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LOOPING MINDS: HOW COGNITIVE SCIENCE EXERTS INFLUENCE ON ITS FINDINGS

Toma Strle*

University of Ljubljana, Faculty of Education
Ljubljana, Slovenia

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ABSTRACT

Drawing on the distinction between natural and human kinds, I will discuss the looping effects of human kinds through the lens of contemporary cognitive (neuro)science. I will try to show that cognitive science is mainly in the business of investigating, understanding and explaining human kinds. As new conceptualisations of the human mind, agency and our nature are being created (by, for instance, neuroscience), they open up the possibility for new, different understandings of what it means to be a human being. This, I will argue, can change how people think and behave and thus change the very phenomena cognitive science investigates. Consequently, cognitive science can affect its very (future) findings. This holds especially true when society embraces new conceptualisations of the human mind and new ways of self-understanding become part and parcel of social discourse, activities, and/or structures.

The quest for understanding the human mind, I will claim, is a looping journey, where what we "discover" about the human mind is inherently dependent on how we, as human beings, understand ourselves; and how we understand ourselves is, to a certain degree, dependent on how science understands us and on how we interpret what it has to say about our nature. At the end of the article, this will lead me to consider cognitive science as an intrinsically ethical endeavour.

KEY WORDS

agency, cognitive neuroscience, human kinds, objectivity, self-referentiality, sociality

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*Corresponding author, η: toma.strle@pef.uni-lj.si; +386 1 5892 200;
University of Ljubljana, Faculty of Education, Kardeljeva ploščad 16, 1000 Ljubljana, Slovenia

INTRODUCTION

In the article, I will discuss the looping effects of human kinds through the lens of contemporary cognitive (neuro)science. Drawing on Hacking's distinction between natural and human kinds [1, 2], I will try to show that psychology and cognitive (neuro)science are mainly in the business of investigating, understanding and explaining human, and not natural kinds. That is kinds that are dependent on what beliefs we hold about them, what descriptions we apply to them and what kind of actions we perform according to our understanding of them – kinds that are affected by and change according to our self-understandings.

As new conceptualisations of the human mind, agency and our nature are being created by science, this opens up the possibility for new, different understandings of what it means to be a human being and thus change how we think and act. This holds especially true when society embraces new conceptualisations of the human mind on a larger scale and new ways of self-understanding become part and parcel of social discourse, activities, and/or structures. And if we agree with the claim that cognitive science's outlook on the human mind – be it neuro-reductionist or enactivist – can affect how people think, decide, exert self-control, behave in moral situations, etc. and (by definition) agree that thinking, decision-making, self-control, moral behaviour, etc. are, among others, cognitive (neuro)science's intended "objects" of investigation, we should accept the claim that cognitive (neuro)science has an impact on the very phenomena it investigates and thus influences its very (future) findings. Understanding the human mind is a *looping journey*; what we "discover" about the human mind is inherently dependent on how we, as human beings, understand ourselves; and how we understand ourselves is, to a certain degree, dependent on how science understands us and how we interpret what it implies about our nature.

Such looping effects are quite foreign to sciences that strive to be as objective as possible, independent of observers' – researcher's or subject's – perspectives and attitudes towards the phenomenon under investigation, and value-free in their account of the human mind and *nature*. Objectivity, as succinctly defined by Reiss and Sprenger, "expresses the idea that the claims, methods and results of science are not, or should not be influenced by particular perspectives, value commitments, community bias or personal interests, to name a few relevant factors." [3] Objectivity, at least in this regard, is unattainable for cognitive (neuro)science; for, the quest for understanding the human mind is inherently a looping journey. The looping nature of understanding the human mind is, however, not something we could explain away as some sort of (neural?) noise, or remedy by, for instance, better methodology or statistical analysis and utter "Good riddance!".

At the end of the article, the presented view on the human mind will also steer me to consider cognitive science more as an ethical endeavour and not as an endeavour that should reveal what the human mind *really is*.

NATURAL AND HUMAN KINDS, AND THE LOOPING EFFECTS OF HUMAN KINDS

In one of his articles, Hacking [2] (see also [1, 4]) discusses the looping effects of human kinds – how entities ("objects" and categories) studied by psychology exert an influence on themselves. But before I delve into the matter, let me first explain the distinction between human and natural kinds.

According to Bird and Tobin [5], natural kind "corresponds to a grouping that reflects the structure of the natural world rather than the interests and actions of human beings." Crucially, natural kinds can hence be characterised by "intelligibility outside discursive

contexts; indifference to the descriptions applied to them; and independence of categories and kinds." [6; p.773] According to Hacking [2] and Brinkmann [6, 7], examples of natural kinds are quarks, sunsets, the common cold, mud, trees, tigers, water, and gold, to name a few. Take water for instance. Water has several properties: it is tasteless, colourless and boils under specific conditions. But physics and chemistry, in their understanding of what water *is*, do not stop at these properties. They aim at *discovering* the *essential properties* of the phenomenon, which, in turn, also enables them to explain the more superficial properties. In the case of water, its essential property is its molecular structure, not its transparency or colourlessness. And, even though we incorrectly *perceived* these superficial properties – if it, for instance, turned out that our sense of taste is not that accurate and we wrongly perceived water as tasteless –this would not change the *fact* that we call this liquid water (at least in physics and chemistry). The reason being that water's basic molecular structure remains the same, irrespective of how we perceive it (see also [8]). The aim of natural sciences is thus in this (a little simplified) regard, "to find natural kinds, because, if they succeed in doing so, they can get an overview of the common essential properties of a class of things that allow them to explain other, more superficial, properties of this class of things." [7; p.1221].

The question that Hacking [1, 2, 4], Brinkmann [6, 7] and others, e.g., [9], pose, is whether psychology is about natural or some other sort of kinds. Do psychology and cognitive science study the same sort of entities (categories, phenomena) as physics, or chemistry? Are their intended objects of investigation – as many would like to believe – independent of particular attitudes, individual perspectives, values, and description applied to them, as is the case in natural sciences? (But confer Kordeš [10] for the discussion on similarities between the study of consciousness and quantum physics.) Some scholars (e.g., Brinkmann and Danziger) would answer with a definite no. Psychology – I will extend some of their claims to cognitive science – does not, in general, study natural but human kinds.

Human kinds can be characterised by "intelligibility only within a discursive context; interaction with the descriptions applied to them; and emergence together of categories and kinds." [6; p.773]. Human kinds, according to Hacking, are "(i) kinds that are relevant to some of us, (ii), kinds that primarily sort people, their actions, and behaviour, and (iii) kinds that are studied in the human and social sciences, i.e. kinds about which we hope to have knowledge. I add (iv) that kinds of people are paramount; I want to include kinds of human behaviour, action, tendency, etc. only when they are projected to form the idea of a kind of person." [2; p.354] For Hacking [2], examples of human kinds are homosexuality, multiple-personality-disorder, suicide, teen-age-pregnancy, adolescence, etc. For Hacking, one of the fundamental characteristics of human kinds is their role in classifying and sorting people into certain categories, or kinds of people (see his four-point definition above). However, I will extend the notion of human kinds to aspects of cognition that are "in the minds of people"; to aspects of the human mind that are paramount to people in their self-understanding (e.g., decision-making, self-control, volition, moral agency, mental disorders, mindfulness meditation, etc.), irrespective of whether people are classified as certain kinds because of being understood in this or that way. (See also Thompson's intriguing article *Looping Effects and the Cognitive Science of Mindfulness Meditation* [11].)

By contrasting natural and human kinds, neither Hacking nor I want to state that human kinds are not natural or part of nature. Human kinds are as real as natural kinds. It is just that they constitute a different "reality" – what they are, how they behave, and what we "discover" about them is partly defined by what beliefs we hold about them, how we characterise them, what we do according to how we understand them, etc. As Brinkmann (paraphrasing A. MacIntyre) crisply puts it: "It makes no difference to water what we call it, but it does make a difference to human kinds. After all, as A. MacIntyre once remarked, molecules do not read chemistry textbooks, whereas humans do read psychology books that affect their self-understandings" [6; p.775].

A very similar attitude towards psychology is held by Danziger in his discussion of what he terms *unreflected naturalism*. He states [9; p.2]:

> "They [psychologists] tend to proceed as though everyday psychological categories, like intelligence, emotion or learning, represented natural kinds, as though the distinctions expressed in such categories accurately reflected the *natural* divisions among psychological phenomena. Psychological discussions typically assume that there really is a distinct kind of entity out there that corresponds exactly to what we refer to as an attitude say, and it is naturally different in kind from other sorts of entities out there for which we have different category names, like motives or emotions. The belief that scientific psychology adds to our knowledge of attitudes, drives, intelligence, etc., involves the implicit assumption that there is a fixed human nature whose natural divisions are reflected in this received network of categories. […] What is certain, however, is that psychological theory requires some pre-understanding of that which it is a theory of. That pre-understanding has generally involved the unspoken conviction that psychological categories constitute historically invariant phenomena of nature, rather than historically determined social constructions."

(Here, a discussion of the notion of naturalism would be in order, but it exceeds the scope of this article; confer [12, 13].) Psychology, for Danziger, is far from being about a fixed human nature that can be studied in an objective way, independent of how we understand it – for him, psychology is not about natural kinds but about kinds that are self-referential and intrinsically bound to social practice. One of the most important features of human kinds is, in this regard, that they exert an influence on themselves. Brinkmann (mostly quoting Hacking's work) nicely expresses the point [6; pp.773-774]:

> "An important feature of human kinds is that they can exert effects on themselves (Martin & Sugarman, 2001). They are affected by their classifications and interact with their classifications, sometimes affecting the classifications themselves. […] This is the looping effect of human kinds: 'People classified in a certain way tend to conform to or grow into the ways they are described; but they also evolve in their own ways, so that the classifications and descriptions have to be constantly revised' (Hacking, 1995a, p. 21). And further: 'Inventing or molding a new kind, a new classification, of people or of behavior may create new ways to be a person, new choices to make, for good or evil. There are new descriptions, and hence new actions under a description. (p. 239)' ".

As said, I will not so much focus on the classificatory or sorting function of human kinds that Hacking emphasises. I shall now rather discuss how science's outlook on the human mind and the way it is perceived by individuals and the public could change how people think and act, and thus change science's very (future) findings. For if a science of the mind investigates human mentality and, at the same time, is in the process of changing people's mentality, it is bound to change what it is "discovering" about it. The quest of understanding the human mind is a looping journey. Choudhury, Nagel and Slaby express the idea in somewhat different manner: "[R]epresentations of the objectified phenomenon influence the phenomenon itself and its subsequent study, and thus, the journey is a loop" [14; p.65].

Let me now turn to cognitive neuroscience's outlook on the human mind, its wide integration into society and to presenting some empirical evidence that indirectly shows how an outlook on the human mind affects people's beliefs, behaviour and mentality. Last, I will discuss how this shows that cognitive (neuro)science is exerting an influence on its very (future) findings.

UBIQUITOUS NEUROSCIENCE: FROM NEURO-TAGGED DISCIPLINES TO SOCIAL STRUCTURE

Neuroscience is becoming better and better in measuring the physical underpinnings of mentality. Its theories are more and more successful in explaining various aspects of the human mind and behaviour in terms of physical processes and mechanisms. It seems the time is ripe that we start understanding the human mind more in terms of its physicality and less in terms of its being separate from it. As Farah puts it [15; p.586]:

> "Neuroscience does not merely give us new tools to be used to the benefit or detriment of humanity; it gives us a new way of thinking about humanity. […] Neuroscience provides an alternative perspective, from which human behavior can also be understood as the result of physical causes. Even for people who do not follow the latest trends in science or spend time thinking about the nature of humanity, the applications of neuroscience […] will provide many reminders that our minds are, at root, physical mechanisms. By making people part of the clockwork universe, neuroscience challenges many assumptions about morality and personhood. […] as the neuroscience of personality, decision making, and impulse control begins to offer a more detailed and specific account of the physical processes leading to irresponsible or criminal behavior, the deterministic viewpoint will probably gain a stronger hold on our intuitions. Whereas the laws of physics are a little too abstract to displace the concept of personal responsibility in our minds, our moral judgments might well be moved by a demonstration of subtle damage to prefrontal inhibitory mechanisms wrought by, for example, past drug abuse or childhood neglect."

It further seems that neuroscience and its mechanistic and sometimes deterministic understanding of the human mind and behaviour are being more and more accepted by the public and discussed in the media [16-18]. In the media, for instance, the brain has been held responsible for many things, adolescents' decisions and purported irresponsible behaviour, among others. To provide one illustration: "Recent studies of brain development in teenagers may finally give parents the scientific authority to say "No you're not!" in answer to the common adolescent complaint, "But I'm old enough to make my own decisions!" That authority comes from brain imaging studies that reveal some surprising features of the adolescent brain" [19].

Neuroscientific methods, findings, and theories are also being more and more integrated into social sciences – traditionally perceived as "softer" sciences in comparison to the more "hard" natural sciences – such as psychology, educational science, economics, business sciences, organizational science, etc., and even into some branches of the humanities (e.g., law, ethics, art). This is well visible from the surge of new neuro-tagged disciplines in the last two decades, such as neuroeducation [20], neuroeconomics [21], neuromarketing [22], consumer neuroscience [23], neuroesthetics [24] and neurolaw [25].

Further, neuroscientific findings, methods, concepts, and theories, are also becoming part and parcel of various social domains, such as the law, education, and policy-making. In the domain of the law, there are, for instance, more and more cases where a "My brain made me do it" defence is being used to diminish the culpability of criminals [26-28], and in the U.S.A. – where the rise in the use of neuroscience in matters of law is most prominent – the supreme court has already partly based its decision to categorically exclude adolescents from sentence of life without the possibility of parole in non-homicide cases upon neuroscientific findings on brain development (in *Graham v. Florida*; see [29]).

In the domain of education, many aspects of learning and teaching have been discussed in light of neuroscientific findings of the human brain and cognition, and various interventions proposed and discussed. For instance in the domains of mathematics, reading, brain training, spaced learning, learning disorders, etc. (see [30] for a review and scope of application across various domains).

Further, it is not only neuroscience that claims that the human mind and behaviour is caused by some sort of unconscious mechanism or mainly guided by unconscious processing. Psychology and behavioural economics of human judgment and decision-making, in large part, make similar claims. They are, even though still predominantly behaviourist, also more and more infused with neuroscience; see [31]. Behavioural sciences of decision-making argue, for instance, that human rationality and self-control are rather limited and that our judgments and choices are many times biased, predominantly lead by unconscious processes, e.g., [32, 33]. Some authors [34, 35] thus propose decision nudges as a solution to flawed human decision-making. Namely, they claim that we should implement changes to background environments (to simplify decision-making, to eliminate the need for choice by default rules, etc.) against which people make choices, to nudge or steer people's choice and behaviour in health, wealth, and happiness-promoting direction. Moreover, more and more governments, policy-making agencies and economic institutions worldwide are trying to base their decisions about policy-making and/or change in social structures upon behavioural insight that is the "result from multidisciplinary research in fields such as economics, psychology and neuroscience, to understand how humans behave and make decisions in everyday life." [36; p.10] For some examples see the following lengthy publications: European Commission's in-house science service (the Joint Research Centre) report *Behavioural Insights Applied to Policy* [36]; the World Bank's report *Mind, Society, and Behavior* [37]; and the OECD's report *Behavioural Insights and Public Policy: Lessons from Around the World* [38].

Together with its growing popularity that is visible through the emergence of new neuro-tagged disciplines, discussions of neuroscientific findings in the media, and neuroscience's growing acceptance in various public domains (such as the law, economics, policy-making, and education), neuroscience seems to not have only reached most scientific communities, but also a large part of the public. This also means that neuroscience is on the way to challenge – if this has not already happened – our self-understanding [18; p.220]:

> "Contemporary neuroscience carries particular social weight. In today's secular societies, the brain is an acutely significant organ, represented as the seat of mind and self (Rose, 2007). Consequently, the production of brain-related knowledge is culturally important, carrying implications for how people see themselves as individuals and human beings. Brain-based information possesses rhetorical power: logically irrelevant neuroscience information imbues an argument with authoritative, scientific credibility (McCabe and Castel, 2008; Weisberg et al., 2008). Thus, the assimilation of neuroscience into public consciousness may have repercussions for beliefs, attitudes, and behavior, and as neuroscience grows in prominence, it is necessary to cultivate awareness of how it is mobilized in society."

HOW SCIENCE'S OUTLOOK ON THE HUMAN MIND AND ITS RECEPTION AFFECT ITS VERY FINDINGS

Let me now present some studies that indirectly show how changing people's beliefs about human agency towards a more deterministic and/or mechanistic conception – which seems similar to how neuroscience is being interpreted, at least in some contexts – changes how people think and behave. I will also consider the question of how cultural beliefs influence the human mind and how this bears upon science's findings of cognitive phenomena.

In their seminal study, Vohs and Schooler [39] demonstrate that changing people's beliefs about free will changes their moral behaviour. They show that weakening people's belief in free will – by presenting them with deterministic and/or reductionistic descriptions of human mentality and action (e.g, a passage from F. Crick's 1994 book [40]) – makes people, compared to the control group, passively (study 1) and actively (study 2) cheat more. Furthermore, studies show that weakening belief in free will increases aggression and decreases willingness to help [41], induces impulsive and antisocial tendencies [42], and even leads to change in basic brain function, such as to the reduction of the readiness potential (linked to voluntary motor action) [43]. According to Rigoni and colleagues, such studies show the following [43; p.617]:

> "[U]ndermining the idea that we are "the masters of our own houses" … presumably reduces the intentional effort we put into action. … Putting less effort into an action might weaken our sense of agency for these actions and lead to a reduced feeling of responsibility. This reduced feeling of responsibility would very likely result in more careless and irresponsible behavior. … From this perspective, we could hypothesize that dismissing the idea that people can control their own actions acts as a nonauthorship indicator, thereby decreasing people's sense of authorship. In sum, … this suggests that abstract belief systems might have a much more fundamental effect than most people would expect."

Similarly, the functioning of self-control – one of the important aspects of human agency psychology and neuroscience avidly investigate – can reveal itself in different ways according to distinct cultural beliefs. Research by Savani and Job [44] shows, for instance, that the ego-depletion effect – exerting willpower leads to worse performance on further mentally demanding task – is quite dependent on people's beliefs about the exertion of will and self-control. They show that Indians' acts of self-control *improved* their subsequent performance on demanding mental tasks, contrary to the American subjects, whose subsequent performance worsened in accordance with the traditional ego-depletion effect. Namely, Indians, contrary to the Americans, exhibited the reverse ego-depletion effect. According to the authors of the study, this is due to their belief that exerting willpower is "energising" – a belief not held by the American subjects (as measured on a questionnaire). The part of the American subjects that held similar beliefs to Indians also exhibited the reverse ego-depletion effect.

The often-naturalised phenomenon of ego-depletion is thus not a universal phenomenon, rooted in human neurobiology alone. Rather, it is to a certain degree dependent on how people understand themselves – be it the consequence of cultural or scientific beliefs about the nature of the human mind. (Scientific beliefs, it must be emphasised, are often also part and parcel of a culture and its values.) The authors of the study [44] state something quite in line with the ideas put forth in this article: "Peoples' cultural background and beliefs contribute considerably to what has been primarily viewed as a biological phenomenon" [44; p.15]. Culture and/or science have the potential to exert an influence on people's beliefs about their minds and that, in turn, changes how their minds function. Hence, the purportedly objective scientific findings of seemingly biological phenomena *loopingly* change according to how people understand themselves; at least in part.

I do not wish to claim that neuroscience *per se* entails that human agency is an illusion or that neuroscience, as such, diminishes human agency (e.g., self-control). Science alone – without someone to interpret, understand, or discuss it – does not have any point of view on the human mind. However, the relation between what neuroscience (or, better put, neuroscientists) states about the human mind and how this is received and interpreted by individuals and the public, is quite important for people's self-understandings. (See also

Dumit's works [45, 46] where he points out that people who see neurobiological evidence for their mental illness, for instance, interpret this evidence in many different ways and act accordingly.) And even though it was not true that neuroscientific findings and theories, as I was in part implying, are being interpreted in the direction of deterministic and mechanistic conception of the human mind, neuroscience seems to have become rather ubiquitous in many aspects of our lives and is, for this reason, probably on the way to redefine how we understand ourselves. In consequence, cognitive (neuro)scientific future findings are bound to be affected by new self-understandings that are continually being brought forth by sciences of the mind, creating a *looping journey* of understanding the human mind.

IN CONCLUSION: LOOPING MINDS AND AN ETHICAL OUTLOOK ON COGNITIVE SCIENCE

When people embrace new (scientific) conceptualisations of the human mind, new, different ways of being a human being become possible. As Hacking puts it: "When new descriptions become available, when they come into circulation, or even when they become the sorts of things that it is all right to say, to think, then there are new things to choose to do. When new intentions become open to me, because new descriptions, new concepts, become available to me, I live in a world of new opportunities" [1; p.236]. And, as new ways of self-understanding become part and parcel of social discourse, activities, and structure, people's behaviour and activities, thoughts and beliefs, feelings and desires, and their self-understandings change as well. Researching, explaining and understanding particular aspects of the human mind are hence not activities of discovery, but, at least to some degree, activities of co-creation and co-construction. That is, what we discover about the human mind is rather dependent on how people *understand themselves* and how people self-understand is partly dependent on science's outlook on the nature of the human mind. Understanding the human mind is thus inherently self-referring. (In cognitive science, the self-referential and looping nature of understanding the human mind is taken seriously, for instance, by the enactive account of cognition put forth by Varela, Thompson, and Rosch [47]; see also [48] for discussions on circularities of the mind.)

This, however, implies that cognitive science (or any science of the human mind) is not in the business of uncovering objective *truths* – devoid of particular perspective and value-free – but in the business of "making up people" [4]. Understanding the human mind and the way we *decide* to understand the human mind (ourselves and others) is thus an endeavour full of personal and cultural values, of what we aspire to become and is, all in all, quite an existential journey. This might remind us that cognitive science – the quest of which is to unravel the mystery of the human mind – is, in its core, essentially an ethical endeavour and not an endeavour that should reveal what the human mind *really is*. To conclude this thought with the beautiful concluding paragraphs of Varela's essay *The Creative Circle: Sketches on the natural History of Circularity* [49; p.320]:

> "[W]hen we follow the guiding thread of circularity and its natural history, we may look at that quandary from a different perspective: that of participation and interpretation, where the subject and the object are inseparably meshed. … It reveals to us a world where 'no-ground,' 'no-foundation' can become the basis for understanding that the age-old ideal of objectivity … is, by its own scientific standards, a chimera. We should do better to fully accept the notoriously different and more difficult situation of existing in a world where no one in particular can have a claim to better understanding in a universal sense. This is indeed interesting: that the empirical world of the living and the logic of self-reference, that the whole of the natural history of circularity should tell us that ethics […] is the very foundation of knowledge, and also its final point."

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