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Moral Perspective from a Holistic Point of View for Weighted Decision-Making and its Implications for the Processes of Artificial Intelligence

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ABSTRACT

In the case of AI, automated systems are making increasingly complex decisions with significant ethical implications, raising questions about who is responsible for decisions made by AI and how to ensure that these decisions align with society's ethical and moral values, both in India and the West. Jonathan Haidt has conducted research on moral and ethical decision-making. Today, solving problems like decision-making in autonomous vehicles can draw on the literature of the trolley dilemma in that it illustrates the complexity of ethical decisions faced in emergency situations, as well as the moral implications of the decisions made. However, a series of moral principles must be understood and cited to avoid insufficient mechanistic explanations. Here we present a compilation of ethical positions both in India and the West.

Keywords: ethics, Indian philosophy, artificial intelligence, decision-making.

1. Eastern and Western Values

Indian moral philosophy is based on the sacred texts of India, such as the Vedas, the Upanishads and the Puranas, as well as the teachings of sages and spiritual masters. One of the main characteristics of moral philosophy in India is its emphasis on the importance of right action (*dharma*) and achieving spiritual liberation (*moksha*) through right action. Right action refers to correct behavior in relation to oneself, others, and the world in general. Right action also refers to correct behavior in relation to duty, social duty, and religious duty (Mondal, 2021; Kaur, 2022).

Indian moral philosophy also focuses on the importance of virtue and self-discipline, and the need to cultivate qualities such as truth, non-violence, honesty, compassion, and non-greed. These qualities are considered essential for achieving spiritual liberation and living a virtuous and fulfilling life

On the other hand, in the ancient West, the School of Paris in the Middle Ages was an important center of philosophical and theological studies. During that time, various ethical problems were discussed, including the nature of good and evil, the relationship between faith and reason, and the nature of human morality. The students and teachers of the School of Paris also debated on political and social issues, including justice, authority and individual freedom.

The problem of applied ethics has been present throughout history, from the classical positions formulated by Saint Thomas Aquinas on the foundation of law as a product of reason and its relationship with the laws of men (Morandin-Ahuerma, 2015), as well as voluntarist positions of the time, for example in Saint Bonaventure (Morandin-Ahuerma, 2017), to modern day issues such as artificial intelligence and decision-making. The problem of free will and decision-making was one of the important topics discussed in the School of Paris in the Middle Ages. Students and professors debated the nature of free will and its relationship to predestination and determinism. Some defended that free will is a capacity of people to make decisions freely and be responsible for their actions, while others argued that everything is predestined and there is no freedom of choice. These debates continued for centuries and have influenced both Eastern and Western philosophy (Mondal, 2021; Kaur, 2022).

From the classic positions that Saint Thomas Aquinas formulated on the foundation of the law as a product of reason and its relationship with the laws of men (Morandín-Ahuerma, 2015; Morandín-Ahuerma, 2016a), as well as the voluntarist positions of At the time, for example in San Buenaventura (Morandín-Ahuerma, 2017a), the problem of applied ethics has been present throughout history up to the present day, when classic problems are addressed even in areas such as artificial intelligence (Morandín-Ahuerma, 2022e) and decision-making.

2. AI Automated Decisions

Arguably, there is some similarity between the debate about free will and decision-making in the Middle Ages and the current debate about automated decision-making through AI. In both cases, the question of responsibility and freedom of choice in decision-making is raised. In the case of AI, automated

systems are making increasingly complex decisions with significant ethical implications, raising questions about who is responsible for the decisions made by AI and how to ensure that these decisions align with ethical values, and morals of the society.

In this sense, there are similarities with the medieval debate, since the same concern is raised about how to guarantee that decisions are made ethically and morally, only that, in this case, instead of men, machines are making. the decisions.

However, trying to understand the way in which both natural and artificial entities make decisions that have moral remnants is complicated because a strict definition of moral judgment with a universal approach is still lacking (Morandín-Ahuerma et al., 2023).

The experiments carried out at the beginning of the 21st century by Jonathan Haidt (Morandín-Ahuerma, 2019b) consider that there is, on the one hand, logical reasoning, to make weighted moral decisions and, on the other hand, there is a non-rational, emotional way (Morandín-Ahuerma, 2016b), which automatically responds to external stimuli (Morandín-Ahuerma, 2019c, 2021b). It has not yet been possible to determine what exactly are the neural correlates involved in moral judgment (Morandín-Ahuerma, 2021b) but what is certain is that, through experiments with moral dilemmas, it is possible to determine experimentally, some significant aspects that build the judgment (Morandín-Ahuerma, 2019a, 2019d).

Haidt (2002) has conducted research on moral and ethical decision making. One of his best-known theories is the theory of moral intuition, which holds that people make moral decisions based on intuitions and emotions, rather than rational reasoning. According to this theory, people tend to respond automatically and emotionally to moral situations, and then use reason to justify their decisions afterwards.

Haidt (2010) has also proposed that there are six universal foundations of morality: defense of security, freedom, loyalty, authority, tradition, and holiness. These six fundamentals are considered universal, since they are shared by different cultures and societies.

In this sense, Haidt (2012) has proposed that some moral decisions are made intuitively, and not necessarily rational, so these decisions can be difficult to explain or justify. However, he has also suggested that these intuitive decisions can be guided by universal principles, such as the six foundations of morality mentioned above.

The so-called tram dilemma, for example, erroneously attributed to Philippa Ruth Foot (Morandín-Ahuerma, 2020b), shows that the same criteria are not always used in the construction of a moral judgment (Morandín-Ahuerma, 2021c; Morandín-Ahuerma & Salazar -Morales, 2020b) and, incredible as it may seem, even in some artificial intelligence applications such as self-driving cars, there must be a moral judgment in non-stochastic algorithmic creation (Morandín-Ahuerma, 2019e).

The tram dilemma is a classic example used in research on moral decision making, and has been used to illustrate how people make moral decisions in emergency situations. This dilemma poses a scenario in which the driver of a tram is about to collide with a group of people who are on the road, and must choose between continuing on the planned path and causing the death of those people, or diverting the tram, and cause the death of a single passenger.

The idea behind the trolley dilemma is that people may have different criteria for making moral decisions in emergency situations. However, this dilemma has some limitations as it is a hypothetical scenario and does not necessarily reflect the complexity of moral decisions in real life. Therefore, it cannot be considered sufficient to understand how we make moral decisions. It is a tool to understand how different approaches can be given in the same situation.

Adaptive automated decision-making systems require both brain plasticity for learning (Morandín-Ahuerma, 2022d) and awareness that neuroeducation (Morandín-Ahuerma, 2022c) can be an interdisciplinary field of work (Morandín-Ahuerma, 2022b, 2022c) capable of explaining, in many ways, how decisions are made both by learning and by synderesis (Morandín-Ahuerma, 2014) which refers to, let's say, intuitive decisions.

Regarding decision-making in self-driving cars, the tram dilemma literature may be useful insofar as it illustrates the complexity of ethical decisions faced in emergency situations, as well as the moral implications of decisions. taken. However, it is important to note that the actual scenarios in which self-driving cars must make decisions are much more complex and varied than the simplified tram dilemma scenario. Therefore, a more comprehensive and holistic approach is required to address ethical issues in decision-making in self-driving cars.

In any case, neuromyths persist (Morandín-Ahuerma, 2022a) that cloud the understanding of those who try to explain in a single theory the process of moral decision-making, moral judgment and how it is extrapolated to other areas such as artificial intelligence. Above all because, some authors such as Searle consider that, after making a decision, there is a distance between said decision and an action, not every decision entails an action but, in some areas, as we have already said, decision making. With automated decisions, it is not possible to overcome this decision gap because each decision corresponds to an action. Nor can the problem of awareness of decision making be overcome.

The gap problem is a problem raised by the philosopher John Searle in relation to artificial intelligence and language comprehension. The problem concerns the difference between a machine's ability to perform tasks that appear to be intelligent or comprehensive, and its actual ability to understand the meaning of what it is doing (Ahuerma, 2016)..

Searle argues that even though a machine can perform tasks that appear to be intelligent, such as understanding language, answering questions, and making decisions, this does not necessarily mean that it actually understands the meaning of what it is doing. According to Searle, a machine can only simulate intelligence, but cannot have a true understanding of the world or of language, because it lacks the capacity for mental states and experiences.

This problem is known as the gap between behavior and understanding. Although Searle's idea has been criticized, his argument has been important to the development of artificial intelligence and the philosophy of mind, as it has helped develop a deeper understanding of what intelligence and understanding really mean.

The mechanistic explanations (Morandín-Ahuerma, 2017e) somehow leave out the metaphysical explanations of moral decision-making, but they have not been enough to explain the way in which what we could call a decision tree is followed. Perhaps the distinction between practical rationality and theoretical rationality (Morandín-Ahuerma, 2017c) is the most viable way to determine the course of action. The human being is a machine with an almost perfect functioning that can, through rationality and synderesis, reach weighted decisions (Morandín-Ahuerma, 2018).

Decision making (Morandín-Ahuerma, 2020a, 2021a, 2021c; Morandín-Ahuerma & Salazar-Morales, 2020a) can be a complex process that involves both logical and rational reasoning as well as intuition and perception. Both approaches have their advantages and disadvantages, and in many cases, they can complement each other to make more informed and effective decisions.

Logical and rational reasoning involves carefully analyzing available data and information, using logic and deduction to evaluate different options and reach a conclusion. This approach is useful for making decisions based on facts and objective data and is especially useful in situations where the information is complete and accurate.

Intuition, on the other hand, is based on perception and experience, and can help you spot patterns or connect with non-verbal or subjective information. It is a faster and less conscious process. It is useful in situations where information is incomplete or uncertain and can help quickly identify the most promising options.

There are multiple natural mechanisms and in nature that have not been adequately explained, but philosophy is capable of theoretically approaching certain concepts (Morandín-Ahuerma, 2017d) that, from a materialist point of view (Morandín-Ahuerma, 2017b) seem to have no been sufficiently understood

For example, as we have already said, synderesis is a term used in ethics and moral philosophy to refer to the innate ability of the human mind to distinguish between good and evil. Synderesis is considered a kind of "inner voice" or moral conscience that guides the human being to make ethical and moral decisions.

The dichotomy between critical philosophical and scientific thought and non-Western thought must somehow converge for the construction of holistic explanatory theories that are capable of encompassing all normative and psychological dimensions of the human being (Morandín-Ahuerma et al., 2022). Each country, each culture has, from their perspective, different modes of expression and explanation of the phenomena that surround them (Morandín-Ahuerma & Villanueva-Méndez, 2022; Morandín-Ahuerma et al., 2019).

3. Conclusion

Our conclusion is that the problem of applied ethics has been present throughout history, from the classical positions of Saint Thomas Aquinas to the present in areas such as artificial intelligence and decision making. The debate about free will and decision-making in the Middle Ages has similarities to the current debate about automated decision-making through AI, as concerns are raised to ensure that decisions are made ethically and moral. However, it is difficult to understand how both natural and artificial entities with moral remnants make decisions due to the lack of a strict definition of moral judgment with a universal approach.

References

Ahuerma, F. M. (2016). Fomes Pecatti y sindéresis en Santo Tomás de Aquino/Fomes pecatti and Synderesis in Saint Thomas Aquinas. Revista Española de Filosofía Medieval, 23, 203-215.

Babbili, A. S. (2007). Ethics and the discourse on ethics in post-colonial India. In The global intercultural communication reader (pp. 317-336). Routledge.

Bilimoria, P., Prabhu, J., & Sharma, R. M. (Eds.). (2007). Indian ethics: Classical traditions and contemporary challenges (Vol. 1). Ashgate Publishing, Ltd..

Biswas, H. K. (2021). Swami Vivekananda: As a Pathfinder of Modern India. International Journal of Research Publication and Reviews, (2)1, 102-105. https://www.ijrpr.com/uploads/V2ISSUE1/IJRPR128.pdf

Biswas, H. K. (2021). Swami Vivekananda: As a Pathfinder of Modern India. International Journal of Research Publication and Reviews, (2)1, 102-105. https://www.ijrpr.com/uploads/V2ISSUE1/IJRPR128.pdf

F. (1955). Goodwin. W. Ethics Indian philosophy. Philosophy 321-344. and value in east and west. 4(4),https://ijrpr.com/uploads/V3ISSUE6/IJRPR4841.pdf

Haidt, J. & Joseph, C. (2004). Intuitive Ethics: How Innately Prepared Intuitions Generate Culturally Variable Virtues. Daedalus, 133, 55-66.

Haidt, J. (2001). The Emotional Dog and Its Rational Tail: A Social Intuitionist Approach to Moral Judgment. Psychological Review, 108(4), 814-834.

Haidt, J. (2003). "The Moral Emotions". Handbook of affective sciences (eds. R. J. Davidson; K. R. Scherer; H. H. Goldsmith). Oxford University Press, 852-870.

Haidt, J. (2006). The happiness hypothesis: Finding modern truth in ancient wisdom. Basic books.

Haidt, J. (2012). The Righteous Mind, Where Does Morality Come From?. Pantheon Books, 3 – 26.

Haidt, J., & Joseph, C. (2008). The Moral Mind: How Five Sets of Innate Intuitions Guide the Development of Many Culture-Specific Virtues, and Perhaps Even Modules. In Carruthers, P., Laurence, S., Stich, S., (Eds.), The Innate Mind (volume 3). Foundations and the Future. Evolution and Cognition (pp. 367-391). Oxford University Press.

Haidt, J., & Kesebir, S. (2010). Morality. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), Handbook of social psychology (p. 797-832).

Haidt, J., Bjorklund, F., & Murphy, S. (2000). Moral dumbfounding: When intuition finds no reason. In Lund psychological reports, (1)2.

Haidt, J., Koller, S. H., & Dias, M. G. (1993). Affect, culture, and morality, or is it wrong to eat your dog?. Journal of personality and social psychology, 65(4), 613.https://ijrpr.com/uploads/V3ISSUE6/IJRPR4841.pdf

Kaur, P. (2022). Professional Development Through Self-Reflection. International Journal of Research Publication and Reviews, (3)5, 275-278. https://ijrpr.com/uploads/V3ISSUE5/IJRPR3849.pdf

Mondal, N. U(2021) In Present Educational System Role of Vivekananda's Man-Making Education. International Journal of Research Publication and Reviews Vol (2) Issue (1) (2021) Page 106-109 . https://www.ijrpr.com/uploads/V2ISSUE1/IJRPR129.pdf

Mondal, N. (2021) In Present Educational System Role of Vivekananda's Man-Making Education. International Journal of Research Publication and Reviews Vol (2) Issue (1) (2021) Page 106-109 . https://www.ijrpr.com/uploads/V2ISSUE1/IJRPR129.pdf

Morandín-Ahuerma, F. (2014). La sindéresis como principio ontológico de racionalidad práctica Universidad Veracruzana]. Xalapa, Veracruz, México.

Morandín-Ahuerma, F. (2015). Ley y sindéresis en santo Tomas de Aquino. Stoa, 6(11), 43-60. https://doi.org/10.25009/s.2015.11.1444

Morandín-Ahuerma, F. (2016a). Fomes Pecatti y sindéresis en Santo Tomás de Aquino [Fomes pecatti and synderesis in saint Thomas Aquinas]. Revista española de filosofía medieval, 23, 203-215. https://www.fabiomorandin.net/p/fomes-pecatti-y-sinderesis-en-santo.html

Morandín-Ahuerma, F. (2016b). Synderesis, reasoning and emotions for moral decisions The Brain, the Mind, and the Person. University of Oxford., University of Oxford. https://www.cyral.info/en/student/fabio-morandin/

Morandín-Ahuerma, F. (2017a). Conciencia y sindéresis desde el voluntarismo de Buenaventura y el intelectualismo de Tomás de Aquino. Saskab, 10, 1-18. https://www.fabiomorandin.net/p/conciencia-y-sinderesis-desde-el.html

Morandín-Ahuerma, F. (2017b). El concepto de naturaleza desde el fisicalismo de Deutsch. HALAC, 7(1), 5-13. https://doi.org/10.32991/2237-2717.2017v7i1.p5-13

Morandín-Ahuerma, F. (2017c). Racionalidad práctica: Phronesis y sindéresis para una teoría de la decisión moral [Practical rationality: phronesis and sinderesis for a theory of moral decision]. *Stoa*, 8(16), 63-75. https://doi.org/10.25009/s.2017.16.2528

Morandín-Ahuerma, F. (2017d). Una aproximación filosófica al concepto de naturaleza [A philosophical approach to the concept of nature]. Agroproductividad, 10(10), 116-120. https://www.fabiomorandin.net/p/una-aproximacion-filosofica-al-concepto.html

Morandín-Ahuerma, F. (2017e). Una reivindicación de mente y voluntad frente al conductismo lógico de Ryle [A Claim of Mind and Will versus Ryle's Logical Behaviorism]. *Revista de Educación y Desarrollo*, 42, 81-89. https://www.fabiomorandin.net/p/una-reivindicacion-de-mente-y-voluntad.html

Morandín-Ahuerma, F. (2018). La maravilla de ser humano desde el racionalismo tomista. Artes y Humanidades, 5(8), 34-45. https://www.fabiomorandin.net/p/la-maravilla-del-ser-humano-desde-el.html

Morandín-Ahuerma, F. (2019a). Deontología y derechos humanos: ¿Por qué no se debería desviar el tranvía? Revista Doxa Digital, 9(16), 81-86. https://doi.org/10.52191/rdojs.2019.99

Morandín-Ahuerma, F. (2019b). Intuicionismo social versus racionalismo. In Neuroética Fundamental y Teoría de las Decisiones (pp. 19-32). CONCYTEP. https://www.fabiomorandin.net/p/intuicionismo-social-versus-racionalismo.html

Morandín-Ahuerma, F. (2019c). La hipótesis del marcador somático y la neurobiología de las decisiones. Escritos de Psicología, 12(1), 20-29. https://doi.org/10.5231/psy.writ.2019.1909

Morandín-Ahuerma, F. (2019d). Leyendas de trolley: juicio moral y toma de decisiones. Universita Ciencia, 8(22), 79-91. https://www.fabiomorandin.net/p/leyendas-de-trolley-juicio-moral-y-toma.html

Morandín-Ahuerma, F. (2019e). ¿Quién mató a Elaine? Autos robot y toma de decisiones. Elementos, 115, 33-38. https://www.fabiomorandin.net/p/quien-mato-elaine-autos-robot-y-toma-de.html

Morandín-Ahuerma, F. (2020a). El valor de los dilemas morales para la teoría de las decisiones. *Praxis Filosófica*, 50, 187-206. https://doi.org/10.25100/pfilosofica.v0i50.8725

Morandín-Ahuerma, F. (2020b). Trolleyology: ¿De quién es el dilema del tranvía? *Vox Juris, 38*(1), 203-210. https://www.fabiomorandin.net/p/trolleyology-de-quien-es-el-dilema-del.html

Morandín-Ahuerma, F. (2021a). Causalidad bivalente en la toma de decisiones morales. In *Neuroética fundamental y teoría de las decisiones* (pp. 33-42). CONCYTEP. https://www.fabiomorandin.net/p/causalidad-bivalente-en-la-toma-de.html

Morandín-Ahuerma, F. (2021b). Correlatos neurales del juicio moral. In *Neuroética fundamental y teoría de las decisiones* (pp. 67-78). CONCYTEP. https://www.fabiomorandin.net/p/correlatos-neurales-del-juicio-moral.html

Morandín-Ahuerma, F. (2021c). Racionalismo, emotivismo y enfoque conjunto. In *Neuroética fundamental y teoría de las decisiones* (pp. 43-54). CONCYTEP. https://www.fabiomorandin.net/p/racionalismo-emotivismo-y-enfoque.html

Morandín-Ahuerma, F. (2022a). La prevalencia de los neuromitos en la educación. In *Neuroeducación como herramienta epistemológica* (pp. 1-22). CONCYTEP. https://www.fabiomorandin.net/p/la-prevalencia-de-los-mitos-en-la.html

Morandín-Ahuerma, F. (2022b). Neuroeducación como herramienta epistemológica. Concytep. https://www.fabiomorandin.net/p/neuroeducacion-como-herramienta.html

Morandín-Ahuerma, F. (2022c). Neuroeducación: un campo de trabajo interdisciplinario. In *Neuroeducación como herramienta epistemológica* (pp. 45-64). CONCYTEP. https://www.fabiomorandin.net/p/neuroeducacion-un-campo-de-trabajo.html

Morandín-Ahuerma, F. (2022d). Neuroplasticidad: reconstrucción, aprendizaje y adaptación. In *Neuroeducación como herramienta epistemológica* (pp. 23-43). CONCYTEP. https://www.fabiomorandin.net/p/neuroplasticidad-reconstruccion.html

Morandín-Ahuerma, F. (2022e). What is Artificial Intelligence? Int. J. Res. Publ. Rev., 3(12), 1947-1951. https://doi.org/10.55248/gengpi.2022.31261

Morandín-Ahuerma, F., & Salazar-Morales, J. (2020a). Una crítica al compatibilismo milleano, entre el utilitarismo y el ius naturalismo. Derecho y Cambio Social, 61, 10-16. https://www.fabiomorandin.net/p/una-critica-al-compatibilismo-milleano.html

Morandín-Ahuerma, F., & Salazar-Morales, J. (2020b). ¿Utilitarismo, emotivismo, deontologismo o ética de la virtud? estudio de tres dilemas morales en estudiantes bachilleres y universitarios. *Revista Panamericana de Pedagogía*, 30, 140-156. https://doi.org/10.21555/rpp.v0i30.2029

Morandín-Ahuerma, F., & Villanueva-Méndez, L. (2022). Identidad regional y globalización. *Universitaria*, 6(40), 32-33. https://revistauniversitaria.uaemex.mx/article/view/19524/14477

Morandín-Ahuerma, F., Romero-Fernández, A., Villanueva-Méndez, L., & Santos-Cabañas, E. (2023). Hacia una fundamentación ético-normativa del sujeto de derecho. Revista Jurídica Crítica y Derecho, 4(6), 1-12.

Morandín-Ahuerma, F., Suárez- Máximo, J. D., Vargas-Vizuet, A. L., Romero-Fernández, A., & Villanueva-Méndez, L. (2021). Estudio para determinar el factor vocacional en enfermería ante la pandemia de COVID-19. *Revista Científica Ágora*, 8(1), 52-63. https://doi.org/10.21679/arc.v8i1.207

Morandín-Ahuerma, F., Villanueva-Méndez, L., & Romero-Fernández, A. (2022). Alfabetización en ciencia y pensamiento crítico en el aula. In F. Morandín-Ahuerma, L. Villanueva-Méndez, & A. Romero-Fernández (Eds.), *Investigaciones Regionales desde Puebla Nororiental* (pp. 281-300). BUAP. https://www.fabiomorandin.net/p/alfabetizacion-en-ciencia-y-pensamiento.html

Morandín-Ahuerma, F., Villanueva-Méndez, L., Vargas-Vizuet, A. L., & Romero-Fernández, A. (2019). Regionalización universitaria como factor para el desarrollo comunitario. In F. Morandín-Ahuerma, L. Villanueva-Méndez, A. L. Vargas-Vizuet, & A. Romero-Fernández (Eds.), *Puebla Nororiental:* estudios regionales transdisciplinarios (pp. 27-38). BUAP. https://www.fabiomorandin.net/p/regionalizacion-universitaria-como.html

Rani, A. (2021). A Critical Study of Indian Culture and Literature in Western Writing in "J.G. Farrell's The Siege of Krishnapur". *International Journal of Research Publication and Reviews Vol.* 2, no. 10, pp. 711-714

Romero-Fernández, A., Villanueva-Méndez, L., Morandín-Ahuerma, F., & Vargas-Vizuet, A. L. (2021). Educación remota de emergencia: experiencias de estudiantes de una unidad académica regional de la BUAP durante la pandemia de COVID-19. Revista Educación Superior y Sociedad (ESS), 33(2), 422-442. https://doi.org/10.54674/ess.v33i2.469

Sarkar, T. (2021). Comparison between the Educational thoughts of Rabindranath Tagore and Mahatma Gandhi. *International Journal of Research Publication and Reviews* Vol (2) 1, 253-256. https://www.ijrpr.com/uploads/V2ISSUE1/IJRPR152.pdf

Vikram Singh, L. (2022). Correlation among the Identified Factors for Spiritual Intelligence: Psychological Determinants: Psychological Determinants. *International Journal of Research Publication and Reviews*, *3*(6), 1173-1178.