HPSC0085
Knowledge Explanation and Classification

Course Syllabus

2023-2024 session | Professor Emma Tobin | Email Address: e.tobin@ucl.ac.uk

Course Information

In this course, students will examine some of the core topics in contemporary philosophy of science. There are some core themes that we will address (1) What counts as scientific explanation and knowledge. (2) What counts as scientific evidence? (3) Can we develop a socially informed epistemology – looking particularly at values, testimony, and expertise. What role does classification play in science? These themes will be examined in the context of some working examples from scientific practice.

Basic course information

Course website:	None
Moodle Web site:	https://moodle.ucl.ac.uk/course/view.php?id=7488
Assessment:	Essay 1 (1,000 words) Essay 2 (3,000 words)
Timetable:	www.ucl.ac.uk/timetable
Prerequisites:	None
Required texts:	See reading list for required reading each week
Course tutor(s):	Prof. Emma Tobin
E-mail	e.tobin@ucl.ac.uk
Web:	https://www.ucl.ac.uk/sts/people/prof-emma-tobin
Office location:	22 Gordon Square, Room 2.4

Schedule

UCL Week	Topic	Date	Activity
6	**1. Knowledge and Explanation I: Introduction**	Tuesday 03/10/23	1. Complete required readings for the lecture and seminar. 2. Attend onsite lecture and seminar.
7	**2. Knowledge and Explanation II: Inference**	Tuesday 10/10/23	1. Complete required readings for the lecture and seminar. 2. Attend onsite lecture and seminar.
8	**3. Evidence I: Prediction and Evidence**	Tuesday 17/10/23	1. Complete required readings for the lecture and seminar. 2. Attend onsite lecture and seminar.
9	**4. Evidence II: Data in the Digital Age**	Tuesday 24/10/23	1. Complete required readings for the lecture and seminar. 2. Attend onsite lecture and seminar.
10	**5. Social Epistemology I: Scientific Knowledge and Values**	Tuesday 31/10/23	1. Complete required readings for the lecture and seminar. 2. Attend onsite lecture and seminar.
11	**Reading Week**	Tuesday 07/11/23	No classes, work on essays, read!
12	**6. Social Epistemology II: Expertise**	Tuesday 14/11/23	1. Complete required readings for the lecture and seminar. 2. Attend onsite lecture and seminar.
13	**7. Classification I: Natural Kind Realism, and the Species Problem**	Tuesday 21/12/23	1. Complete required readings for the lecture and seminar. 2. Attend onsite lecture and seminar.
14	**8. Classification II: Classification in Scientific Practice: Proteins, Planets and Messy Kinds**	Tuesday 28/12/23	1. Complete required readings for the lecture and seminar. 2. Attend onsite lecture and seminar.
15	**9. Classification III: Philosophy of Technology: the classification of**	Tuesday 5/12/23	1. Complete required readings for the lecture and seminar.

	Artefact kinds and the ethics of digital technologies		2. Attend onsite lecture and seminar.
16	**10. Classification IV: The Epistemic Value of Classification and Non-Epistemic Values in Classification**	Tuesday 12/12/23	1. Complete required readings for the lecture and seminar. 2. Attend onsite lecture and seminar.

Assessments

	Description	Deadline	Word limit	Deadline for Tutors to provide Feedback
Essay 1	Literature Review. 30% of final grade.	5pm 20 November 2023	1,000	20 December 2023
Essay 2	Full essay 70% of final grade.	5pm 9 January 2023	3,000	February 23

Assignments

Essays must be submitted via Moodle. Essay 1 literature reviews must be focused on 1 piece of literature covered in the first half of term. Essay 2 topics will be distributed on Moodle by the end of reading week. To be deemed 'complete' on this module students must attempt both essay 1 and essay 2.

Teaching Format

Lectures and seminars will be conducted onsite by the course tutor on Tuesdays during term 1. Please see the UCL timetable for the time and room allocation. Students should complete the required reading and come to the seminar prepared to discuss the weeks topic.

The departmental marking guidelines for individual items of assessment can be found in the STS Student Handbook. Details of college and departmental policies relating to modules and assessments can be found in the STS Student Handbook www.ucl.ac.uk/sts/handbook All students taking modules in the STS department are expected to read these policies. Course-specific guidance to be presented and discussed in class.

Aims and Objectives:

aims

- To provide knowledge of the 3 core topics: knowledge, explanation, and classification.
- To provide some foundational philosophy of science material.
- The theoretical concepts will be grounded in case studies from scientific practice. Students will be encouraged to think about other case studies.

- Integrate these topics with related theoretical concepts from other courses (e.g., models, representations, causation, mechanism, and evidence)

objectives

By the end of this module students should be able to:

- A grounding in key concepts in history of philosophy of science.
- A grounding in the core conceptual accounts of knowledge, explanation, evidence, social epistemology, and classification in contemporary philosophy of science
- A grounding in some case studies in scientific practice, from a range of scientific disciplines e.g., biochemistry, medicine, astronomy
- A grounding in some case studies from the history of science and how they illuminate these 3 philosophical topics.
- Students will be encouraged to think about other case studies and how the theoretical accounts would apply to them.
- Students will be able to think philosophically, analyse arguments critically.
- Students will be able to integrate the philosophical concepts learnt on this course with other HPS and STS courses.

Reading list

Week 1: Knowledge and Explanation I: Introduction Explanation & Understanding

Lecture Reading:

- De Regt. Henk (2019), From Explanation to Understanding: Normativity Lost? *Journal for General Philosophy of Science*, 50, 327-343.

Seminar Reading:

- Elgin, Catherine (2007) Understanding and the facts. *Philosophical Studies*, 132: 33-42.

Further Reading:

- Bird, A. (1998), *Philosophy of Science*, London & New York: Routledge, Ch. 2.

- Bromberger, S., (1966), "Why Questions", in Mind and Cosmos: Essays in Contemporary Science and Philosophy, R. Colodny, (ed), Pittsburgh: University of Pittsburgh Press.
  Curd & Cover (eds.) *Philosophy of Science: The Central Issues*, Norton & Company, 1998, Ch. 6.
- Hempel, C. (1965), *Aspects of Scientific Explanation*, New York, The Free Press.

- Lipton, P. (2009) Understanding without Explanation, *Scientific Understanding: Philosophical Perspectives*, 2009, pp. 43-63.

- Psillos, S. (2002), *Causation & Explanation*, Acumen, 215- 293, Ch. 3.

- Salmon, W., (1989), *Four Decades of Scientific Explanation*, Minneapolis: University of Minnesota Press.

- Woodward, Jim. (2009), "Scientific Explanation", *Stanford Encyclopedia of Philosophy*.

Week 2: Knowledge and Explanation II: Inference

Lecture Reading:

- Lipton, P. W.H. Newton-Smith (ed) *A Companion to the Philosophy of Science* (Blackwell, 2000) 184-193.

Seminar Reading:

- Bird, A. Inference to the Only Explanation, *Philosophy and Phenomenological Research* **74** (2007) 424–32.

- Bird, Alexander (2020) How Can Loveliness Be a Guide to Truth? Inference to the Best Explanation and Exemplars, *The Aesthetics of Science*, Milena Ivanova & Stephen French (eds.). Chapter 7.

Further Reading:

- Bird, A. Inference to the Only Explanation, *Philosophy and Phenomenological Research* **74** (2007) 424–32.

- Bird, A. (2010) 'Eliminative Abduction: Examples from Medicine', *Studies in History and Philosophy of Science*, Part A, 41(4): 345-352.

- Bird, A. (2020), 'Scientific Realism and Three Problems for Inference to the Best Explanation', in W. J. Gonzalez (ed.), *New Approaches to Scientific Realism.*

- De Gruyter. Day, T & Kincaid H. (1994), Putting Inference to the Best Explanation in its Place, *Synthese,* 98(2): 271-295.

- Glass, H. (2007) Coherence Measures and Inference to the Best Explanation, Synthese 157 (3): 275-296

- Lipton, P. (1991) *Inference to the Best Explanation*, London: Routledge.

- Lipton, P. (1996) 'Is the Best Good Enough?', in D. Papineau (ed.), The Philosophy of Science (Oxford: Oxford University Press), pp. 93–106.

- Lipton, P. (2001) What Good is an Explanation?', in G. Hon & S. Rackover (eds.), *Explanation: Theoretical Approaches*, Kluwer, 2001, 43-59. Reprinted in J. Cornwell (ed.) *Understanding Explanation*, Oxford University Press, 2004, 1-22.

- Makonis, A (2013). Inference to the Best Explanation, Coherence and Other

Explanatory Virtues. Synthese 190(6): 975-995.

- Okasha, S. (2000) "Van Fraassen's Critique of Inference to the Best Explanation", *Studies in History and Philosophy of Science* 31: 691-710.

- Walker, D. (2012), 'A Kuhnian Defence of Inference to the Best Explanation', *Studies in History and Philosophy of Science,* 43: 64–7.

Week 3: Evidence I: Prediction & Evidence

Lecture Reading:

- Barnes, C.E. (2018) Prediction vs Accommodation, *Stanford Encyclopedia of Philosophy*

Seminar Reading:

- Scerri, E and Worrall, J. (2001) 'Prediction and the Periodic Table'. In *Studies in History and Philosophy of Science*, 32, 407-452.

- Frisch, Mathias, (2015), "Predictivism and Old Evidence: A Critical Look at Climate Model Tuning", *European Journal for the Philosophy of Science*, 5(2): 171–190. doi:10.1007/s13194-015-0110-4

Further Reading:

- Akeroyd, Michael, (2003) F. Prediction and the periodic table: A Response to Scerri and Worrall. Journal for General Philosophy of Science, 34 (2): 337-355.

- Barnes, E. C. 2005a, "Predictivism for Pluralists", *British Journal for the Philosophy of Science*, 56(3): 421–450. doi:10.1093/bjps/axi131

- Barnes, E.C. 2005b, "On Mendeleev's Predictions: Comment on Scerri and Worrall", *Studies in the History and Philosophy of Science*, 36(4): 801–812.

- Cronyn, M. W. (2003) The Proper Place for Hydrogen in the Periodic Table. In Journal of Chemical Education, 80, 947-951.

- Lipton, Peter. (1990) 'Prediction and Prejudice'. *In International Studies in the Philosophy of science*, 4 (1): 51 – 65 (1990)

- Forster, Malcolm and Elliott Sober, (1994), "How to Tell when Simpler, More Unified, or Less *Ad Hoc* Theories Will Provide More Accurate Predictions", *British Journal for the Philosophy of Science*, 45(1): 1–35.

- Hitchcock, Christopher and Elliott Sober, 2004, "Prediction versus Accommodation and the Risk of Overfitting", *British Journal for the Philosophy of Science*, 55(1): 1–34. doi:10.1093/bjps/55.1.1

- Scerri, E. *The Periodic Table: Its Story and Significance*, Oxford University Press, Chapters 4 and 5.

- Scerri, E (1998) 'Has the Periodic Table Been Successfully Axiomatized?' In *Erkenntnis*, 47: 229-243.

- Scerri, Eric R., 2005, "Response to Barnes's critique of Scerri and Worrall", *Studies in the History and Philosophy of Science*, 36(4): 813–816.

Week 4: Evidence II: Data in the Digital Age

Lecture Reading:

- Leonelli, S. (2015) What Counts as Scientific Data? A Relational Framework, *Philosophy of Science,* 82 (5): 810-821.

Seminar Reading:

- Ankeny, R.A. (2017) Bringing Data Out of the Shadows. *Science, Technology, & Human Values*, 42(2): 306–310.

- Leonelli, S. (2014) 'Data Interpretation in the Digital Age', *Perspective on Science* (eds. Henk de Regt and Wendy Parker.

Further Readings:

- Leonelli, Sabina (2016) *Data-Centric Biology: A Philosophical Study*. Chicago, IL: Chicago University Press. pp. 288.

- Leonelli, S & Tempini, N (eds). (2020) Data Journeys in the Sciences, Data Journeys in the Sciences. Springer, Open Access.

- Woodward & Bogen, (1988) 'Saving the Phenomena ' *The Philosophical Review*, 97(3), pp. 303-352.

- Woodward, J.F. (2011) 'Data and Phenomena: A Restatement and Defence'. *Synthese* 182 (1): 165-179. McAllister, W. (2011) 'What do Patterns in Empirical Data Tell us About the Structure of the World?' Synthese, 182 (1): 73-87.

Week 5: Social Epistemology I: Scientific Knowledge and Values

Lecture Reading:

- Longino, H. (2013) *The Social Dimensions of Scientific Knowledge, Stanford Encyclopedia of Philosophy.*

Seminar Reading:

- Douglas H. (2000) 'Inductive Risk and Values in Science', *Philosophy of Science*, 67(4).

- Ruphy, Stéphanie, (2006), "'Empiricism All the Way down': A Defense of the Value-Neutrality of Science in Response to Helen Longino's Contextual

Empiricism", *Perspectives on Science*, 14(2): 189–214.

Further Reading:

- Anderson, E. (2004). 'Uses of value judgments in science: A general argument, with lessons from a case study of feminist research on divorce.' *Hypatia*, 19: 1–24.

- Dorato, Mauro, (2004), "Epistemic and Nonepistemic Values in Science", in Machamer and Wolters 2004: 52–77.

- Douglas, H. (2004), "The Irreducible Complexity of Objectivity", *Synthese*, 138(3): 453–473.

- Douglas, H (2009), *Science, Policy, and the Value-Free Ideal*, Pittsburgh, PA: University of Pittsburgh Press.

- Douglas, H. (2011), "Facts, Values, and Objectivity", Jarvie and Zamora Bonilla: 513–529.

- Douglas H. (2007) 'Rejecting the Ideal of Value-Free Science' in Value Free Science? Ideals and Illusions (2007), pp 120-140

- Kuhn, T. (1977), "Objectivity, Value Judgment, and Theory Choice", in his *The Essential Tension. Selected Studies in Scientific Tradition and Change*, Chicago: University of Chicago Press: 320–39.

- Longino, H. E. (1990). Science as Social Knowledge: Values and Objectivity in Scientific enquiry, Princeton, NY: Princeton University Press. CH 4.

- Longino, H (1996), "Cognitive and Non-Cognitive Values in Science: Rethinking the Dichotomy", in *Feminism, Science, and the Philosophy of Science*, Lynn Hankinson Nelson and Jack Nelson (eds.), Dordrecht: Springer Netherlands, 39–58.

- Machamer, Peter and Gereon Wolters (eds.), 2004, *Science, Values and Objectivity*, Pittsburgh: Pittsburgh University Press.

- Kitcher, P. *Science, Truth and Democracy*, Oxford, Oxford University Press.

- Longino, H. E. (1990). 'Science as Social Knowledge: Values and Objectivity in Scientific enquiry'

- Machamer, P. & Wolters, G. (2004) *Science, Values and Objectivity*, Pittsburgh, University of Pittsburgh Press.5

- Nagel, Ernest. (1961) 'The value-orientated bias of social inquiry.' Can be found in his *The Structure of Science;* or in Martin & McIntyre (eds.) (1994) *Readings in the Philosophy of Social Science*

Week 6: Social Epistemology II: Expertise

Lecture Reading:

- Collins HM, Evans R. The Third Wave of Science Studies: *Studies of Expertise and Experience. Social Studies of Science*. 2002;32(2): 235-296

Seminar Reading:

- De Cruz, Helen (2020) Believing to Belong: Addressing the Novice-Expert Problem in Polarized Scientific Communication Social Epistemology A Journal of Knowledge, Culture and Policy 34:5.

- Baghramian, M.& Croce M. Experts, Public Policy, and the Question of Trust in Michael Hannon & Jeroen De Ridder (eds.), *Routledge Handbook of Political Epistemology*. London, UK: Routledge (forthcoming)

Further Readings:

- Brewer, Scott, (1998) "Scientific Expert Testimony and Intellectual Due Process", *Yale Law Journal*, 107(6): 1535–1681

- Collins, H.M & Evans, R (2007) Rethinking Expertise Chicago, University of Chicago Press
- Croce, Michel, 2018, "Expert-Oriented Abilities vs. Novice-Oriented Abilities: An Alternative Account of Epistemic Authority", *Episteme*, 15(4): 476–498

- Goldberg, Sanford C (2009) "Experts, Semantic and Epistemic", *Noûs*, 43(4): 581–598.
- Goldman Alvin 2001, "Experts: Which Ones Should You Trust?", *Philosophy and Phenomenological Research*, 63(1): 85–110

- Haack, S. (2005) 'Trial and Error: The Supreme Court's Philosophy of Science', The American Journal of Public Health.

- Lackey, Jennifer (2018), "Experts and Peer Disagreement", in *Knowledge, Belief, and God: New Insights in Religious Epistemology*, Matthew Benton, John Hawthorne & Dani Rabinowitz (eds), Oxford: Oxford University Press, 228–245

- Majszak & Jebeile (2023) Expert judgment in climate science: How it is used and how it can be justified. *Studies in the History and Philosophy of Science* 100 (C):32-38.

- Zagzebski, Linda Trinkaus, 2012, *Epistemic Authority: A Theory of Trust, Authority, and Autonomy in Belief*, Oxford: Oxford University Press.

Week 7: Classification I: Natural Kind Realism and the Species Problem

Lecture Reading:

- Bird A. and Tobin E. Natural Kinds, *Stanford Encyclopedia of Philosophy*.

Seminar Reading:

- Boyd, (1991) Realism, anti-foundationalism, and the enthusiasm for natural kinds. *Philosophical Studies, 61*(1–2), 127–148.

- Slater, M. H. (2015). Natural Kindness. *The British Journal for the Philosophy of Science, 66*(2), 375–411.

Further Reading:

- Bird, A. (2018) "The metaphysics of Natural Kinds". *Synthese*, 195:4, pp/ 1397-1426.

- Clarke, E. (2010) 'The Problem of Biological Individuality', *Biological Theory*, 5, pp.
- 312–25

- Devitt Michael, (2011) Natural Kinds and Biological Realisms in Michael O'Rourke, Joseph Keim Campbell & Matthew H. Slater (eds.), *Carving Nature at its Joints: Natural Kinds in Metaphysics and Science*.)

- Dupré, J., (2001), "In Defence of Classification", *Studies in History and Philosophy of Biological and Biomedical Sciences*, 32(2): 203–219.Ereshefsky, M. (1998). "Species Pluralism and Anti-Realism." *Philosophy of Science* 65: 103–20.

- Ellis, B., (2001), *Scientific Essentialism*, Cambridge Studies in Philosophy. Cambridge: Cambridge University Press.

- Hacking, Ian. (2007), "Natural Kinds: Rosy Dawn, Scholastic Twilight". *Royal Institute of Philosophy Supplements*, 61: 203-239.

- Hawley, K. and Bird, A., (2011). "What are Natural Kinds?", *Philosophical Perspectives*, 25:205-221.

- Khalidi, M.A. (2010) Interactive Kinds, *British Journal for the Philosophy of Science* 61(2): 335-360

- Massimi, M. (2014), Natural Kinds and Naturalized Kantianism, *Nous*, 48: 3, pp. 416-449.

- Tobin, E. (2010). "Crosscutting Natural Kinds and the Hierarchy Thesis", *The Semantics and Metaphysics of Natural Kinds*, Helen Beebee and Nigel Sabbarton-Leary (eds.), New York: Routledge, 179–191.

- Tobin, E. (2017) Mechanisms and Natural Kinds, *The Routledge Handbook of Mechanisms and Mechanical Philosophy*, Routledge, Ch. 15.

- Craver, C. "Mechanisms and Natural Kinds", *Philosophical Psychology,* Vol.

22, No. 5, October 2009, 575–594.

- Wilson, R. A., 1996, “Promiscuous Realism”, *British Journal for the Philosophy of Science* 47: 303–316.

- Wilson, R.A. Barker, M. Brigandt, I. (2007), ‘When Traditional Essentialism Fails: Biological Natural Kinds’, PHILOSOPHICAL TOPICS, VOL. 35, NOS. 1 & 2.

Week 8: Classification II: Classification in Scientific Practice: Proteins, Planets and Messy Kinds

Lecture Reading:

- Slater, M. H. (2009) Macromolecular Pluralism, *Philosophy of Science* 76 (5): 851-863.

Seminar Reading:

- Tobin, E. (2010*), “*Microstructuralism and Macromolecules: The Case of Moonlighting Proteins”, *2010 - Foundations of Chemistry* 12 (1):41-54.

- Chang, H. (2017), Epistemic Iteration and Natural Kinds: Realism and Pluralism in Taxonomy”. Philosophical Issues in Psychiatry IV: Classification of Psychiatric Illnesses (Oxford: Oxford University Press, 2017), 229–245

- Belazzi, F (2022) The Superpowers of Proteins, *Jargonium*.

Further Reading:

- Bartol, Jordan. (2016). “Biochemical kinds”. *British Journal for the Philosophy of Science* 67: 531-551.

- Bellazzi, Francesca. (2022) Biochemical Functions, *British Journal for the Philosophy of Science.* https://doi.org/10.1086/723241 (online first)

- Havstad, Joyce C. (2018). “Messy Chemical Kinds”. *British Journal for Philosophy of Science*. 69: 719-743.

- Messeri, Lisa r. (2009), “The Problem with Pluto: Conflicting Cosmologies and the Classification of Planets *Social Studies of Science April 2010 40: 187-214.*

- Santos, Vallejos & Vecchi (2020) A relational-constructionism account of protein macrostructure and function, *Foundations of Chemistry* 22 (3):363-382

- Slater, M., (2009). “Macromolecular Pluralism”, *Philosophy of Science*, 76: 851–863.

- Slater, M. (2015). “Natural kindness”, *The British Journal for the Philosophy of Science*, 66, 375–411.

- Ruphy, Stephanie, (2010), Are Stellar Kinds Natural Kinds? A Challenging

Newcomer in the debate on Monism/Pluralism and Realism/Anti Realism debates, *Philosophy of Science* 77 (5):1109-1120.

- Tahko, T. (2020) Where do you get your Protein? Of Biochemical Realization, *British Journal for the Philosophy of Science* 71 (3):799-825.

Week 9: Classification III: Philosophy of Technology: the classification of Artefact kinds and the ethics of digital technologies

Lecture Reading:

- Boon M. (2015) The Scientific Use of Technological Instruments. Ch. 4 in: *The Role of Technology in Science*: *Philosophical Perspectives*, S.O. Hansson (ed.). Dordrecht: Springer Series: Philosophy of Engineering and Technology, 18.

Seminar Reading:

- Reydon, T (2014) Metaphysical and Epistemological Approaches to Developing a Theory of *Artefact Kinds*, Springer, Chapter 8.

- Russo, Federica (2018) Digital Technologies, ethical questions, and the need for an informational framework. *Philosophy and Technology* 31(4), 655-667.

Further Reading:

- Boon M. (May. 2015). The Scientific Use of Technological Instruments. Ch. 4 in: *The Role of Technology in Science*: *Philosophical Perspectives*, S.O. Hansson (ed.). Dordrecht: Springer Series: Philosophy of Engineering and Technology 18.

- Elder, C. L. (2007). On the place of artifacts in ontology. In E. Margolis & S. Laurence (Eds.), *Creations of the mind: Theories of artifacts and their representation* (pp. 33–51). Oxford: Oxford University Press.

- Franssen, Lokhost and van de Poel, Philosophy of Technology, *Stanford Encyclopedia of Philosophy*.

- Franssen, M Kroes, P. Reydon, T. & Vermaas P, (2013) Introduction: The Ontology of Technical Artefacts in *Artefact Kinds*, Springer.

- Franssen, M. P. M. (2008). Design, use, and the physical and intentional aspects of technical artifacts. In P. E. Vermaas, P. Kroes, A. Light, & S. A. Moore (Eds.), *Philosophy and design: From engineering to architecture* (pp. 21–35). Dordrecht: Springer.

- Kroes, P., & Meijers, A. W. M. (2006). The dual nature of technical artifacts. *Studies in History and Philosophy of Science, 37*, 1–4Russo, Federica (2022), *Technoscientific practices: an Informational approach*, Rowman & Littlefield International.

- Vallor, Shannon (ed). (2021) *Oxford Handbook of Philosophy of Technology*. Oxford University Press, Oxford.

Week 10: Classification IV: The epistemic value of Classification and non-epistemic values in classification

Lecture and Seminar Reading:

- Kendig, C. and Gray J. (2019), "Can the Epistemic Value of Natural Kinds Be Explained Independently of Their Metaphysics?" *British Journal for the Philosophy of Science*, 72(2).

- Reydon and Ereshefsky (2022), How to Incorporate Non-Epistemic Values into a Theory of Classification, *General Philosophy of Science*, 12(4).

Further Reading:

- Boyd, R. (2000): 'Kinds as the "Workmanship of Men": Realism, Constructivism, and Natural Kinds', in J. Nida-R Rumelin (ed.), *Rationalitat*, Realismus, Revision, Berlin: De Gruyter, pp. 52–89

- Kendig, C. (2016). *Natural kinds and Classification in Scientific Practice*, London, and New York: Routledge.

- Kendig, C. (2020). Ontology and values anchor indigenous and grey nomenclatures: a case study in lichen naming practices among the Samí, Sherpa, Scots, and Okanagan, Studies in History and Philosophy of Science Part c, Vol. 84.

- Khalidi, M. A. (2013). *Natural Categories and Human Kinds: Classification in the Natural and Social Sciences*. Cambridge University Press.

- Lemeire, O. (2018): 'No Purely Epistemic Theory Can Account for the Naturalness of Kinds', *Synthese.*