibility makes it a minimal starting point from which different approaches to artificial intelligence and cognitive science can develop their more specific theories. This then led to various theories of mental representation, which we are about to explore.

The core idea, again, is that thoughts, beliefs, desires, and perceptions can be understood as containing representations of the world. These mental *contents* are often seen as bearing a semantic relationship to the things they represent, meaning they have aboutness or intentionality (Von Eckardt, 2012). Computational theories extend this representational framework by specifying that mental processes are computational processes. They argue that cognition involves the manipulation of symbols according to formal rules, akin to a computer running software. At the heart of computationalism is the view that cognitive processes can be understood as operations on symbolic representations, transforming input information (sensory data) into output (behavioural responses, decisions, etc.) through a series of computational steps.

The *determination of content*—how mental representations acquire their specific content—within computationalist theories necessitates a rigorous examination of how information is encoded, transformed, and utilised by cognitive systems. In order to understand these theories and debates surrounding content determination in mental representation the works of theorists Jerry Fodor and Fred Dretske are particularly useful,

although they come from slightly different perspectives. Their informational/causal approach posits that mental representations function as indicators or symbols for external realities, where these connections are not arbitrary but are grounded in the causal interactions between an organism and its environment (Fodor, 1983, 1987; Dretske 1981). Fodor is best known for his *Language of Thought Hypothesis* (LOTH) and the notion of mental modularity (Fodor 1975, 1983). Fodor argues that mental representations have syntactic and semantic structure similar to language, which allows for the complex manipulation and processing of information internally. For Fodor (1987), the content of mental representations is closely tied to their role within the cognitive architecture and their causal relations to the world. Specifically, he proposes that a mental symbol represents a particular object or property if the symbol is reliably caused by that object or property under normal conditions.

Fred Dretske (1981) offers a somewhat different approach with his informational theory, which focuses on how information is encoded and represented in the mind. Dretske argues that mental states represent the world because they carry information about it, which is a result of lawful, causal relationships between the world and our sensory apparatus. For Dretske, knowledge is fundamentally about the *flow* and encoding of information from the environment to an agent. His more naturalistic perspective puts more emphasis on the importance of the environment in shaping the content and structure of mental representations.

Since it was Dretske who introduced the idea that mental states acquire content through the information they carry about the world, I should have placed him first in this analysis. By starting with Fodor, I was engaging with a theory that, while foundational, establishes a clear, computational model of cognition and representation. This positioning allows for a smoother conceptual transition towards the more embodied and dynamic approaches to cognition that I plan to explore next, moving from a more computational and modular (Fodor) understanding of cognition towards the more naturalistic theories that emphasise the role of evolutionary history, biological functions, and ultimately, the embodied interactions with the environment.

After Dretske's informational theory, which focuses on how representations are causally related to their content in the environment, I would like to introduce Ruth Millikan's biosemantics as an extension of the conversation into the biological realm. Millikan's theory emphasises the evolutionary history and the function that certain representations have been

selected for, introducing the idea of *proper functions* which complements and expands upon Dretske's causal account.

Proper functions are determined by how an entity's predecessors contributed to the fitness and survival of organisms in which they appeared (Millikan, 1984). For instance, the retina is a layer of tissue at the back of the eye that is sensitive to light. It contains photoreceptor cells (rods and cones) that convert light into neural signals. These signals are then processed by the brain to produce visual perception. The proper function of the retina, in teleosemantic terms, is to transduce light into neural signals that facilitate vision. This function has been honed through evolutionary history, where individuals with retinas that effectively performed this transduction were more likely to survive and reproduce, thus passing on their genes.

When discussing proper functions, the concept of malfunction is critical. If the retina is damaged or genetically malformed, resulting in impaired vision or blindness, it can be said to fail in performing its proper function. This failure is not just a descriptive fact but carries normative weight; the retina ought to perform a certain way (transduce light for vision), and failure to do so indicates a malfunction. While the retina might participate in other processes (e.g., influencing circadian rhythms through light detection), its proper function is specifically related to vision, it was evolved to facilitate vision.

Similarly, the content of a mental representation is determined by the function that the representation has been selected for over evolutionary time. This function is what it is ‘proper’ for the representation to perform. In other words, just as the proper function of the retina is vision due to its evolutionary history, the proper function of a mental representation is to represent certain kinds of information because that representation has been selected for its beneficial role in an organism's survival and reproduction.

The content of a mental representation (what it is about) is determined by its proper function—what it has been selected to do. A mental representation of ‘food,’ for example, has the content it does because its proper function is to guide the organism towards edible and probably nutritive substances. A mental representation can misrepresent (make errors) if it fails to perform its proper function. If an organism's mental representation of ‘food’ is triggered by an inedible substance, like a hat, this constitutes a misrepresentation because the representation fails to fulfil its proper function of identifying edible substances.

While grounded in the evolutionary perspective shared with Ruth Millikan, Karen Neander provides her own insights into how misrepresentations occur and are accounted for within a naturalistic framework. Like Millikan, Neander argues that the content of mental representations is determined by their evolutionary function. This function informs what the representations are about. For Neander, misrepresentation occurs when a mental representation fails to accurately represent the world as it is supposed to. A mental representation or a representational system malfunctions when it fails to perform its proper function as determined by what it was selected for. This could be due to developmental errors, damage, or other factors that impede the system's operation according to its evolutionary design (Neander, 1995).

In the context of fishing, to see a tangible example, when humans fish using bait or lures, they essentially rely on the fish's misrepresentation of the bait as actual food (e.g., a worm or a smaller fish). The bait or lure is designed to mimic the appearance or movement of the fish's natural prey. When a fish perceives the bait and mistakes it for real food, it is experiencing a misrepresentation. Its cognitive system is representing the bait as something it is not, based on the visual, tactile, or chemical cues that are normally reliable indicators of prey. This misrepresentation occurs because the fish's representational system has a proper function, evolved over time, to identify and prompt the fish to pursue certain types of prey. When this system is triggered by the bait, it is doing what it evolved to do, but in this case, it's led astray, and eventually the seeker of food becomes food itself.

Importantly, this scenario does not necessarily indicate a malfunction of the fish's cognitive or perceptual systems. Malfunction would imply that the system itself is not working as it was designed to do so by evolution—perhaps due to damage, disease, or developmental errors.

This distinction between misrepresentation and malfunction is philosophically significant. It highlights that cognitive and perceptual systems can be fully functional and yet still susceptible to error or deception due to the complexity of environmental inputs and the possibility of artificial manipulation of those inputs.

The discussions around proper functions, misrepresentation, malfunction, and especially the frameworks proposed by philosophers like Ruth Millikan and Karen Neander, do address a key concern within cognitive science and philosophy of mind, which is the

avoidance of ‘pancognitivism.’ This concern arises from a desire to maintain a clear and meaningful definition of cognition that does not dilute its explanatory power by making it applicable to everything, thereby losing its specificity and utility. Through grounding cognitive functions and the content of representations in evolutionary history and the specific survival and reproductive advantages they confer, Millikan and Neander provide a naturalistic basis for cognition. This specificity helps differentiate between processes that genuinely involve representation and intentionality and those that do not. The introduction of concepts like proper function, misrepresentation, and malfunction brings a normative dimension to the discussion of mental states. Not all biological functions or processes entail normativity in this sense. This helps distinguish cognitive processes from other biological processes. Also, by emphasising the *functional* roles that mental representations play within the cognitive systems of organisms, these theories help specify what counts as cognitive or mental.

Pushmi-pullyu representations (PPRs) are a concept from Ruth Millikan's work, describing mental states that simultaneously serve both descriptive (informational) and directive (action-oriented) functions (Millikan, 1995). Essentially, a PPR tells an organism what something is and what to do about it in one cognitive step. In the scenario of a fish encountering a fisherman's bait: The fish perceives the bait as food due to its PPRs, its mental representations evolved to identify prey and initiate feeding behaviour. This perception encompasses both recognising the bait as prey (descriptive) and triggering the impulse to eat it (directive), all in one integrated response.

The fisherman, by using a lure that mimics real prey, exploits the fish's PPRs. This act of deception is more sophisticated in that it involves understanding and manipulating the fish's automatic, evolved responses for specific ends. While the fish's actions are driven by PPRs directly linking perception to action, the fisherman's actions involve a higher level of cognitive processing, including planning, prediction, and the use of technology. Despite the apparent sophistication of the fisherman's behaviour compared to the fish's more instinctual reactions, both are rooted in the same fundamental cognitive processes. The fisherman's ability to plan and deceive is built upon more complex and flexible cognitive systems that, like the fish's simpler responses, evolved to navigate and exploit the environment. Both the fish's immediate, unreflective action upon seeing the bait and the fisherman's strategic use of

the lure are outcomes of evolutionary pressures, albeit manifesting at different levels of complexity.

In transitioning from Millikan's representations that are directly tied to evolutionary functions and behavioural outcomes to the more encompassing view of embodied cognition, we see a natural progression in cognitive science. Teleosemantics has already departed from the classical computational (Fodor) understanding of representations, advocating for types that are directly linked to *action,* such as pushmi-pullyu representations. These representations are also unique because they encapsulate affordances—opportunities for action provided by the environment.

The embodied approach however places an even stronger emphasis on the dynamic interplay between an organism and its environment (Clark, 1997). This approach eliminates the need for separate, action-neutral representations of the world and the organism's goals, enabling more direct and efficient interaction with the environment. Embodied cognitive science (ECS) aims to reduce the reliance on complex, abstract mental processes[16] traditionally thought necessary for cognition. This perspective suggests that perception and action are not mediated by detached representations but are closely integrated with the organism's actions and environmental interactions.

While Ruth Millikan's teleosemantic approach provides a theory for how representations acquire content and function, her work is more aligned with traditional cognitive science in a sense that it still tends to rely on the concept of internal representations, albeit grounded in an evolutionary context. Embodied cognition, on the other hand, might incorporate ideas compatible with teleosemantics regarding the purpose-driven nature of cognitive processes but tends to focus more on the mechanisms by which cognition is realised through the sensorimotor engagement with the environment.

Furthermore, humans further extend their cognitive capabilities by altering their environments and employing tools and technologies. This extension blurs further the boundaries between the brain, body, and environment, suggesting a more distributed notion

[16] In his book, Radical Embodied Cognitive Science, Anthony Chemero uses the concept of "mental gymnastics" to describe such processes in order to critique traditional cognitive science models that rely heavily on complex internal representations and computational processes, a very substantial expression indeed.

of cognition, and again, challenges the traditional views of cognition as confined to the brain or even the individual (Clark, 2003).

RECS is nuanced when it comes to the role of computation and representations in cognitive science. Anthony Chemero (2009) suggests that embodied cognitive science, while incorporating elements like the necessity of embodiment and dynamical explanations, tends to dilute the more radical claims by attempting to merge these with computational theories of mind. Chemero's characterisation of RECS as distinct from both traditional cognitive science and more moderate embodied cognition approaches underscores a commitment to a nonrepresentational, dynamically engaged, and thoroughly embodied understanding of cognition. This approach seeks to fundamentally reframe how cognitive processes are conceptualised, ultimately moving away from internalist models towards a view of cognition that is entwined with the physical and social environment.

In fact Chemero outlines distinct genealogies for RECS and the more general forms of embodied cognitive science. This distinction highlights how RECS and embodied cognitive science, although overlapping in their emphasis on the importance of the body and environment in cognition, originate from different intellectual traditions. Embodied cognitive science, though critical of computationalism, often maintains a more dialogic relationship with computational models and theories of representation. In contrast, RECS focuses on understanding cognition through the dynamics of organism-environment interaction, drawing heavily from Jamesian pragmatism and Gibsonian ecological psychology.

To better grasp the distinctions in intellectual evolution, it is insightful to refer to Chemero's visualisation through a figure from his influential book, Radical Embodied Cognitive Science (2009 p.30).

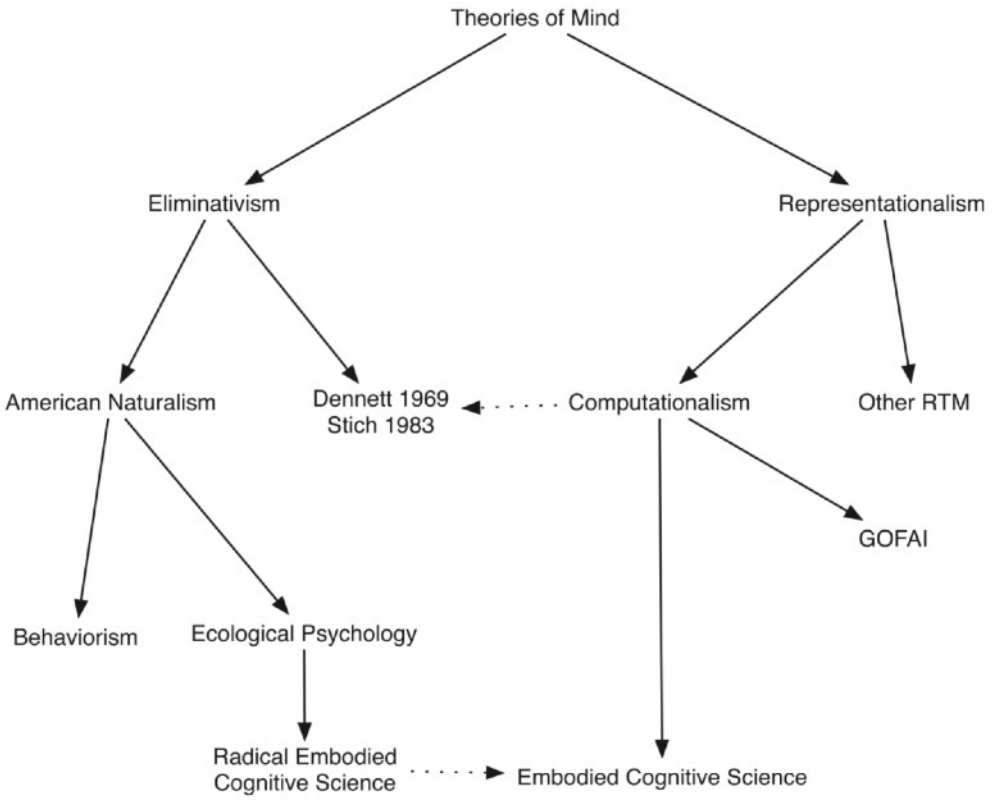

Figure 1. Theories of Mind. From: Radical Embodied Cognitive Science, by Anthony Chemero, 2009, MIT Press. (p. 30).

'GOAFI' and 'RTM' are acronyms that refer to 'Good Old-Fashioned Artificial Intelligence' and 'Representational Theory of Mind.' This genealogy captures the philosophical debates and shifts in thinking that have shaped the field, indicating that radical embodied cognitive science and embodied cognitive science, although related (connected with dots), have distinct intellectual roots with RECS coming more from Jamesian and Gibsonian perspectives rather than the computational lineage.

Perceptual experience

In a previous career—although my tenure in this field was quite recent and relatively brief—I was engaged in the field of translational neuroscience, working primarily with macaques.

Intriguingly, a peer of mine within this discipline held firm disbelief in the concept of evolution. This initially sparked an internal debate in me, considering the fundamental premise of translational neuroscience is grounded on our genetic similarity with these primates. Hence, it struck me as paradoxical that she could align with the idea of utilising monkeys as our substitutes in this field while rejecting the evolutionary connection between our species. Nonetheless, upon deeper reflection, I grasped the broader significance of our macaque counterparts in this field. It was not essentially about them modelling humans in our research. Rather, it was about the invaluable predictive insights they offer. Their role was pivotal not as mere stand-ins for our species, but as instrumental tools that facilitated a more manageable dissection of formidable, intricate problems. They served as means for testing the efficacy of potential solutions such as medications before we ventured into human trials. Hence, their purpose lied not in *representing* us, but in enabling us to approach and understand complex problems in a segmented, comprehensible manner, or their usefulness in general. This practical perspective shift served to enhance my comprehension of James, and how mental representations should be thought about in general.

James might be thought about as an early representationalist, because he does indeed talk about brain processes as being reproductive in his analysis of perception. It is interesting to note that James appears to prefigure one of today's movements (RECS) that challenge representationalism also. Both sides, ECS and RECS, often claim James as a source of inspiration. It is important, however, to remember that it would not be chronologically accurate to directly compare James with contemporary theories, despite his evident influence. His fundamental ideas and proposals about the course of experimental psychology were either set aside or went on a tangent before being revisited in recent decades. The resolution to the previous paradox lies in James' distinctive method of pragmatic intentionality. From a current perspective, James seems to straddle the line between representationalism and anti-representationalism, perhaps inclining towards the theories that emphasise reproduction, or at the very least, his ideas lend themselves to arguments in favour of representations. Through James' work, we have an excellent opportunity to illustrate how representations can be conceptualised as not necessarily representing something, just like my beloved laboratory monkeys do. James’ description of the mind is evolutionary-based, in which consciousness, this constant flow, arose from adaptation, and it has a function in guiding, regulating, and

directing the behaviour to success. He believed that perceptions are part of our lived experience and should be understood in terms of their immediate impact on behaviour and action (James, 1890).

Consider for a moment the horse-car example from one of the previous chapters, and what we were taught about the distal representations. Distal representations are practically organised to guide the interaction with the object in the environment, they prepare the body for interacting with the environment. I hear the sound the car makes, my mental representations may come online about the image of the car, meanwhile I get up form my chair contemplating my next move to open the gate for it. The meaning of the representation is not to represent, but to be useful in preparation for the further actions. There is a flux of sensible qualities available, similarly to Gibson's ecological theory, and I attend to, I am conscious of the ones I need in order to purposefully interact with the object. But this is not information processing in the Gibsonian sense, because I tend to pick the qualities I am more acquainted (familiar) with through the learning process of perception. This also means that there is no such thing as an essential property to any object, as those may be different in every other situation.

In our culture, for instance, we usually learn at a very early age—and typically in the hard way—that the pointed, green pepper is the one that should be processed carefully. Having learned that, if I see the pointedness, and greenness qualities of any pepper, I know what to expect, and how to proceed. I know that it is likely hot to taste, and that my hands should be kept away from my eyes at any cost while dealing with it, in order to avoid the unbearably burning hot sensation the irritation may bring about. Here, consciousness does not just passively catalog the properties of the pepper; it actively informs how to interact with it, reflecting James's view of consciousness as evolutionary and adaptive, guiding behaviour towards success. Inn this sense consciousness is not distinguishable from the contents of my perceptual experience. It is not there to contain my experiences either, it is there to serve a function instead. It is not a mere byproduct either, but a trait which evolved through natural selection (Jmaes, 1904).

James offers a prescient vision of cognition that transcends the binary of representationalism and anti-representationalism. His evolutionary-based description of the mind as a dynamic, adaptive flow, aimed at enhancing our interaction with the world, echoes

through contemporary cognitive science debates, underscoring his seminal influence on our understanding of the mind-body-environment nexus.

So far we have seen a compelling argument by James on how the content of the perceptual experience can be explained. And this is a cornerstone of psychology becoming a real science. Now the aspiration of psychology has to be clear, it has to match this whole mental state of experience with similarly dynamic states of the brain. As I stated earlier, this programme of experimental psychology got discontinued, first by the more elementist approaches, later on by behaviourism. Then cognitive science came along to be the dominant paradigm in the field of experimental research on perception. Classical cognitivism views perception as a process of extracting and interpreting information from sensory input, and emphasises the role of mental representations and cognitive processes in perception. From one perspective, I have consistently harboured an instinctive skepticism regarding the ontology of mental representation. I found its standing too nebulous to be credited with such considerable explanatory authority in relation to perceptual experiences.

James did believe that our thoughts and perceptions are about the world and can thus be seen as representing it in some sense, but he was more concerned with the processes of thought and the dynamics of consciousness, than with the nature of mental content (James, 1912). In opposition, the majority of cognitive scientists maintain that we need a particular kind of brain: a brain that operates akin to a computer, with minds that process and manipulate the computer-like representations within that brain. From this point of view classical cognitivism can be interpreted as a more materialistic transliteration of Cartesianism, and as such it may be too vulnerable to the problem of interaction: if one is a dualist who believes in interactionism, one faces the challenge of explaining how the mind and body interact. If one is a physicalist who believes that all mental phenomena can ultimately be explained in terms of physical processes, one faces the challenge of explaining why and how certain physical processes give rise to subjective experience (also known as the explanatory gap).

In fact, for a cognitive scientist the quandary presented by the essence of mental content transcends mere philosophical curiosities. It inherently forms a substantial segment of the age-old ‘mind-body’ conundrum, which grapples with the intricate interweaving of our mental attributes and the tangible physicality of our brain and corporeal form. Therefore,

should we construct a compelling narrative of mental content that elucidates how both humans and other sentient beings manage to harbour states that correspond to external entities, and adhere to benchmarks of truth actualisation or accuracy, we would then be on the brink of untangling this historic philosophical enigma.

Yet, this line of reasoning can be attributed to a retrograde perspective: the underpinning dualistic stance itself instigates the mind-body dilemma. The pivotal concern isn't the existence or non-existence of mental content per se. Rather, the crux lies in bestowing upon them such immense explanatory prowess when their ontological standing remains so enigmatically nebulous.

In all fairness, dualism in both scientific and everyday thinking is hard to eliminate because it is a deeply ingrained and intuitive idea that is supported by many cultural and religious beliefs. Additionally, there is a lack of a fully satisfactory alternative.

Dualism has this intuitive appeal because it seems to capture the common-sense notion that there are two distinct types of things in the world: physical objects and mental states. Most people find it difficult to reconcile the idea that their thoughts and feelings are just a byproduct of physical processes in the brain.

Dualism is also deeply ingrained in our language, which reflects our conceptual framework for understanding the world. We use language that implies a separation between mind and body, such as saying that we do ‘have’ a body, or for instance, if one wants to lose weight they are often told that it is only a matter of making that decision in one’s ‘head’ with no regard to the possible metabolic disadvantages, and hormonal imbalances one has that may affect their guts to the extent that it hampers all those dietary attempts directed to achieve the desired weight. We frequently hear the advice to diligently take care of our own body, as encapsulated by the proverb 'sound mind in a sound body.’ But who is it really in charge? Is it not my body that takes care of itself after all?

Dualistic thinking is also reinforced by many cultural and religious beliefs. Many religions posit the existence of a soul that is separate from the physical body and that survives after death. The idea of an immaterial, and therefore immortal soul is difficult to let go (Murphy and Brown, 2007).

A cogent enough alternative to all these is hard to find, and once found, very difficult to fathom. Such alternative should require a view so wholistic that it may be very difficult to apprehend, and even more difficult to have undergone experimental scrutiny.

Another, a rather methodological stance, we tend to apply to urselves and the environment may also encourage a form of dualistic thinking: the tendency to break things down into parts in order to better understand them, and specialise in smaller areas to deepen the knowledge of a given system[17].

Dualistic thinking has a significant impact on medical practice as well, particularly in the diagnosis and treatment of mental illnesses. With dualism, mental illnesses are seen as distinct from physical illnesses, and this can lead to the separation of the treatment of the two types of illness. This can lead to patients with mental illnesses being stigmatised and receiving suboptimal care. On the other hand, from a psychiatric point of view, if mental illnesses are often seen as separate from physical illnesses, then treatments may focus solely on changing the patient's thoughts and emotions, rather than addressing any underlying physical factors that may be contributing to the condition.

Compounding the issue, there is a prevalent tendency to conceptualise the body as distinct and separate from the head. This might be the result of a complex interplay between evolutionary, cultural, and neurological factors. Our head houses most sensory organs, such as the eyes, ears, nose, and mouth, providing the information we are most consciously aware of. Ironically enough, proprioception, which is again, the awareness of our body's position and movement in space, also contributes to our perception of the body and head as separate. In a way that our brain uses information from sensors in our muscles and joints to create a mental map of our body's position and movement, and this map reinforces the perception of the body and head as distinct entities (Berlucchi and Aglioti, 1997). Proprioceptive

[17] Dualism may not be in error completely, but too problematic and too expensive. The real issue is what Gilbert Ryle (1949/1984) calls ‘category mistakes’ which occur when we try to understand something by placing it in the wrong category. He argued that this often happens when we take things apart and focus too much on the individual components, rather than considering the object as a whole. The debate is ongoing between proponents of dualism, monism, neutral monism, panpsychism and the likes, and it may not ever be settled. What is given though, and we should not lose sight of, is the whole system, the organism itself. When we focus too much on the individual components of an object, we may fail to see how those components work together to create a functional whole. When we for instance, take behaviour apart we might see thinking or the mind as something separate, and something added we might miss out on the notion that it is something which is already within the system.

information is constantly being processed by the brain, even when we are not consciously aware of it.

Having most sensory organs on the head is common among many animal species, such as mammals, birds, reptiles, and insects. However, bipedalism, or the ability to walk on two feet, as a unique adaptation that distinguishes us, humans from most other primates (Lovejoy, 1988) likely played a significant role too in changing our perception of the body and head separation.

Although, at this point we cannot assume a one way causal relationship, instead what we can state is that our relationship with our body is very different from that of animals, more precisely, we do presume a whatever relationship between the head and the body. Animals do have a sense of their bodies and are aware of their surroundings, but they probably do not have the same level of self-awareness and ability to consciously control and manipulate their bodies that humans have. They do not perceive their bodies and heads as separate entities in the same way that we humans do, and they do not experience the same level of body dissatisfaction, self-consciousness, or other psychological factors that can affect our relationship with our bodies, or in fact create this disunion. Animals are more closely aligned with their evolutionary history and natural environment, and their lifestyles and diets are often determined by their ecological niche and the needs of their species. They typically do not face the same societal pressures and cultural expectations that humans do regarding their appearance, behaviour, and social status (Tomasello, 1999).

Additionally, being ‘top-heavy’ as a species, we tend to rely heavily on our intellect and cognitive abilities, which are associated with our large and complex brains. This may have allowed us to develop a range of technological, cultural, and social systems that have enabled us to dominate many other species on the planet (Ambrose, 2001). But it also comes at a price: our heavy reliance on intellectual and cognitive abilities has also led to certain challenges and vulnerabilities. Our complex brains and social structures can make us more susceptible to mental health issues such as depression and anxiety (Burns, 2010).

Our tendency to prioritise intellectual pursuits over physical activity and connection with nature can also contribute to physical health issues: obesity, heart disease, and other chronic conditions related to our mostly sedentary lifestyle (Owen et al., 2010).

Despite these limitations, humans are capable of remarkable physical feats too, including dance, gymnastics, and sports. Even though the average human cannot possibly swing form vine to vine with such ease and grace as a macaque would do, with practice, training, and conditioning, some humans can master their physical abilities and learn to move more smoothly, and in synchrony with others.

While many animals have excellent physical abilities and coordination, they are generally specialised for specific types of movement or tasks. In contrast, human hands and fingers are uniquely adapted for a wide range of complex movements and precision tasks. Human dexterity, a hallmark of our species, sets us apart from most animals in manifold ways. Many creatures possess impressive, enviable physical whole-body abilities and coordination, but we have our hands, fitted with opposable thumbs. Our hands and fingers are marvels of evolution, uniquely adapted for a vast range of complex movements and precision tasks (Marzke, 1997; Napier, 1956). The precision and versatility of our dexterity enable us to accomplish remarkable feats, from performing delicate surgery to crafting intricate works of art, play instruments, or express our emotions.

Surprisingly enough, only a few people have a positive and comfortable relationship with their bodies still, others may experience discomfort, dissatisfaction, or even hatred towards their own bodies[18]. Dubious efforts, such as the body positivity movement, have

[18] There are several organisations and institutions that monitor the extent of body distortion and negative body image among the population. Some of these include The National Eating Disorders Association (NEDA), The World Health Organization (WHO), and The Body Image Movement. In order to assess one's attitude towards their body the use the multidimensional (and rather representationalist) concept of 'body image'. Different age and gender groups have different levels of body satisfaction. The largest rates of body dissatisfaction, according to studies, are found in youth, young adulthood, and women. The reported rate of body dissatisfaction ranges from 30% to 75%, while the reported rate of body image misperception has been claimed to be up to 50%, a remarkably high rate. Sarah Grogan's book *Body Image: Understanding Body Dissatisfaction in Men, Women, and Children* discusses the widespread issue of body dissatisfaction among men, women, and children, highlighting the influence of media, societal standards, and personal relationships on body image.

been established to alleviate this bodily dissatisfaction[19]. There are several examples of pathological relationships with the body, which can include body dysmorphic disorder, eating disorders, body integrity identity disorder, body-focused repetitive behaviours, and gender dysphoria just to name a few, and such top-down driven movements can be little to no help in palliating the physical and mental discomfort these conditions bring about.

The ‘head-body problem’ of bodily alienation and dissatisfaction is not commonly used in academic literature, as it is not a formal philosophical problem. But it may have some implications regarding the ‘mind-body problem’ which is indeed a philosophical conundrum.

In discussing the phenomenon of bodily alienation and dissatisfaction, I intended to introduce the concept of the 'head-body problem.' It is however important to clarify that this term, while evocative of the more traditional mind-body problem within philosophy, is employed here in a metaphorical sense. Unlike the philosophical conundrum that delves into the ontological and epistemological relationship between consciousness and physicality, the head-body problem seeks to capture contemporary issues of how individuals perceive and relate to their physical selves in an increasingly disembodied society. This distinction underscores a methodological choice in my thesis: the use of folk-psychological and common-sense descriptions serves illustrative purposes, offering a lens through which to view everyday experiences. These descriptions are not invoked as explanatory mechanisms with scientific backing, but as a narrative tool to enhance understanding of the lived realities they reflect.

To be clear, the employment of folk-psychological elements and the metaphorical head-body problem within this thesis are carefully distinguished from the empirical and theoretical foundations that underpin the explanatory dimensions of our discussion. This distinction ensures that while descriptive narratives draw from everyday language and

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[19] The body positivity movement is about empowering people to feel good about themselves, regardless of how they look, it encourages people to embrace their bodies. It aims to challenge and break down societal norms and beauty standards that have been historically based on a narrow definition of what is considered ‘ideal’ or ‘normal’ in terms of body size, shape, and appearance. The body positivity movement may reinforce the head-body dualism by placing too much emphasis on the body's appearance and not enough on its functionality and health. Furthermore, it can sometimes promote unhealthy behaviours, such as glorifying obesity or encouraging people to ignore health concerns in favour of accepting their bodies as they are. It can sometimes reinforce traditional beauty standards by emphasising the need to love and accept one's body, rather than challenging the societal norms that have contributed to negative body image and discrimination.

common understanding, the explanations provided are firmly rooted in rigorous scientific inquiry and philosophical analysis.

However, this metaphorical exploration of the head-body problem does not stand isolated from the broader philosophical discussions it echoes. By examining how societal and cultural narratives shape our experiences of our bodies, we inadvertently touch upon age-old questions about the intertwining of our mental states and physical existence. It is here that the metaphorical head-body problem indirectly informs our understanding of the mind-body problem.

As the mind-body problem has evolved over time, a shift from a mind-body problem to a mind-brain problem occurred, which can be traced back at least to the rise of modern neuroscience in the 20th century. As neuroscience began to develop, researchers started to explore the relationship between the mind and the brain. They found that there was a clear correlation between brain activity and mental processes. This led to the realisation that the brain was not just an organ of the body but also the physical basis of the mind. As a result, the focus of the mind-body problem shifted from the relationship between the mind and body to the relationship between the mind and brain.

Whit this move, a hint of dualism, at least in the form of the head-body dualism, was transplanted into the contemporary computational and algorithmic understanding of cognition, stretching as far as the filed of neurophilosophy, as a branch of philosophy that is informed by the latest findings in cognitive science and neuroscience. More recently however, there has been a growing recognition in contemporary science, philosophy, and psychology of the importance of the body in understanding the human experience. This recognition is often referred to as the ‘embodied turn’ or the ‘somatic turn’ in these fields (Varela et al. 1991).

Hence, there has been a renewed interest in the works of James, Gibson, and the phenomenologists, Merleau-Ponty especially, and Gilbert Ryle to name those thinkers most frequently reaffirmed within this shared realm of philosophy and psychology. What they share is a rejection of the idea that perception is a purely intellectual process, but they have different views on the nature of perceptual experience and how it relates to the body, the environment, and the subjective perspective of the perceiver. Although we can identify differences in their approach to perception that reflect their emphasis on different aspects of

perceptual experience, it is not entirely accurate to put these thinkers on an anti-intellectualist spectrum because the term ‘anti-intellectualism' typically refers to a rejection of intellectualism or the belief that practical experience and common sense are more valuable than theoretical knowledge or expertise[20].

Still, I cannot resist the idea to somehow line these thinkers up to see how much the body weighs in their approach to the perceptual experience, or in a more general and contemporary sense, how do they differ in the extent to which they ground cognition in the body and the environment. Gibson, in this sense, represents one extreme as he emphasised the direct and unmediated nature of perception and rejected the need for internal representations or mental processes. At the other end, we could place Gilbert Ryle, who emphasised the importance of practical engagement with the world and rejected the idea of mental processes as separate from bodily interactions (Ryle, 1949/1984). In between these two extremes, we could place William James and the phenomenologists. William James emphasised the active and subjective nature of perception, while the phenomenologists highlighted the importance of subjective experience and the embodied nature of perception.

However, it would be misleading to place them on a linear spectrum because their approaches are complex and multifaceted, and they do not fit neatly into a single category or position, it probably helps illustrate the contrast these thinkers represent against the classical representational cognitivism and its approach to the perceptual experience. It also helps better understand the variances among the contemporary embodied approaches to the matter. Once more, the classical cognitivist approach tends to put the emphasis on the construction of mental representations of the world, while the thinkers mentioned earlier reject this approach and tend to foreground the importance of embodied and situated aspects of perception.

They generally argue that perception is not just a matter of registering sensory input and constructing mental representations but also involves active engagement with the

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[20] I refer to anti-intellectualism in the epistemological sense, which concerns the nature of knowledge and belief. This is a different concept from the cultural and social anti-intellectualism, as it has nothing to do with the distrust or dismissal of intellectual pursuits and disciplines, such as science, education, literature, and the arts. Not an excellent choice of words, but most thinkers, especially the ones arguing for it (see e.g. Chemero, Noë, Kumar) prefer to use it when they refer to a philosophical stance that values practical, embodied, or ‘knowing how’ knowledge over theoretical, conceptual, or ‘knowing that’ knowledge. This perspective often emphasises experience, action, and practical engagement with the world. Obviously, anti-intellectualists will also have to deny that our experiences depend on mentally represented knowledge of the world. As we see later on, this task may not be as easy as it first seems.

environment and is shaped by the perceiver's goals, expectations, and bodily experiences. Therefore, not every embodied cognitive scientist is anti-representationalist per se. ECS, particularly as discussed among psychologists, often integrates the concept of embodiment with the computational theory of mind, following Chemero's perspective outlined in the previous chapter. It does recognise the importance of the embodiment and it prefers dynamical explanations, but it rejects anti-representationalism. This can also thought a 'top-heavy' approach, as it does indeed realise embodiment as a prerequisite for the perceptual experience, suggesting that our bodily experiences help to shape our internal processes, but it is still the cognitive processing which takes centre stage. Prominent thinkers who have contributed to the field of embodied cognitive science are George Lakoff and Mark Johnson, Andy Clark, and Shaun Gallagher.

A more anti-intellectualist approach is represented by enactivism, and is promoted by thinkers such as, Francisco Varela, Evan Thompson, and Alva Noë. This list is far from exhaustive, but it provides a sample of the breadth of work being done in embodied cognition. It is important to note that the boundaries between different areas of embodied cognition are not always clear, and many thinkers contribute to multiple areas, and they might agree on certain principles while disagree on others.

It is radical embodied cognitive science however that truly takes the principles of embodied cognitive science further by arguing against the need for internal mental representations and computations entirely. Instead, it posits that cognition arises directly from the dynamic interactions between the body, the brain, and the environment. In this view, thinking isn not about manipulating symbols in the brain based on representations of the world, but is about acting and interacting in the world based on direct perception and feedback, very much in line with the original ideas of the Gibsons. Talking of whom, we can state that while embodied cognitive science and radical embodied cognitive science both emerged as reactions to traditional cognitive science, they have different origins and influences. Embodied cognitive science grew out of a recognition in the late 20th century that traditional cognitive science, with its focus on abstract symbol manipulation and computational models, was insufficient to explain many aspects of cognition (Gallagher, 2005). Researchers began to argue that the body, and its interaction with the environment, play crucial roles in shaping cognition. It was also driven by the need to shake off the

Cartesian stigma once and for all. This approach drew on a wide range of influences, from phenomenological philosophy, and the ecological psychology of James Gibson to the dynamical systems theory in mathematics, and the neuroscience of embodiment. It was also inspired by research in areas like cognitive linguistics and developmental psychology, which showed how much cognition is really grounded in bodily experiences. In contrast, RECS can be seen as continuing the Gibsonian tradition more directly. This Gibsonian tradition forms the backbone of RECS. For RECS it has always been about the body, while Embodied Cognitive Science represents a broader shift within cognitive science. This makes RECS an inherently more monistic or non-dualistic approach to cognition.

In RECS, since cognition is not thought to involve the manipulation of abstract symbols within the brain, cognitive creatures like humans are seen to perceive the world directly and react to it. Perception, in this context, is a way of directly picking up *information* from the environment. The idea is that our bodies interact with the world and shape our experiences and perceptions. Our cognition is fundamentally shaped by the *sensory* and *motor systems* that allow us to perceive and act within our environment. With perception acting as the mediator, cognitive creatures interact with their environment, shaping it and being shaped by it. It is through this interaction that cognitive processes occur.

A central concept in RECS is the concept of the Gibsonian *affordances*. Remember, an affordance is a possibility for action offered by the environment to an organism, illustrating how the physical world and its inhabitants interact. For example, a tree branch provides a monkey with the opportunity to swing, highlighting the organism-specific nature of affordances. Perception is crucial for recognising and engaging with affordances, underscoring its pivotal role within the RECS framework. Thus, cognition is not a static phenomenon but emerges from the continuous interplay between our perceptual systems and the environment. Hence, perception is so crucial to radical embodied cognitive science. It is a field that radically re-thinks our understanding of cognition and places perception at the forefront of this process.

I might sound redundant in revisiting this radically embodied perceptual process on and on again, but it is rather hard, and also very crucial to understand how such a process devoid of the involvement, or the mediation of any intellect can function. Even those embodied thinkers who claim to be more on the radical side, such as the ones arguing for the

sensorimotor approach (see e.g. Kevin O'Regan, Alva Noë) despite their best efforts to eliminate representations from the perceptual process, still tend to subtly sneak in some form of representations as mediators between the experiencer and the experienced (Chemero, 2016).

The sensorimotor approach claims to be inspired by the ideas of Maurice Merleau-Ponty, and the Gibsons, while it suggests that perception is more directly tied to our interactions with the environment: we perceive properties of the world in terms of the sensory consequences of potential actions. This theory is built on the idea of sensorimotor contingencies, which are the laws that govern the sensory changes brought about by different motor actions(O'Reagan and Noë, 2001).

Consider the simple example of looking at an object, say, a monkey on a table. When one moves their head to the right, their visual field shifts to the left, and vice versa. This is a sensorimotor contingency: a regularity that describes how a certain action (moving the head to the right) changes one's sensory input (the monkey appearing to move to the left). These rules or contingencies are learned over time and guide our interactions with the world. These contingencies are of course not just about vision. They apply to all sensory systems. When you move your hand closer to the monkey, provided that the monkey does not bite, you can feel it more precisely (its coat through touch), it may become louder (if the monkey is vocalising), it may smell stronger (if the monkey has a scent, which they certainly do). These contingencies are learned through our interactions with the world over time. For instance, a small infant learns through trial and error that reaching out and grasping can bring objects closer, change their appearance, feel different, etc. Through this kind of interaction, we *learn* the contingencies that allow us to understand and navigate our environment effectively. O'Regan and Noë (2001) claim that senses are mediated by this knowledge of what they call sensorimotor contingencies.

Chemero (2016) takes issue with both the knowledge and mediation aspects of the theory on account of not being as anti-intellectualist as it claims to be, calling it a Kantian understanding in which a particular knowledge has to precede a certain experience. Chemero has been known to be skeptical of certain approaches to cognition that he sees as unnecessarily preserving elements of representationalism, and the sensorimotor approach has

been one of those. His main criticism of the sensorimotor approach is that it still relies on the notion of internal representations, albeit in a different form.

The sensorimotor approach posits that we learn and maintain sensorimotor contingencies—essentially, rules or laws that describe how sensory input changes based on our actions. Chemero argues that this still constitutes a form of representation because it involves internalising and storing these rules, which then guide our actions and perceptions. From Chemero's perspective, this is not a full departure from the classical cognitivist view. He argues for a more radical approach, which sees cognition as not just embodied but also embedded, extended, and enacted. In his view cognitive processes are not confined to the brain, but are distributed across our body and our environment, and are fundamentally about interaction.

While Chemero does not refute the sensorimotor approach as a whole, he offers another concept with which the problematic knowledge aspect of the theory can be replaced. Drawing heavily on the ideas of Merleau-Ponty, particularly on his concept of the ‘lived body,’ he proposes what he calls the sensorimotor empathy. According to Merleau-Ponty (1962), the lived body is our primary way of being in the world. It is through our bodies that we perceive the world, interact with it, and even come to understand it. This perception is not merely passive, but rather a constant, active engagement. We do not simply 'have' bodies in this view; we 'are' our bodies, in an essential and existential sense. The lived body is therefore more than just a collection of physical parts; it is deeply intertwined with our subjective experiences, perceptions, and consciousness.

Maurice Merleau-Ponty's concept of the ‘body schema’ is an integral part of his philosophy and relates closely to his idea of the lived body. The body schema is a dynamic, pre-conscious understanding of the body in its ability to function in the world. It is not a mental representation or a conscious image of the body, instead, it is an embodied, practical awareness that guides our movements and interactions with our environment. It should not be mistaken for the concept of body-image. The body image is a conscious and representational awareness of our body—how we think or imagine our body to look like, or how we perceive it in a mirror, for example.

The body schema, on the other hand, is not representational or conscious in this way. It is more immediate, more direct—it's how we 'know' how to move, how to navigate, how to

act. When a basketball payer is about to shoot a free throw, they do not need to consciously calculate the distance, angle, the ball's trajectory, and force required. Instead, their body 'knows' how to perform this action. This is the body schema at work: a practical, embodied skill that guides our actions in the world.

In order to experience it is not enough just to have those skills, but we need to explore by engaging them in action. In order for the basketball player to score it is certainly not enough to imagine how it would be like to throw the ball, they have to act on it. But engaging those skills may not be enough to be successful either, as they also have to become the ball themselves, flying through the hoop. It is not their body the player wishes to send through the hoop, but the ball, which once released continues on its trajectory towards the goal.

This act of moving beyond the body is very much in line with some contemporary approaches within cognitivism, such as the extended mind or extended cognition (see e.g. Andy Clark, David Chalmers, Anthony Chemero). The temporary unit of the ball and the player will become the lived body which interacts with the environment. Chemero takes this moment of body-tool synergy to define what he means by sensorimotor empathy. The feeling-into the ball is what is relevant to the grounding of experience. Empathy is this sense should be understood according to the original meaning, the German originated expression of 'Einfühlung[21]'. This is not empathy in the emotional sense, but rather a bodily, perceptive feeling-into the tool being used. Owing to our remarkable dexterity, we humans are probably the most proficient and versatile tool users, however we are far from the only species to do so.

In summary, radical embodied cognitive science provides a perspective that acknowledges the role of the body and its interactions with the environment in shaping perceptual experience without the need for internal representations, hence it is different from any explanation remotely dualistic. While I personally find this type of explanation

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[21] The term 'empathy' comes from the German word 'Einfühlung,' which was coined in the 19th century by German philosopher Robert Vischer to describe our emotional engagement with art. The word 'Einfühlung' literally translates as 'feeling into'. Wilhelm Wundt also used the term 'Einfühlung,' but in a different context than Robert Vischer—in his psychological studies to describe the act of projecting one's own feelings onto objects or events. Edward B. Titchener (mentioned earlier), a British psychologist who was a student of Wilhelm Wundt, is credited with introducing the term 'empathy' to the English language in the early 20th century. Titchener used the term to translate the German 'Einfühlung' into English. In his perspective, empathy was a process of 'feeling oneself into' an object or another person which aligns with Wundt's use of 'Einfühlung' as a kind of emotional projection.

compelling, I acknowledge that it may not resonate with all. Despite the scarcity of scholars openly espousing dualism, an undercurrent of this belief subtly persists, likely due to its intuitive appeal. Most critiques arise from the perceived lack of explanation for the phenomenological nature of our experiences—an assertion that, in itself, seemingly substantiates this subtle dualistic inclination.

The phenomenological character of our perceptual experience

It is imperative to discern between representational content and phenomenal character, recognising that their interrelation in mental states is not direct or elementary. To shed light on what we mean by phenomenal character, think of states such as enduring pain, sensing joy, or hearing an abrupt sound. Instinctively, for each state, there's a unique essence or quality to the experience of being in that state. This essence, or 'what-it's-like' dimension, is termed the state's phenomenal or qualitative aspect. Some scholars might refer to this as the state's 'quale.' Such states, rich in this unique essence, are identified as being 'phenomenally conscious.'

Initially, one might find it challenging to contest the idea that certain mental states, replete with representational content, also possess a phenomenal character. This is especially evident in the realm of perceptual experiences. Qualia[22] (the plural form of quale)—the subjective experiences that accompany our sensory inputs, like the redness of red or the excruciating pain of a headache—when one is in such a state of perceptual experience, it not only reflects a specific portrayal of the world but also carries with it a unique, inherent feeling or essence, a distinct 'what-it's-like' (Nagel, 1974) sensation. Consequently, any discourse on perceptual experiences inevitably demands consideration of their phenomenal essence.

Venturing into the realm of the mind's properties, one encounters the question of whether every state with phenomenal character invariably has representational content. Proponents like Dretske (1995) and Tye (1995) affirm this notion, suggesting that sometimes

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[22] The term "qualia" was popularized in its contemporary philosophical context by C.I. Lewis in his book *Mind and the World Order: Outline of a Theory of Knowledge* (1929), where he referred to "recognizable qualitative characters of the given" (p. 121). Lewis used the term to refer to the subjective, qualitative aspects of experiences, which has since become a central topic in discussions of consciousness and the philosophy of mind.

this representational content might be veiled or not directly discernible. When we probe deeper, contemplating the nexus between a state's representational content and its phenomenal character, we are met with a triad of theoretical stances, each elucidating distinct perspectives. Firstly, there's the 'intentionalism' or 'representationalism about phenomenal character,' a view championed by the likes of Dretske and Tye. This stance posits that the phenomenal character is inherently sculpted by the representational content, implying that any shift in the phenomenal essence is mirrored by a corresponding shift in its representational content. On the other side of the spectrum lies the 'phenomenal intentionality approach,' an orientation suggesting the converse. Here, the belief is that the representational content is moulded by the state's phenomenal character (Searle,1983; Loar, 2003). A third, more neutral stance, upheld by scholars such as Papineau (2021), suggests that these two properties—phenomenal character and representational content—operate independently, neither influencing the other. Every methodology I have mentioned here operates on a foundational premise: the notion that mental content is not just an illusion, but a tangible and pivotal aspect of our cognition. From this shared starting point, each framework then branches out, proposing its distinct interpretation and explanation of this phenomenon. In contrast, the 'anti-representationalist' paradigms that we have explored in the previous segment on the perceptual experience, challenge this prevailing consensus. Advocates of these perspectives express a degree of skepticism, questioning either the very existence or the attributed importance of content-rich, representational states.

RECS might approach the matter most radically compared to other cognitive science perspectives.

RECS is by definition an eliminativist movement (Chemero, 2009). Neither Gibson himself, nor RECS seems to be invested in explaining the conscious experience, for the simple reason that they do not have to. A primary commitment of RECS is the rejection of representationalism, which is the idea that the mind constructs internal representations of the world and uses them to guide behaviour. Proponents of RECS do not entirely reject the existence of representations. Instead, they question whether representations, as such, can genuinely contribute to explaining behaviour or, to be more specific, if they can do so by virtue of being representations.

According to the traditional view, qualia could be seen as the subjective quality of these internal representations. However, from the perspective of RECS, there are no internal representations, and hence, no qualia in the traditional sense. Instead, RECS may propose that what we call ‘qualia' emerge directly from our interactions with the world, rather than being features of some internal model of the world. The traditional problem of qualia arises when trying to explain how these subjective experiences can emerge from physical processes in the brain. If we abandon the need for inner representations, as RECS suggests, then the problem of qualia takes on a different shape.

Without representations, we are not trying to explain how subjective experiences arise from inner symbolic processes, but rather, we focus on how organisms interact with the world based on the affordances it presents. For example, the 'redness' of a red apple is not an internal representation of the apple's properties but is a direct experience that arises from the particular way our perceptual systems interact with light reflecting off the apple. In fact, the apple appears red because it reflects red wavelengths of light while absorbing others. This physical interaction underscores how, from a radical embodied cognitive science perspective, qualia—such as the experience of 'redness'—may not be conceived as private, internal experiences separate from the world. Instead, they are integral aspects of our embodied, situated engagement with the environment, shaped by the specific ways in which our sensory systems and the physical properties of objects interact.

Instead of conceiving the mind as separate from the body and the world, RECS posits that cognition is fundamentally embedded in, embodied by, and extended into the world. Affordances are a key concept in RECS. Gibson introduces the *reality* of affordances to provide the contents of experience, and we know that perceptual experience requires information, and they are out there in the environment, ready to be picked up. Therefore, experiences are not happening in the mind, but between us (or the animal) and the environment as a system (Chemero, 2003, 2009). Affordances are not subjective perceptions; they exist as real properties in the environment relative to the capacities of the organism. RECS sees cognition as fundamentally about perceiving and responding to affordances. However, this leads us to inquire: What, precisely, do we understand by the term ‘affordances'?

As Gibson (1966) puts it plainly "[by affordances] I mean simply what things furnish, for good or ill" (p. 285). This may be a simple description, but not an unambiguous one, especially when it comes to human behaviour. Even Gibson (1979) has to admit that affordances are dubious in ontological character as they bridge the environment with the actor: they are both physical, and psychical, or neither, nor subjective and neither objective properties, or both. They are not to be found in the actor, nor in the environment alone, but in both, as they belong to whole situations. Also, our affordances seem to be very different from other species' indeed. Affordances in human-environment relations seem very odd at times, resulting in more shipwreck than what the perceptual learning process could explain. The theory of affordances are very well applicable to other organism, but humans. Also, there is a personal quality to our conscious experiences.

How come that most animals can do without being conscious of their I-ness? Affordances should present themselves to animals in the same way as they do to humans, but it all remains on the level of behaviours and functions. Therefore I understand if some may not feel the phenomenological character of the affordances fully explained, or rather, they may feel them simply explained away. Gibson's information-based theory as well as Chemero's radical embodied cognitive science may leave an epistemic itch behind in some readers. I am certainly not one of them. In my view affordances provide a holistic and relational way to understand our interactions with the environment, emphasising the inherent connections between the agent and the world, sidestepping some of the dualistic conundrums that have historically dominated philosophical and psychological discourse. Navigating the labyrinthine alleys of cognition and behaviour, one cannot help but notice that affordances, in their palpable reality, seem to cast a longer shadow than representations. It is not so much a matter of contesting the very existence of representations, but rather querying their potential to wield substantive explanatory clout. Once again, we find ourselves standing at the crossroads of ontological essence and explanatory prowess. Whether or not an agent recognises or uses them, affordances exist. A ledge might afford jumping off, but just because someone doesn't jump does not mean the affordance is not present, as Chemero (2009) details:

> "…the affordance for appearing red doesn't go away when no one with the right visual system is around to take advantage of it. What we perceive, which is to say what we experience, are relations between ourselves and our environments." (p. 201)

So, the affordance for appearing whatever colour, as the property of the object is somewhat in superposition. It is there, but the experience emerges when an actor is there to witness it. Conscious experience is therefore taken out of the mind, and into the animal-environment system. Surely, nothing is taken away when nobody is around to appreciate the red apple, and when someone is, nothing is added.

The puzzle of qualia emerges predominantly from the manner in which computational cognitive science addresses the mind-body conundrum: Both a human being and a computer can harbour representations, yet the latter lacks the depth of perceptual experiences. This disparity gives rise to the notion that conscious experience, rather than being an innate facet, might appear as a supplementary layer—an enigmatic element demanding an intricate dissection. The facet of radical embodied cognitive science (RECS) that generates the most scrutiny is precisely its treatment, or lack thereof, of conscious experience.

This, of course, elicits critique particularly from those who find the RECS approach falling short in elucidating the richness of our inner lives. The dismissal or downplay of qualia and conscious phenomena tends to incite opposition, often from those vested in traditional frameworks that place considerable emphasis on the articulation of consciousness. Most notably, Valerie Hardcastle (2020) suggests that RECS may not provide a comprehensive framework for understanding the relationship between cognition and consciousness. Her critique centres on two main points: Hardcastle questions the notion that cognition and consciousness are the same. She argues that expanding the definition of cognition in the way Chemero suggests makes it difficult to tie cognition to 'phenomenal experience' (our subjective experiences or qualia). She implies that cognition, so broadly defined, is not a 'natural kind' to which we can attach experiences of consciousness. Furthermore, Hardcastle argues that, contrary to Chemero's claims, RECS does not actually solve any of the 'hard problems' related to consciousness. While I haven not stumbled upon a

written rebuttal defending radical embodied cognitive science (RECS) from these criticisms, it seems necessary to craft one on my own terms.

RECS isn not bereft of substance when it comes to tackling the issue of consciousness; it merely shifts the focal point. By avoiding the classic mind-body conundrum that has often ensnared psychology and philosophy alike, RECS sidesteps the need to articulate what 'consciousness' or 'qualia' might be in isolation. This does not imply an absence of nuance or depth, but rather a reorientation towards a more integrated, system-based understanding of cognition and experience. Hardcastle argues that expanding the concept of cognition to include interactions with the environment makes it difficult to tie cognition to phenomenal experience. From my point of view, this is actually a strength rather than a weakness of RECS. By breaking away from the traditional, restrictive definitions of cognition, RECS may offer a richer, more accurate account of human experience as inherently embedded and extended. The framework might not see ‘natural kinds’ as a necessity for linking cognition and consciousness.

Hardcastle asserts that RECS does not solve the hard problems associated with consciousness. I would argue in response that RECS offers a different framework for approaching these problems. While it may not solve the hard problem in the way dualist or materialist theories attempt to do, it reframes the problem in a manner that could be considered a form of progress. A direct counter to Hardcastle's critique that RECS cannot account for phenomenal experience is that phenomenal experiences, or qualia, are not isolated from but are part of the dynamic interactions between an organism and its environment. From this perspective, qualia aren't ‘things’ to be explained but are aspects of relational activity. One of Hardcastle's main criticisms is against Chemero's claim that cognition and consciousness are the same thing. I do not seem to be able to find in which paper Chemero ever claimed this verbatim. In my reading they are not the same, but consciousness arises from the same kind of dynamic, embodied interactions that constitute cognition. Separating the two creates an artificial divide that does not exist in the actual workings of human beings.

Illusions and hallucinations

Any externalist theory of perception, such as direct realism, has to account for illusions and hallucinations. While visual illusions have traditionally been a stumbling block for many theories advocating direct perception, an approach advocated by Favela and Chemero (2016) and grounded in the principles of ecological psychology can offer more compelling explanations. This does not mean that they are dismissing the complexity of perceptual phenomena; instead, they are offering an alternative lens through which to view them—one that could potentially resolve longstanding ambiguities.

While Favela and Chemero narrow their focus to visual perception in their article, it is crucial to recognise that an ecological understanding embraces perceptual systems as a whole, not just isolated sensory faculties. Moreover, this perspective can be broadened to encompass other kinds of illusions, like those related to touch or bodily sensation. Moreover, the framework's potential isn not merely confined to the realm of perception. Indeed, my intent in the chapter ahead is to stretch these ecological principles into broader cognitive territories, aiming for a more encompassing understanding.

In essence, the ecological framework offers a comprehensive lens for examining various perceptual experiences. According to the ecological psychology view, perception results from direct contact with the environment, not mediated by any mental representations. Affordances exist objectively in the environment and are directly perceivable (Gibson, 1977).

This view is deeply tied to the evolutionary development of perceptual systems, suggesting that simpler creatures also interact directly with their environment without the need for complex mental representations. This perspective tightly couples perception and action, essentially making them two sides of the same coin. One perceives in order to act, and acting enhances one’s perception (Gibson and Pick, 2000). This is integral for understanding affordances, as opportunities for action provided by the environment. Within this framework, the ‘problem of illusion’ is less critical than it is in other theories that rely on mental representations.

If perception is directly linked to action in the environment, then what is often termed an 'illusion' might just be a situation where the information available does not serve the current action-oriented goal. It is not necessarily a 'fault' in internal cognitive processing. Contrary to the traditional cognitive science’s view that sensory input is impoverished and

needs to be enriched by mental processes, the ecological view argues that stimuli in the environment are rich enough for direct perception, particularly when considered in the context of an organism actively moving through its environment (Turvey and Shaw, 1999). Therefore, instead of being errors in internal mental representation, illusions might be better understood as outcomes of specific interactions between an organism and its environment, particularly interactions that are not optimised for the organism's current action-oriented goals.

Ecological psychology posits that perception is direct. This contrasts with the cognitive science perspective, which argues that perception starts with an internal representation (like a retinal image) that the mind then processes. Ecological psychology, however, suggests that even creatures without complex sensory organs or brains can perceive their environments, making it implausible that internal representations are universally necessary for perception. Perception and action are intrinsically connected. Perception exists to guide action; they are not separate systems but parts of a unified whole. This is illustrated by the example of reading a street sign, or we can think back to the monkey example above, where a multitude of actions (moving eyes, tilting head, etc.) are involved in the act of perception.

This idea also emphasises the temporal aspect of perception, noting that perceiving is a kind of action and all actions take time. Motion is equally important in the ecological account of perception. As an organism moves, the resulting ‘optic flow’ generates additional information, like ‘motion parallax,’ that helps in making perceptual discriminations, such as distance or size (Gibson and Pick, 2000). This again argues against the idea of an impoverished stimulus, and for the richness of sensory information available in the environment.

It is important to note that ecological psychology does not consider space as an abstract, Euclidean entity. Instead, it conceptualises space in terms of relationships between the dimensions of a creature and the dimensions of its environment. In this framework, information is not just stimuli that the creature internalises and represents. It is structured in specific ways in the environment, and creatures of particular kinds pick up that information in specific ways. Thus, both the environment and the perception-action capacities of the animal

are crucial for understanding perception. In ‘natural’ circumstances, perception is direct and involves the perceiver actively engaging with an environment over time.

But some instances of perception are set up to be ‘unnatural,’ this being often the case in experimental conditions. For instance, an optical illusion might work best when the viewer's movement is restricted, forcing an ‘unnatural' point of view. A good example to illustrate this might be the ‘Ames Room.’ The Ames Room (Ittelson, 1952) is constructed to look like a normal rectangular room when viewed through a peephole, but it is actually built with irregular trapezoidal walls. When two people stand in opposite corners of the room, one appears to be a giant while the other appears to be tiny, even though they are both of the same size. When people are allowed to perceive in a natural way—by moving and interacting with their environment—the instances commonly cited as evidence of indirect perception (like optical illusions) lose their illusory quality. This is because, in a natural setting, perception is not static; it unfolds over time and in response to a rich context that includes not only the object being perceived but also the animal's (or a person’s) actions and the environment's features.

The distinction between hallucinations and illusions is a crucial one for ecological psychologists as well. Hallucinations are subjective experiences of individual perceivers, often seen as physiological malfunctions. They are irregular and unpredictable. For example, hearing voices or seeing things that aren not there. They may arise due to internal factors like mental illness, intoxication, or drug influence. Illusions, however, are predictable and often arise from specific environmental conditions, like the refractive qualities of water making a stick appear bent. They can be experienced by multiple individuals in the same way, provided they share similar perceptual capacities.

As we have discussed above, perception is a temporally extended action, therefore the quick and transient nature of hallucinations makes them a poor model for understanding perception in general. Direct realists often face problems when dealing with illusions and hallucinations. However, from an ecological psychology standpoint, these issues may be less problematic due to the fact that perception is understood as an active, time-extended process of exploring the world. In this view, illusions and hallucinations occur when the perceiver does not have the opportunity or capability to explore the environment sufficiently to make useful discriminations.

Further criticism of ecological psychology

So far Favela and Chemero have offered some robust arguments in favour of an ecological approach to direct perception that does not need to posit internal concepts or representational states. While they also argue that phenomenal experience can be built into the animal-environment interaction, some might argue against it, stating that this does not fully capture the subjective qualities of experience. They cite Paul Coates' (2007) 'critical realism' against Noë's (2004) sensorimotor approach to visual perception to represent this opposing metaphysical stance.

Coates proposes two elements in perception: the conceptual and the phenomenal. This view has Kantian roots, suggesting that our mental faculties transform passive sensory input into a coherent perceptual experience through concepts. Coates argues that any explanation of perception must take into account both the phenomenal (raw sensory data) and conceptual (cognitive understanding) aspects.

The paper continues to argue against Coates' claim that concepts are necessary for meaningful action or perception. It contends that the ecological model (on which Noë's sensorimotor approach is based) already accounts for meaningful perception and action without requiring an inferential or conceptual step. The text cites examples from the animal kingdom and simpler systems to suggest that concepts are not required for successful navigation and interaction with the environment.

The authors are aligning themselves with Gibson's ecological psychology, stating that their view is "explicitly not Kantian." Gibson's theory of direct perception, and the ecological approach more broadly, argues that we can directly perceive affordances, or opportunities for action in the environment. When one sees, for instance, a chair, one does not just see colour and shape; one directly perceives the 'sit-ability' of that chair. The Kantian criticisms, which demand the incorporation of concepts for meaningful interaction, do not apply to their model, because it has a completely different metaphysical stance.

I may add, to be more precise, that ecological psychology does not explicitly engage with metaphysics in the way that some other philosophical traditions do, it does however have underlying assumptions that could be considered metaphysical in nature. In the context of ecological psychology, particularly as formulated by Gibson, the focus is more on

empirical and theoretical matters of perception and behaviour rather than traditional metaphysical, or philosophical concerns for that matter. Ecological psychology does have underlying philosophical commitments, but it often approaches questions about reality, perception, and action from a genuinely scientific standpoint. Critics coming from a more philosophical background may remain eternally unconvinced by this view. Their demands for explanation often orbit around constructs and frameworks that the ecological psychology deliberately steps away from. Thus, meeting their criteria for a 'satisfactory' explanation might prove elusive.

Ecological psychology serves as the bedrock upon which RECS is constructed. Continuing along this intellectual trajectory, it is worth acknowledging that some philosophical purists may find the underpinnings of ecological psychology, and by extension RECS, to be insufficiently rigorous or comprehensive. Yet, that very dissatisfaction often stems from their own conceptual frameworks—frameworks that RECS and ecological psychology deliberately sidestep in favour of a more dynamic, organism-environment approach. The 'insufficiency' they perceive could, in fact, be a reflection of the limitations inherent in their own philosophical lenses. While both RECS and ecological psychology might sidestep certain classical psychological constructs—such as illusions or qualia—they do so not out of neglect but rather a focus on what they deem as the crux of the perceptual process: the dynamic interaction between organisms and their environments. This is no sign of intellectual laxity. On the contrary, figures like Favela and Chemero have just shown they are more than willing to step into the philosophical ring to defend thinkers like Noë from critiques. Their work in refining the philosophical scaffolding of RECS indicates a commitment to keeping the framework not just scientifically, but also philosophically, sound.

So, a radical embodied cognitive scientist does not need an account of these philosophical problems, but it does not mean that this is an excuse not to say anything about them, especially in the face of criticism. And some of these criticisms are indeed justified. RECS may consider itself adequately philosophical, its divergence from traditional philosophical concerns about mind and cognition may leave some critics wanting more. RECS fundamentally shifts the grounds on which questions about mind and cognition are traditionally asked. In sidestepping the vocabulary and questions deemed essential by more classical or computational approaches—such as representationalism and the qualia problem

—RECS may appear to some as evasive, incomplete, or some form of intellectual escapism. For critics who view qualia as essential to understanding the mind, any framework like RECS that does not explicitly account for them may seem incomplete or less satisfying. As a recovering property dualist myself, I can relate to them as well.

Additionally, the critics might argue that RECS leaves some phenomenological aspects of cognition unexplained by focusing primarily on the animal-environment system. It may offer a framework for understanding perception and action, but less so for introspective or 'inner' experiences that seem to demand an explanation in terms of qualia.

Ecological psychology leaves the door ajar to further criticism. A line of critique could say that while ecological psychology may offer a compelling account of perception, it remains an open question whether this account can be extended to all of cognition without invoking some of the representational mechanisms that RECS is designed to eliminate. Critics might ask: Can RECS adequately address higher-level cognitive activities like problem-solving, abstract reasoning, or language comprehension? While the purview of this thesis remains predominantly trained on perception, it must be noted that perception, even within the ecological framework, is not without its own challenges and criticisms. For instance, the ontological ambiguity surrounding affordances persists as a point of contention. Moreover, the labyrinthine nature of human perceptual experience seems to exceed the scope of mere affordances for action. Consider aesthetic reverie, symbolic cognition, and the realm of abstract thought; these dimensions appear to elude the simplistic confines of direct perception of affordances.

While my thesis remains primarily centred on the complexities of perception, I intend to delve deeply to ensure that all possible angles on phenomenological character are adequately covered. Initially, I had aspired to conduct an empirical experiment rooted in the principles of radical embodied cognitive science to offer tangible conclusions. However, due to unforeseen circumstances, this avenue was cut short. Instead, I have pivoted to scrutinising well-established thought experiments to provide substance to the discussion.

The use of thought experiments

Attempts to explain, or at least map the conscious experience have led to some of the most exuberant thought experiments both the history of philosophy and psychology have ever

witnessed. In essence, as long as key figures in the field insist that the enigma of consciousness defies a purely materialistic explanation, there is a wide berth for intellectual exploration. This keeps the door ajar for imaginative theories and thought experiments. These experiments have a reach across time as well. Although they carry the distinctive signs of being a production of the specific era, for instance with regard to the technical advancement of the time, but there are reoccurring themes around which these thought-experiments are formed, and they seem to be very resistant to solutions. Henci nearly all old ones are still up for debate, while new ones keep entering the rink. Other thought experiments are clearly so ahead of their time, that they border on futurology or, better still, science-fiction.

Thought experiments can serve various functions for radical embodied cognitive scientists as well, even though these scientists prioritise the dynamic, situated nature of cognition and perception. Radical embodied cognitive scientists can use them, for instance, for counterfactual reasoning, to consider how different conditions might affect perception or cognition. They can identify new empirical questions to explore.

Thought experiments can serve as a precursor to empirical investigation or to challenge existing theoretical assumptions.

Obviously, thought experiments have limitations, especially for a discipline that emphasises the dynamic and situated nature of cognition. Thought experiments often involve isolated, decontextualised, and ‘unnatural’ scenarios that might not accurately represent the complexities of real-world perception. But it can actually be used to argue for the ecological stance in perception.

Not everybody is remotely as enthusiastic as I am when it comes to thought-experiments. Daniel Dennett, as for one, finds them “fiendishly clever devices” (1991) which are only worth their seductiveness, and sneeringly calls them ‘intuition pumps.’

In exceptional cases, advancements in technology or empirical methodology allow thought-experiments to transition into the realm of experimental investigation. Such developments provide opportunities to critically assess and validate the conjectures initially confined to theoretical discourse. So, to check whether those armchair hypotheses actually hold water in the real world. Other times case studies concerning the same problem point at the direction towards which the explanation may be found. In most cases neither thought experiments, nor case studies can live up to scientific standards, the former not being easily

testable, the latter has a problem of too many variables not being under control. Nevertheless, with careful reasoning they can be gateways for new ideas to enter the realm of science.

Imagination is a vehicle for thought experiments, but also its pitfall, as it can create fiction far too easily, rather than engaging with reality. But with a little bit of risk assessment, I believe that thought-experiments are still worth proper consideration. I would like to think about them as thought-stretches, rather than experiments. Intuition and imagination might seem to be, at first glance, problematic for a radical embodied view, but there are various angles from which this perspective could approach the subject. RECS does not profess to be the be-all and end-all for understanding every nuance of cognition—like imagination, intuition, or the elusive realm of qualia. These areas are notoriously challenging to pin down, not just for RECS but for traditional and computational theories as well.

What RECS does exceptionally well is to provide a unique, organism-environment centred viewpoint for decoding certain aspects of cognition, particularly those linked to perception and action. Although, if thought-experiments consistently fail to yield reliable or replicable outcomes when put to the test in real-world settings, it certainly strengthens the position of RECS, which emphasises the importance of organism-environment interactions. RECS' grounding in the tangible interactions between organisms and their environments seems validated when traditional thought experiments falter upon practical application.

Vision

In the 17.th century, Irish writer William Molyneux sent a letter to his friend (about to be), John Locke, in which he proposed the following problem (1688). There is a man who has been blind from birth and has learnt to distinguish and name a globe and a cube only by touch. Now this man is suddenly allowed to see for the first time. Will he be able to distinguish and name these object simply by relying on his vision? The proposal has been known as *Molyneux's problem* ever since.

Molyneux, being on the empirical side, among with other empiricists, Including Locke himself, gave negative answer to the question, arguing that one learns through experience. Locke in his answer went a level deeper that that and argued that because the modalities of touch and vision are different, or to put it more precisely, the ideas of vision and

the tactile idea of depth are not associated yet in the newly sighted person, hence he is unable to differentiate between the objects only by sight.

A RECS proponent might predict that a newly sighted person would initially struggle with interpreting visual stimuli, not because they lack the internal representation of the objects, but because they have not yet developed the action-perception loop for visual perception. They would need time to develop the skills and 'tunings' to navigate the world visually, much in the same way that they initially learned to navigate it through touch.

Locke's perspective does share some similarities with what RECS might argue, although the frameworks and terminologies are different. Locke focuses on ‘ideas,’ a term laden with mentalistic and representational connotations, a RECS proponent would probably avoid such language. However, both would agree that the skills or understandings developed in one sensory modality are not immediately transferable to another. For Locke, this is because the ‘ideas’ generated through each sense are distinct. For a RECS theorist, it would be because each sensory system involves a different set of action-perception loops.

We are better-equipped scientifically in the present century to answer to this challenge than Molyneux was back then when he proposed the original question, therefore we know that there is no such monolithic answer to that, as he may have hoped. We have gained considerable knowledge regarding how the brain processes information pouring through the doors of perception.

Furthermore, we have now access to real experimental data, as it happened since then that some people have indeed had their sights restored as a result of medical intervention, and were tested for Molyneux’s problem following the measure. Children with the congenital, but otherwise curable condition of bilateral cataracts, between the ages of 8 and 17 had been recruited form the *Project Prakash*, which is a humanitarian effort aiming at locating, and providing treatment to blind children in developing countries. This study offered a real-world test for Molyneux's question, and the empirical findings suggest, a negative response is most likely accurate. Despite their newly-acquired visual capabilities, subjects could identify objects either visually or through touch but struggled to correlate these perceptions across the two senses. The outcomes of tests measuring this touch-to-vision connection were hardly more accurate than mere guesses. Yet, this ability to integrate sensory information improved swiftly within just a few days (Held et al., 2011).

The results were, again, leaning towards the negative, but one must note that according to the original question, the blind person's visual system had otherwise been intact, in contrast, those who are congenitally (but reversibly) blind may have missed out on some nervous maturation happening normally in early childhood, as a result of the lack of excitation. Also, the subjects undergoing the measure had been shown pictures of tactilely familiar objects (lego bricks), but on a computer screen, therefore they were not able to, for instance, walk around them, thus being a typically unnatural setting. Therefore, while Locke's perspective gains some empirical support, the unique conditions and constraints of the study also warrant caution before drawing strong conclusions. It does not necessarily mean RECS is incorrect; the experiment was set in a constrained and 'unnatural' environment that could potentially limit the application of its ecological approach.

Thought experiments designed to illustrate the *knowledge argument* are often cited as challenges to physicalism. These experiments aim to show that there exist non-physical aspects of consciousness, commonly referred to as qualia. Among these thought experiments, one particularly stands out for its frequency of discussion among scientists and philosophers: the case featuring Mary, a character central to this specific line of inquiry.

Mary is a super scientist, not because she is super blind, but almost. Mary, the super informed neurophysiologist is in possession of all informations that are available about vision, and of course, colour vision, in terms of their physical properties. She understands the mechanisms and physiological processes that occur when we look at a banana and perceive its yellow colour, as well as how we articulate the statement, "The banana is yellow," albeit from a purely mechanical and physiological standpoint. As a rather cruel twist in Mary's tale, she is confined in her room which is devoid of colours; everything she encounters, including the computer screen she uses, manifests solely in shades of black, white, or varying tones of grey.

What will happen if Mary is either given a colour monitor, or is suddenly let out in the world to observe a banana in its full, glorious technicolour? Will she learn something new? Intuition tells that Mary will 'feel' something dramatically new, or at least this is what most commentators suggest. When I fist encountered the problem I had an overwhelming concern about Mary's mental well-being having spent all this time in solitary confinement with all that science, but still with a serious visual, and social deprivation. Then I went further with

my thoughts empathising with Mary, marvelling at the impossibility of the situation; poor Mary she cannot bump into objects and have bruises black and blue, in fact she must be wearing a black (or white) bodybag so that she doesn't see her own skin at all. Does she have to shower in the dark?

The original mind riddle was proposed by Australian philosopher, Frank Cameron Jackson (1982). Jackson, originally a mild property-dualist, later overturned his knowledge argument, and all arguments for non-physical properties for that matter, and sided with the purely materialistic approaches. But originally he aimed to demonstrate that there are certain aspects of subjective experience that cannot be fully captured by objective scientific descriptions.

As compelling as Mary's story may seem at first sight, one soon suspects something to be wrong, or at least misplaced here, and of course commentators soon picked up the problem to dissect it to pieces. The very setup of Mary's black-and-white room imposes an experiential limitation that is unrealistic. No human being lives in such sensory isolation. This calls into question the generalisability of the conclusions drawn from this artificial scenario. This artificiality could be seen as a methodological issue that biases the outcomes in favour of the anti-physicalist position the experiment aims to support. A better invocation of a problem should include the most of what we factually know regarding the matter, and then with the help of imagination and some creative moving these facts around, we may see if something missing form the big picture, and if that missing puzzle piece has the shape of a quale.

In Mary's case the invocation of the problem is based on her omniscience, a body of knowledge immensely vast, and to which we do not even have access just yet. Mary does. So, how are we supposed to guess even how she reacts when she experiences colours for the first time? Also, in order to propose that Mary indeed knows everything, we have to assume that factual knowledge is finite. Aligned with this, we have to postulate that the body of all knowledge is fathomable by humans, therefore Mary is a human, as opposed to a transhuman, or a species evolved beyond homo sapiens. There might be too much to assume, so the fairest answer is just that it cannot be answered, based on the premises. Despite its shortcomings Mary's room has elicited responses from philosophers with various ontological and epistemological commitments (Dennett, Churchland, Lewis - just to name a few).

In my own examination of Mary's room, I intend to bypass the specifics of what prominent philosophers have contributed to the debate. Instead, I will focus on a direct analysis of the thought experiment itself, scrutinising its underlying assumptions and implications, particularly from the perspective of radical embodied cognitive science. To commence my analysis, I will first tackle the intricate issue of colours and textures.

The hierarchical role of colour relative to texture is worth examining in the context of object recognition or sensory evaluation. Colour, as a sort of dye, is probably secondary to texture (mediated by the colour, as the light is projected from the surface) when we look at an object, in order to identify it, or to tell, for instance, if it is the right temperature to be touched or tasted. One has to wonder whether Mary, in her isolated environment, ever had the tactile experience of holding a banana, albeit in darkness, or if her exposure was solely limited to grayscale images displayed on her computer screen. This nuance could have considerable implications for her understanding and perceptual experience.

In his book titled *The Mind's Eye*, Dr. Oliver Sacks recounts the compelling narrative of Howard Engel, a Canadian author who faced remarkable perceptual challenges. Due to a large blind spot in his visual field, brought about by a stroke, Mr. Engel had major difficulties recognising colours. Everyday objects, like apples, oranges looked like exotic fruit to him, until he squeezed them and sniffed them for substantiation. This suggests that Mary might also encounter difficulties in recognising a banana by sight alone once she leaves her confined environment. Although a banana has a distinct shape, there's a possibility she could confuse it with something like a boomerang, a pickle, or an old-fashioned telephone. If Mary cannot immediately identify the object, would the experience of its colour still represent new knowledge for her?

As Gibson(1966) remarks: “The meaning of the term color is one of the worst muddles in the history of science” (p. 183). Unfortunately, he does not wish to elaborate any further on this matter, but colour is indeed a difficult conception to use in a scientific context, and as we know, Mary’s language is science. In that sense Mary knows about colour vision, knows that certain colours correspond with certain wavelengths on the visible colour spectrum. But the learning of specific colour hue names in reality does not happen by learning what photoreceptors are involved in the process, or what light energy is absorbed or reflected by the object, but by making associations between the objects and their colour

properties, along the lines of the blueness of the sky, the redness of the rose, the yellowness of the banana, and so on. Spectral colours refer to sets of wavelengths, rather than just one wavelength, yellow being roughly between 575 and 595 nm. Mary knows it all, factually. Additionally, she is aware that the banana owes its yellowness to the carotenoid pigment. But the mere physical laws and facts she knows will not elicit anything. Like physical laws alone will not cause carotenoids to appear miraculously, nor they make the receptors be excited, what they do is that they explain and predict. They are there to explain, not to cause.

Consequently, my speculation is that Mary will encounter 'something' novel upon seeing a banana for the first time, although I remain skeptical that the thought experiment has successfully isolated a quale. I am not sure if that task is accomplishable at all. My understanding hinges on whatever scope I can fathom for Mary's all-encompassing knowledge, which is therefore inherently restricted. However, I recognise that to assert Mary can truly understand the colour simply through physical facts, one must incorporate the 'hard problem' of consciousness. This would imply that the problem had been resolved through physical laws, effectively sealing the explanatory gap.

I found considerable gratification upon reading Daniel Dennett's 1991 book and his take on the Mary conundrum. I noticed several points of convergence, including the use of the banana as an example. Dennett also highlighted the curious issue of how Mary could avoid seeing her own skin; he posited that she might wear black gloves as opposed to being encased in a body bag. Dennett however, with an ingenious idea, developed the story further when he imagined handing a blue banana to Mary when she is out of her confinement. With his own words from page 400 of the book, this is how Mary he believes would react:

> "… I was not in the slightest surprised by my experience of blue (what surprised me was that you would try such a second-rate trick on me). I realize that it is hard for you to imagine that I could know so much about my reactive dispositions that the way blue affected me came as no surprise. Of course it's hard for you to imagine. It's hard for anyone to imagine the consequences of someone knowing absolutely everything physical about anything!"

Dennett’s Mary can figure out colours, based on her physical knowledge ‘only,’ but since she cannot really test them against reality, owing to the lack of real colours being present, I suppose she will have to use her imagination to do so. The issue of visual imagery presents another captivating angle, one that could very well be incorporated into the discussion surrounding Mary. However, before delving into that, it is worth addressing the complications arising from Mary's supposed omniscience. What exactly is meant by Mary "knowing all physical facts"?

If she knows only the current physical facts, that leaves open the possibility that future discoveries could change our understanding of consciousness and qualia. On the other hand, if she knows all possible physical facts that could ever be known, then she would, in theory, have a complete understanding of consciousness and experience, making the thought experiment moot from a physicalist standpoint. How one interprets Mary's omniscience may be influenced by one's pre-existing philosophical stance. A physicalist might presuppose that all phenomena, including qualia, can ultimately be explained by physical facts, while someone who believes in non-physical properties might argue that Mary's physicalist knowledge would still be incomplete. In the Mary thought experiment, the assumptions made about her reaction to seeing a banana for the first time might differ based on one's philosophical leanings. If one believes that non-physical properties exist, one would likely predict that Mary would experience something entirely new and outside her comprehensive understanding of physical facts when she sees the banana.

However, the experiment can be further complicated. Imagine if Mary is presented with a banana that is blue or red rather than yellow. Even with her exhaustive knowledge of all things physical, she would still likely experience awe or surprise. This suggests that the 'newness' Mary feels may not be tied to experiencing the specific quale of 'yellow.' Instead, her awe could be a more generalised reaction to any unexpected sensory experience, challenging the thought experiment's capacity to pinpoint a unique, unexplained quale.

I am concerned that the specific quale we are trying to isolate may not be what Mary actually experiences. If her vast knowledge includes not just all physical facts but also currently-debated non-physical properties—which may ultimately be shown to be physical in nature—then she would be able to distinguish between a yellow and a blue banana. She might even have a vivid mental image of the banana before she physically encounters it. However,

it is important to note that the assumptions we make about Mary's experience are inherently biased. While the original thought experiment isn't fundamentally flawed, its premises allow for varying interpretations that can easily lead us astray.

It is difficult to claim that the thought experiment has nothing relevant to say about qualia, given that the outcome—Mary's reaction—is deeply influenced by one's prior assumptions about the nature of qualia. Even Dennett, in his vivid description, could not have been completely neutral in outlining Mary's response; it is more a portrayal of his materialistic stance. Though Dennett's 'blue banana' scenario does not necessarily debunk the concept of qualia, it does challenge the original intent of the Mary thought experiment as a 'knowledge argument.'

However, if we lower our expectations a bit, the experiment could serve another purpose: shedding light on a previously under-examined aspect of Mary's cognitive process, namely her capacity for visual imagery. While it is practically impossible for us to grasp the full scope of Mary's knowledge, one does not need exhaustive understanding of physical processes to imagine a colour. This suggests that comprehensive factual knowledge does not necessarily equate to the ability to form visual imagery. If Mary, in her confined state, contemplates an apple or any other object, she would most likely visualise it in black or white, given the limited colour palette available to her. Being aware that a banana is yellow in the 'outside world' might not enable her imagination to render it in true colour, especially if she has no prior sensory experience of it. Her susceptibility to the 'blue banana' trick hinges on whether she has a mental image of a yellow banana stored in her memory. Without that, she might sense something amiss in the colour, but would lack the means to compare the 'blue' to the 'yellow' she's supposed to know.

Neuroanatomically speaking, memory, perception and imagery are intertwined, they share mutual pathways in the brain. Oliver Sacks (2010), famed British neurologist and author's book, *The Mind's Eye* is a plethora of case studies and descriptions of experimental researches depicting this relationship. Most of his handpicked examples show how mental or visual imagery can activate the visual cortex the same way as it were normal perception. The most fitting example comes from his other collection of cases, from the book titled *An Anthropologist on Mars* (2011). The first chapter of the book describes the curious case of Mr I., an artist who lost his colour-vision as a result of a head injury and a consequent brain

damage (no damage to the cones of the retina). With his own words: ”My vision was such that everything appeared to me as viewing a black and white television screen.” That sounds familiar. His sudden colour-blindness is curious enough, but on top of that, he reported a complete loss of ability to evoke colours in his memory or in his imagery.

According to Sacks and Kosslyn (2006) it was likely not visual imagery or memory that suffered the loss of perceptual colour blindness, but the other way round, it was the perception of colour which suffered the loss of visual imagery and memory. To state it more clearly, visual perception relies on visual imagery; what we recognise visually comes from the sensory input from our retinas being aligned with the mental images stored in our mind or brain. I argue that this process is bidirectional. To discern that a banana is blue rather than yellow, we must compare it to the mental image we have stored in memory, which is facilitated by our imagination. However, for that mental image to exist in the first place, we need the sensory data from our retinas. Therefore, before she encounters the blue banana in the real world, Mary would have had to envision a yellow banana in her mind's eye to recognise that the blue one deviates from her expectation. As we demonstrated that knowledge does not imply memory or imagination. Given that Mary had not previously experienced the colour, she would not have any internal 'templates' to match the colour of the banana against. As a result, she might initially be puzzled, noticing that the colour of the banana seems unusual, perhaps manifesting as an unexpected shade of grey. However, since her colour perception mechanisms are fundamentally unimpaired, she might gradually learn to distinguish different colours over time, similar to the way young children do. That said, this doesn't necessarily speak to the question of qualia. Even her experiences in black and white would have had some qualitative aspect for her.

The thought experiment about Mary could be interpreted more as a commentary on visual awareness rather than on qualia. In essence, the experiment poses questions about what it is like to have an experience (i.e., seeing colour) for the first time and whether that experience can be fully captured by physicalist descriptions. However, these questions are generally about awareness—being aware of a new experience, a new piece of information, or a new aspect of reality.

Visual awareness could be thought of as an intricate interplay between visual perception, memory, and imagery. In this framework, visual perception is the initial sensory

input, providing the raw data for the experience. Memory serves as the archive, storing previous visual data to which new experiences can be compared. Imagery functions as a sort of mental ‘sandbox,’ allowing one to simulate or revisit visual experiences even in the absence of the stimulus. These components are dynamically interconnected. For example, visual perception is enhanced by memory and imagery, as we use stored images and simulated scenarios to better interpret what we see. Meanwhile, the act of seeing can enrich our bank of stored images, which in turn enriches our capacity for visual imagery.

The case presented above engages deeply with the interconnectedness of perception, memory, and imagery, highlighting the reciprocal relationship between these elements. Neurologically the same pathways are often activated whether one is experiencing direct perception, a memory, or a mental image. This poses intriguing questions for theories of cognition like radical embodied cognitive science, which tends to downplay the role of internal representations.

The example of Mr. I, who lost both his colour perception and the ability to imagine or remember colours, suggests that these processes are tightly coupled. As per Sacks and Kosslyn's interpretation, it is not just that visual imagery depends on prior perceptual experiences, but also that visual perception itself relies on the capacity for mental imagery and memory. This seems to directly contradict the principles of RECS, which argues against the necessity of internal mental representations for perception. Since Mary has never had any experience with colour before, she would lack any mental 'blueprints' to compare the hue of the banana against. She might recognise that something is amiss with the colour, but couldn't pinpoint it as blue or contrast it with the anticipated yellow.

This perspective underscores the interconnectedness of perception, memory, and mental imagery, which in turn raises questions about the adequacy of the RECS model that tends to downplay or even deny the importance of internal cognitive representations. My line of reasoning suggests that the intricate relationships among perception, memory, and mental imagery complicate the notion of cognition as solely embodied and non-representational, as posited by RECS. While RECS provides useful perspectives on the bodily and environmental aspects of cognition, it might benefit from incorporating insights about the role of internal cognitive processes, such as memory and imagination. These internal elements may add

depth to our understanding of cognitive experience, potentially filling gaps left by a strictly embodied approach.

Touch and Bodily Awareness

The 18th-century radical empiricist Étienne Bonnot de Condillac (1930) proposed a fascinating thought experiment that led him to believe that the sense of touch was the most reliable form of perception, thereby taking precedence over visual perception. In this thought experiment, one is asked to consider a statue resembling a human but lacking animation, much like a robot. The statue is selectively given only one sensory modality at a time or a combination of two or more.

According to Condillac, providing the statue with only visual perception does not afford it a sense of space or an ability to recognise other objects within that space. He contends that it is through the sense of touch that the statue gains an awareness of itself, other objects, and the spatial environment they occupy. Moreover, when equipped with multiple senses, it is through touch that the statue associates these additional sensory experiences with itself and other objects.

The statue gains the deepest understanding of its own continuous existence particularly through the experience of self-touch, which is distinct from being touched by another object or touching something else. The ingenuity of Condillac's statue-man thought experiment lies in multiple aspects. Notably, it might have been one of the earliest attempts to explore sensory experiences as combinations, instead of investigating them one sense at a time. This approach serves as a significant precursor to contemporary multisensory research.

Another key aspect is the emphasis on bodily awareness and the tactile sense in gathering experience and gaining knowledge about both oneself and one's surroundings. Even empiricists, who considered sensation to be the foundation of knowledge, tended to exhibit a form of ‘technical dualism’ that separated the head from the body. This was not a dualism of properties but rather one that focused on the location of the brain and central sensory organs in the head, distinct from the rest of the body.

In contrast, Condillac was ahead of his time when incorporating touch, bodily awareness, and even movement into his investigations concerning the senses. Up until the late 19th and mid-20th centuries, bodily awareness and touch did not enjoy the prominence

that Condillac had initially granted them. It's not surprising that their reintroduction coincides with the advent of experimental psychology, commonly dated to 1879 with the establishment of the first psychology laboratory in Leipzig. One individual who merits recognition for reintroducing the concept of body ownership into experimental psychology is likely the physicist and philosopher, Ernst Mach, around 1898. This was followed by a hiatus owing to experimental psychology turning to behaviourism and abandoning the question of the mind and the senses all together. It was not until the rise of cognitive science that another wave of focus on the brain/mind and the senses occurred. Initially, this movement was largely influenced by the computer-mind analogy.

Concurrently, Merleau-Ponty, in 1962, made a seminal contribution to the understanding of touch, self-touch, and bodily awareness from a phenomenological perspective in philosophy. His work not only influenced Gibson but also continues to inspire a host of modern researchers in experimental psychology, particularly those aligned with the sensorimotor approach, such as Manos Tsakiris. These researchers aim to extend the scope of cognitive science to include subjective experience.

In fact, bodily awareness is receiving more focus from psychologists today than it perhaps ever received from philosophers, despite its centuries-long presence in philosophical discourse. In turn, ongoing research on bodily awareness, including studies on bodily illusions, is generating a plethora of philosophical questions. The historical philosophical oversight of the nexus between touch and bodily awareness is understandable, given that this sensory complex is incredibly challenging to grasp without insights into its neural mechanisms. Touch stands apart from the other four primary senses in several significant ways. While all senses converge at the brain for processing, touch cannot be localised to a single organ as vision can be with the eyes, or olfaction with the nose. Touch has a more dispersed anatomical basis—it involves the entire body. The skin, our largest organ, contains receptors for various sensations such as temperature, pain, vibration, and shape. Interestingly, there is no single type of ‘touch receptor.’

The complexities do not end there. The sense of touch is not merely a summation of the sensations mediated by the integumentary system. For example, pain and thermal information travel along similar neural pathways, yet pain does not straightforwardly

contribute to our sense of touch. Additionally, touch integrates inputs from systems beyond the skin, like the receptors in our joints and muscles.

Here is where proprioception comes into play, often dubbed the 'sixth sense.' This system, involving receptors in joints, muscles, and ligaments, was only formally recognised about a century ago when Charles Sherrington detailed it in his comprehensive book, *The Integrative Action of the Nervous System*, in 1906. Despite its critical importance to our sensory experience and motor control, proprioception had been largely overlooked until then, which is astonishing given its essential role in how we interact with and perceive the world. The uninterrupted flow and the unconsciously, but constantly available sense of where one's body parts are had been so familiar, so taken for granted that it had gone under the radar for a long time.

Oliver Sacks in his book *The Man Who Mistook His Wife For a Hat* describes the hopelessly disembodied state of his protagonist, Christina, who lost her sense of proprioception as a result of an acute inflammation in her nerves. Proprioception, like most things we tend to take for granted, shows its presence, paradoxically, when it is missing or malfunctioning. In Christina's case, like in most people suffering from a loss of the sense of one's bodily self, vision could substitute for the loss. These patients can stand, or with practice even walk, given that they visually focus on their legs constantly. With even more practise, eventually, the unconscious feedback of proprioception can be replaced by the automatism of vision, therefore one no longer has to consciously focus on the extremities in order to move them. This example shows how plastic the brain should be in order to adapt to the new challenges of functioning in the environment that the changes in the availability of senses brought about, while accommodating an intact scheme of one's own body. But what does it all have to do with touch? I have a fairly good example to shine some light on that.

I had to pay a visit to the dentist for a very minor procedure to be performed. In contrast with the trivial nature of the measure, I was given a disproportionate amount of analgesics which turned my mandible entirely benumbed for hours. In a proprioceptive sense I had no sensation of my jawbone and it indeed felt like I did not even have any. I was trying to drink a sip of water, but due to the lack of sensation in my lower lip it was poring down on my chest complementing to my mental image of myself being a jawless zombie. For a moment it felt so convincing that I instinctively reached for my chin to feel it is still there.

Though it was still there it felt so different, it was oddly soft, and smooth. I had bottom-up information from the cutaneous receptors of my fingertips, but nothing (at least nothing consciously felt) from the skin on my chin, and the muscles underneath. The act of touching immediately destroyed the zombie illusion, now that I had just enough information for making up for the partial loss of proprioception to create the mental image of my head to be whole and intact.

This experience also demonstrates the complex interplay between different sensory systems in constructing our perception of ourselves and the world around us. While touch provided the tactile confirmation that my jaw was present, it was proprioception that normally keeps me aware of the positions and movements of my body parts, even without me having to touch them. When one system failed (proprioception), the other (touch) was able to step in and fill the gap. This synergy between touch and proprioception is crucial for a lot of everyday tasks and is also foundational for more complex cognitive processes, from walking and grabbing objects to social interaction and self-awareness. Thus, both senses are essential parts of a much larger, integrated system of perception and action.

Touch is one of the first senses beginning to form, as early as in the womb, because it is essential in exploring the environment. It begins to form in the womb as early as eight weeks into pregnancy. In the womb there is the state of blissful ignorance. In the womb, the foetus does not have the sensory contrasts that define our experience in the external world—no hot or cold, light or dark, up or down. It is an environment of amniotic uniformity, and the foetus, in a way, feels as if it is part of an undifferentiated whole. This could be viewed as a form of fundamental embodied experience, one that precedes the individuation that happens after birth. Cutaneous receptors develop on the face only, mostly in the mouth and nose. The development of touch in utero can be seen as the foetus's first interaction with an ‘environment,’ even if that environment is very different from the one it will later inhabit (Piontelli, 2015). As such, it sets the stage for more complex forms of sensory processing and perception that come later in life.

It also prepares the newborn for the crucial role that touch will play in social bonding, emotional development, and learning about the world. Once the infant is born, and past the vegetative state, they start to really explore the environment surrounding them, and the people within. This is when touch starts to become a complex sensory system. Still with

proprioception and kinesthetics not being fully on line (not being able to crawl or stand up, let alone, move around), infants do what they are best at, mercilessly shovelling everything into their mouth. With the ability of crawling around they learn that tactile interaction with the environment can happen in two ways basically: either they bump into things, or they bump into them.

The sense of touch is fundamentally interwoven with movement, physical awareness, and a sense of location in space. When we come into contact with an object, various sensory mechanisms spring into action. The fine hairs on our skin bend, and the skin itself, along with the underlying muscles, experiences deformation. Mechanoreceptors in the skin code this tactile information, serving as the primary mediators of this sensory input.

However, it does not end just there. Our muscles and joints also contribute immediate feedback through proprioception, signalling to our brain the precise location and nature of the touch. This creates a rich, multidimensional sensory experience that goes beyond mere surface contact.

Furthermore, much of our tactile interaction with the world is not passive; it is active and often exploratory. We don not just receive touch; we seek it out. Whether we are probing an object's texture or reaching out to another person, our actions are guided by a quest to understand our environment and ourselves better. This dynamic interplay between touch, movement, and proprioception forms a complex sensory network that helps us navigate and make sense of the world around us. The kind of touch which involves action is also called haptic touch, and this will remain with us for the rest of our lives as a reliable source of information about the environment, and—as Condillac made us aware of it—the most reliable source of the certainty that we exist, in a body, and as a one, as an ‘I’.

The bodily self

When I experience a sensation or feel an emotion, these experiences are inherently understood as my own. This implicit, foundational level of self-awareness is known as the ‘minimal’ self, a concept long emphasised in phenomenological philosophy, from Husserl, Sartre, and Merleau-Ponty to contemporary thinkers like Gallagher, Metzinger, Zahavi, Hohwy, and Blanke.

The minimal self is the most basic form of self-awareness; it is the implicit experience of being a self, devoid of narrative or reflective thought. This basic self-awareness is what allows us to experience things from a first-person perspective. It manifests in a prereflective way, meaning that one does not have to consciously think about it for it to be active. It's the 'I' that is doing, sensing, and feeling before one even has time to reflect on what the 'I' is.

There is a broad consensus on the crucial role that our bodily experiences play in shaping this form of prereflective self-awareness. Essentially, the mind is better understood as a system that aids in the body's functioning, rather than the body serving the mind (Ciaunica and Fotopoulou, 2017).

The prereflective sense of self fits well into our discussion of touch, proprioception, and multi-sensory processing, and the embodied and enactive cognition paradigm. In this context, touch and proprioception play pivotal roles in shaping the minimal self. The foundational understanding of prereflective self-awareness should primarily consider the intricate interplay among the brain, body, and external environment. From the moment we are born, the tactile sensations we experience help form the foundation of our self-awareness.
Infants learn about themselves in part through the sensation of touch—whether it is the experience of being held, the instinct to suckle, or the curiosity that drives them to reach out and touch the world around them. These primal interactions are not just about gathering data from the external world; they are also critical moments in the ongoing construction of the self. The self is not just an abstract concept or a narrative we tell ourselves; it is also a sensory and embodied experience. In this way, our senses—especially touch and proprioception—help form the bedrock of the minimal self. These senses are not passive data inputs but active processes that continually shape and are shaped by our understanding of who we are. So when you consider the self from a multi-sensory, embodied perspective, the notion of a purely cognitive or disengaged self starts to appear incomplete. It is a compelling avenue for exploration, bridging philosophy, psychology, and neuroscience to provide a richer understanding of human experience.

The concept of the minimal self serves multiple purposes in philosophy, cognitive science, and psychology. It addresses several theoretical and empirical gaps and offers a framework for understanding aspects of self-awareness and consciousness that are more

foundational than the incomprehensibly complex, reflective self-concepts that often dominate discussions in these fields.

Not all experiences of the self are laden with complex narratives or social and cultural contexts. Some are more immediate and prereflective. The minimal self concept allows for the investigation of this immediate sense of self that is experienced prior to any cognitive reflection. Traditional accounts of self-awareness often focused on high-level cognitive processes, potentially neglecting the more basic, foundational aspects of self-experience. The minimal self serves as a counterbalance, focusing on the basic, embodied experience of being a self. The concept has been useful in linking philosophical discussions with empirical research in psychology and neuroscience. It allows for more nuanced discussions that acknowledge both the complexity and the simplicity of different aspects of self-experience.

Understanding the minimal self can have important implications for fields like psychiatry and neurology, where disruptions to basic self-experience can be symptomatic of various disorders[23]. Also, in empirical research, studying the minimal self can help bridge the gap between low-level sensory processes and high-level self-awareness, again, aiding in a more complete understanding of consciousness.

In recent times, there has been a surge in studies focusing on self-consciousness, along with a rejuvenated focus on its bodily underpinnings. In the realm of philosophy of mind, there is a general consensus that the crux of the issue lies in comprehending the bodily origins of pre-reflective self-awareness. This is defined as those aspects of self that operate independently of cognitive or linguistic capabilities yet form the basis for our subjective experience of being a 'self.' These foundational elements also serve as enabling conditions for a cognitively mediated, first-person perspective and advanced social cognition. This focus on the bodily foundations of self-awareness is particularly evident in experimental research that employs bodily illusions, such as the rubber hand illusion, to study these phenomena. These experiments serve as powerful tools for dissecting the intricate relationship between the body and our sense of self, shedding light on how our physical form contributes to our pre-reflective awareness and, by extension, our overall consciousness (Blake and Metzinger 2009). Transitioning from the realm of thought experiments, we now delve into the intriguing world of illusions.

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[23] See Anna Ciaunica's extensive work on depersonalisation disorder (DPD).

Experimental researches targeting touch and bodily awareness took off significantly after 1998, when Botvinick and Cohen had their paper published on the intriguing phenomenon called the rubber hand illusion (RHI). The illusion itself had been around for a while, but Botvinick and Cohen used an experimental paradigm in which the illusion could be assessed in the quantitative manner for the first time, which was a great leap forward in terms of the scientific exploration of bodily awareness and touch as well.

In their experiment they had the participant put both their arms on a tabletop in front, with palms down. Then one (usually the non-dominant) hand was blocked out of view using a screen. In place of the unseen hand a dummy (rubber) hand was placed on the tabletop. A piece of material was thrown over the shoulder of the participant, and led down to the wrist of the dummy hand, in order to provide a continuation between the shoulder and the dummy wrist joint. From a peripheral view it engendered the impression of a real arm. The participant was instructed to visually focus on the passive hand, while behind the screen on the real, and on the visible dummy hand simultaneously, synchronous strokes were performed by the experimenter using a brush.

The procedure elicits the RHI in which the participant believes the bogus hand to be part of their own body, they believe it to be their own hand, to a certain extent. Before undergoing any illusion, the participants is asked to close their eyes and hover over and point in the air above the real hand where they feel the index finger of the hand to be. The participant is asked to repeat this act once the illusion has been elicited. There is a measurable difference between where the participants feels the finger of the real hand without, or under the illusion. Under illusion typically drifting toward the passive hand. Hence this behavioural measure is known as the proprioceptive drift. The kind of processing which is behind the illusion is called the multimodal or multisensory integration.

Multisensory integration means the synergy between the senses. Information coming from the different modalities are divergent in several ways. They have different physical properties, use different organs, then pathways, but the perceived reality has to show a meaningfully whole image, and has to be oriented in space and time as well. The merging of information has to happen on brain-level, where the neurones ‘speak the same language’. It is thought to be happening in the cerebral cortex and the midbrain. In the particular case of the RHI the brain receives bottom-up information from the tactile sensation (the real hand

being stroked), while simultaneously there is a visual input of seeing the dummy hand in place of the real hand, and being stroked on the same spot and with the same frequency. The two account for the complex of visuo-tactile sensation. Top-down mechanisms are also at work as the mind tries to maintain the idea of the body being intact (since the hand is not missing in reality) and is ready to involve the dummy hand into the body-matrix in order to make it happen.

Although the expressions multimodal and multisensory are often used interchangeably, the difference between them can be articulated if the user argues that certain modalities—such as proprioception—do not create sensations. There are individual differences in how much one 'feels' the illusion, it may not work on some at all. But if it works it is an intense and memorable experience on the phenomenal level.

Illusions are not exclusive to the confines of experimental settings; they are actually quite prevalent in our day-to-day lives.

The rubber-glove illusion, for instance, occurs when doing dishes with some rubber gloves on; the tactile sensations may trick you into thinking your hands are wet inside the gloves, only to find them dry upon removal. The 'taptic engine[24]' illusion is experienced on certain mobile phones, where pressure-sensitive feedback mimics the feeling of pressing a physical home button, even though no such button exists. Both the rubber-glove and the taptic engine illusions serve as fascinating examples of how our senses work together to construct our perception of reality and our sense of self.

The rubber-glove illusion demonstrates how our tactile expectations can be subverted, leading us to question whether our hands are wet or dry based solely on the sensory information inside the gloves. Similarly, the taptic engine illusion in mobile phones shows how a combination of subtle vibrations and sounds can convincingly simulate the experience of pressing a physical button, even when no such button exists. There is even an everyday version of the proprioceptive drift when after carrying a heavy bag on one shoulder, one's sense of the position of that shoulder may temporarily shift, feeling lower than it is. These illusions not only underscore the complex interplay of our senses but also highlight how our sense of self—our minimal or prereflective self—is continually being shaped by these multisensory experiences. Far from being passive receptors, our senses actively engage with

24 A compound of "tap" and "haptic feedback".

the environment to construct a version of reality that is then subject to higher cognitive interpretation. These examples bring to the fore the intricacies of bodily awareness and the role it plays in shaping our conscious experience.

I would like to reintroduce the radical embodied cognitive science perspective at this point, which I left off at the discussion about the thought experiments. While RECS might have had its limitations in dealing with abstract thought experiments, it offers a compelling lens through which to interpret bodily illusions. According to RECS, cognition is deeply rooted in real-time interactions between the body and its environment, without necessarily relying on internal representations or computations. This framework might provide a more satisfactory explanation for phenomena like the rubber hand illusion or the 'taptic engine' illusion in mobile phones. In these cases, the illusions emerge not from internal mental models but from the dynamic interplay between sensory input and bodily awareness. RECS emphasises that this awareness is continuously updated through our interactions with the world around us, offering a radically different, yet plausible, account of how bodily illusions occur.

A matter of perspectives

When I was a child I often paid visits to my Viennese grandmother who had her residency close to the famous Naturhistorisches Museum at the Maria-Theresien Platz. Every once in a while she would allow me to go for little strolls around town on my own, carrying some pocket money on me in case I chance upon an ice cream van. Little did she know that the change in my pocket, which was meant to be spent on worldly indulgences had never made it to the ice cream van, never quite had the chance to wonder across the city for that matter either, instead it paid my way into the museum just across the street. The main attraction of the museum was—and it is safe to say that after so many years it still is—an 11.1-centimetre-tiny Venus figurine believed to have been made sometime during the Upper Palaeolithic, called the Venus of Willendorf. Although there are many Venus figurines from the same period of prehistoric Europe, the Venus of Willendorf has become the poster girl (if I may say so) of such sculptures. All these Venus figurines share some strikingly similar features. Most notably the body parts are disproportionately represented, with arms usually rested on the breasts, as they all appear somewhat obese with shortened legs and torso. So much for the

paleo diet, one may think. The faces are obscure either due to a complete lack of facial characteristics, or some sort of hair or headdress appear to have overgrown down the area where the face should be.

Beside the museum's extensive collection of meteorites, fossils, and gemstones what drove me in was of course this little sculpture of dubious origin or function. In the attempt of trying to find a sufficient explanation as to why the sculpture had been made in the first place, I felt more bamboozled rather than convinced by the wide-spread theories around its purpose.

It had been proposed that this pocket-size figurine may have served the function of a fertility fetish due to its overemphasised sexual characteristics. For some reason I could not quite picture in my head convincingly enough the image of prehistoric men sitting around diligently craving some fetish objects of such small scale.

In 1996 Professor Leroy McDermott in his work titled Self-Representation in Upper Palaeolithic Female Figurines hypothesised something remarkably different from the current theories. He proposed that these little sculptures may have been self-portraits of mostly pregnant women. The bodily clues that led him to think about the figurine's purpose from a remarkably different perspective were the shortened torso and legs, and the lack of face representation, very much like what one sees gazing down on one's own body. And the position of the arms, hands—although this is just my addition to the interpretation—suggests a self-discovering touch. Given the lack of mirrors in this prehistoric age one relation to one's body was either based on the presence of others, or on the experience of self-touch. There were of course bodies of water, such as lakes or ponds in which one may have been able to see their own reflection, but then again, unless someone were able to float above the water horizontally the reflected image would still be distorted.

McDermott's theory met mild criticism and never became mainstream, but certainly we can learn a thing or two by just meditating on the plausibility of such proposal. It is interesting if a sculpture is present we readily believe it to be made by someone of someones else, rather than being a self-portrait.

If one could peer through the veil of millennia that separates us from those ancient sculptors, one might see not just artisans but philosophers of the flesh, proto-psychologists of the sensory realm. It seems that humanity has always been in a dialogue with the body, attempting to decode its mysteries through touch, sight, and even artistic representation.

Radical embodied cognitive science, would perhaps see in these sculptures not mere artefacts but extensions of a cognitive system that involves the body as an equal partner. Imagine the sculptor, feeling the weight of the stone and the tug of the chisel, guided by the same hands that would later run over the sculpture to ensure its form. Each groove carved, a neurone fired; each contour refined, a synaptic bridge crossed. The hands, skin, muscles, and stone all part of an expansive, interlocking system of cognition that defies the boundaries of skin and skull.

Experimental psychology, often criticised for its mechanical reductionism, might find a poetic justice in these ancient self-portraits. They could serve as primordial testaments to the complex interplay between mind and body, evidence that our ancestors too navigated the tricky terrains of proprioception, bodily illusion, and self-representation.

Illusions are not modern constructs; they are as ancient as the Venus of Willendorf herself. They remind us that the line between perception and reality has always been less a boundary and more akin to a porous membrane, allowing a constant flow of influence. If McDermott's theory challenges us to see these sculptures as self-portraits born of tactile exploration, then they serve as poignant reminders of our unending quest for self-awareness. The Venus of Willendorf, faceless yet full of presence, embodies a minimal self, a term philosophers and neuroscientists coin but ancient sculptors lived. This minimal self is not merely an intellectual abstraction but a lived, tactile experience—a mosaic of sensations, reactions, and moment-to-moment awareness that form the canvas on which our more complex, reflective selves are painted.

In both ancient stone and modern experiment, the body persists as the primary stage where the drama of cognition unfolds, where the self takes its first trembling steps toward awareness. Before the mirror, before the camera, before the self-help book, there was touch. A hand reaching out to feel the world, and in doing so, discovering itself. So, as we trace the evolving dialogue between art, philosophy, and science, we find that it is not just our minds that are interwoven with the fabric of the world; it is our bodies too. Our sense of self is not a fortress to be defended but a river, its waters ever-shifting yet constant, drawing from the tributaries of bodily experience and mental reflection, ancient wisdom and modern inquiry. Thus, the Venus of Willendorf, small yet monumental, whispers to us across eons,

challenging our contemporary conceits and inviting us to rediscover, through the science of the body and the poetry of touch, the timeless landscape of the self.

Conclusion

In concluding this exploration at the intersection of cognitive psychology and philosophy, it becomes clear that the discipline's evolution is not merely a matter of scientific inquiry but also deeply rooted in philosophical foundations. The resurgence of interest in the seminal philosophies of William James and the ecological insights of J.J. Gibson underscores the indispensable role of philosophical perspectives in shaping our understanding of cognition.

This thesis, positioned within the philosophy of science, seeks not only to question the adequacy of representational theories of cognition but also to illuminate the philosophical underpinnings of the radical embodied cognitive science (RECS) approach. While RECS offers a compelling alternative, its attempts to sidestep the metaphysical intricacies characteristic of representational theories inadvertently highlight the necessity of philosophical rigour.

The limitations of RECS, as well as its potential for growth, remind us of the critical role of philosophical analysis in refining and advancing cognitive science. Indeed, the conversation between representational and non-representational theories is fundamentally a philosophical debate.

While I set out to question the sufficiency of representational theories of cognition, I have found that the radical embodied cognitive science (RECS) approach, though not without its limitations, offers a promising alternative perspective. However, RECS may have overreached in its attempt to avoid the metaphysical complexities that plague representational theories, limiting its scope and applicability. Given its relatively recent emergence, there is room for growth and refinement.

Importantly, the divergence between representational and non-representational theories need not be seen as a stark dichotomy; rather, these frameworks can potentially coexist, complementing each other in their respective strengths and weaknesses. As the field of cognitive psychology continues to evolve, it is crucial that we remain open to embodied approaches—be they representationalist or eliminativist.

By doing so, we can forge a unified path that honours both the complexity of human cognition and the intricate interplay between mind, body, and environment. It is in this symbiotic relationship between diverse theories that the future of cognitive psychology lies, promising deeper, more nuanced understandings of the enigma that is human nature. Furthermore, in embracing the philosophical implications of cognitive science, we open ourselves to a broader spectrum of inquiry, one that appreciates the intricate weave of empirical evidence and conceptual analysis.

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