

Model and Theories – Comprehensive Bibliography

Roman Frigg

Every chapter of *Models and Theories* has its own bibliography. This is a comprehensive bibliography containing all works cited in the book. The references are from my own final version (October 2021), and changes and updates made at proof stage are not reflected in the below.

- Abell, C. 2009. Canny Resemblance. *The Philosophical Review* 118: 183-223.
- Abrantes, P. 1999. Analogical Reasoning and Modeling in the Sciences. *Foundations of Science* 4: 237-270.
- Accorinti, H. L. 2019. Incompatible Models in Chemistry: The Case of Electronegativity. *Foundations of Chemistry* 21: 71-81.
- Achinstein, P. 1963a. Theoretical Terms and Partial Interpretation. *The British Journal for the Philosophy of Science* 14: 89-105.
- Achinstein, P. 1963b. Variety and Analogy in Confirmation Theory. *Philosophy of Science* 30: 207-221.
- Achinstein, P. 1964. Models, Analogies, and Theories. *Philosophy of Science* 31: 328-350.
- Achinstein, P. 1965a. The Problem of Theoretical Terms. *American Philosophical Quarterly* 2: 193-203.
- Achinstein, P. 1965b. Theoretical Models. *The British Journal for the Philosophy of Science* 16: 102-120.
- Achinstein, P. 1968. *Concepts of Science: A Philosophical Analysis*. Baltimore: Johns Hopkins Press.
- Achinstein, P. 1972. Models and Analogies: A Reply to Girill. *Philosophy of Science* 39: 235-240.
- Achinstein, P. 1991. Maxwell's Analogies and Kinetic Theory. In *Particles and Waves: Historical Essays in the Philosophy of Science*. Oxford and New York: Oxford University Press, pp. 207-232.
- Ackermann, R. J. 1966. Confirmatory Models of Theories. *The British Journal for the Philosophy of Science* 16: 312-326.
- Adams, E. W. 1959. The Foundations of Rigid Body Mechanics and the Derivation of Its Laws from Those of Particle Mechanics. In L. Henkin, P. Suppes, and A. Tarski (eds.), *The Axiomatic Method: With Special Reference to Geometry and Physics*. Amsterdam: North-Holland, pp. 250-265.
- Agassi, J. 1964. Analogies as Generalizations. *Philosophy of Science* 31: 351-356.
- Ainsworth, P. 2009. Newman's Objection. *The British Journal for the Philosophy of Science* 60: 135-171.
- Akerlof, G. A. 1970. The Market for 'Lemons': Quality Uncertainty and the Market Mechanism. *Quarterly Journal of Economics* 84: 488-500.
- Alexandrova, A. 2008. Making Models Count. *Philosophy of Science* 75: 383-404.
- Alexandrova, A. and R. Northcott 2013. It's Just a Feeling: Why Economic Models Do Not Explain. *Journal of Economic Methodology* 20: 262-267.
- Alspector-Kelly, M. 2004. Seeing the Unobservable: Van Fraassen and the Limits of Experience. *Synthese* 140: 331-353.
- Altschul, E. and E. Biser 1948. The Validity of Unique Mathematical Models in Science. *Philosophy of Science* 15: 11-24.

- Ambrosio, C. 2014. Iconic Representations and Representative Practices. *International Studies in the Philosophy of Science* 28: 255-275.
- Anapolitanos, D. A. 1989. Theories and Their Models. *Journal for General Philosophy of Science* 20: 201-211.
- Andersen, H. 2001. Reference and Resemblance. *Philosophy of Science* 68: 50-61.
- Andreas, H. 2008. Another Solution to the Problem of Theoretical Terms. *Erkenntnis* 69: 351-333.
- Andreas, H. 2010. Semantic Holism in Scientific Language. *Philosophy of Science* 77: 524-543.
- Andreas, H. 2013. Deductive Reasoning in the Structuralist Approach. *Studia Logica* 5: 1093-1113.
- Andreas, H. 2017. Theoretical Terms in Science. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/fall2017/entries/theoretical-terms-science/>.
- Andréka, H., J. X. Madarász, I. Németi, and G. Székely 2012. A Logic Road from Special Relativity to General Relativity. *Synthese* 186: 633-649.
- Ankeny, R. A. 2001. Model Organisms as Models: Understanding the 'Lingua Franca' of the Human Genome Project. *Philosophy of Science (Supplement)* 68: 251-261.
- Ankeny, R. A. and S. Leonelli 2011. What's So Special About Model Organisms. *Studies in History and Philosophy of Science* 42: 313-323.
- Ankeny, R. A. and S. Leonelli 2020. *Model Organisms*. Cambridge: Cambridge University Press.
- Antoniou, A. 2021. A Pragmatic Approach to the Ontology Of models. *Synthese Online First*, <https://doi.org/10.1007/s11229-021-03085-9>.
- Apostel, L. 1961. Towards the Formal Study of Models in the Non-Formal Sciences. In H. Freudenthal (ed.), *The Concept and the Role of the Model in Mathematics and Natural and Social Sciences*. Dordrecht: Reidel, pp. 1-37.
- Argyris, J., G. Faust, and M. Haase 1994. *An Exploration of Chaos. An Introduction for Natural Scientists and Engineers*. Amsterdam: Elsevier.
- Aristotle 1902. *Poetics*. London: McMillan.
- Armstrong, D. 1983. *What Is a Law of Nature?* Cambridge: Cambridge University Press.
- Atanasova, N. A. 2015. Validating Animal Models. *Theoria* 30: 163-181.
- Avigad, J. and R. Zach 2016. The Epsilon Calculus. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/sum2016/entries/epsilon-calculus/>.
- Ayer, A. J. 1936/1946. *Language, Truth and Logic* (2nd ed.). New York: Dover.
- Azzouni, J. 2014. A New Characterization of Scientific Theories. *Synthese* 191: 2993-3008.
- Bacaër, N. 2011. *A Short History of Mathematical Population Dynamics*. London: Springer.
- Bailer-Jones, D. M. 1999. Tracing the Development of Models in the Philosophy of Science. In L. Magnani, N. J. Nersessian, and P. Thagard (eds.), *Model-Based Reasoning in Scientific Discovery*. New York, NY: Kluwer Academic/Plenum Publishers, pp. 23-40.
- Bailer-Jones, D. M. 2000. Modelling Extended Extragalactic Radio Sources. *Studies in History and Philosophy of Modern Physics* 31: 49-74.
- Bailer-Jones, D. M. 2002a. Models, Metaphors, and Analogies. In P. Machamer, and M. Silberstein (eds.), *The Blackwell Guide to Philosophy of Science*. Oxford: Blackwell, pp. 108-127.
- Bailer-Jones, D. M. 2002b. Scientists' Thoughts on Scientific Models. *Perspectives on Science* 10: 275-301.

- Bailer-Jones, D. M. 2003. When Scientific Models Represent. *International Studies in the Philosophy of Science* 17: 59-74.
- Bailer-Jones, D. M. 2009. *Scientific Models in Philosophy of Science*. Pittsburgh: Pittsburgh University Press.
- Bak, P. 1997. *How Nature Works: The Science of Self-Organised Criticality*. Oxford: Oxford University Press.
- Baldissera Pacchetti, M. 2021. Structural Uncertainty through the Lens of Model Building. *198*: 10377-10393.
- Balzer, W. 1986. Theoretical Terms: A New Perspective. *The Journal of Philosophy* 83: 71-90.
- Balzer, W. and C.-U. Moulines (eds.) 1996. *The Structuralist Theory of Science: Focal Issues, New Results*. Berlin and New York: De Gruyter.
- Balzer, W., C.-U. Moulines, and J. D. Sneed 1987. *An Architectonic for Science: The Structuralist Program*. Dordrecht: Reidel.
- Balzer, W., J. D. Sneed, and C.-U. Moulines (eds.) 2000. *Structuralist Knowledge Representation. Paradigmatic Examples*. Amsterdam: Rodopi.
- Bangu, S. 2009. Understanding Thermodynamic Singularities: Phase Transitions, Data, and Phenomena. *Philosophy of Science* 76: 488-505.
- Bangu, S. 2012. *The Applicability of Mathematics in Science: Indispensability and Ontology*. Basingstoke: Palgrave Macmillan.
- Barberousse, A. and P. Ludwig 2009. Models as Fictions. In M. Suárez (ed.), *Fictions in Science: Philosophical Essays in Modeling and Idealizations*. London: Routledge, pp. 56-73.
- Barcan Marcus, R. 1961. Modalities and Intensional Languages. *Synthese* 13: 303-322.
- Barr, N. 2000. The History of the Phillips Machine. In R. Leeson (ed.), *A. W. H. Phillips: Collected Works in Contemporary Perspective*. Cambridge: Cambridge University Press, pp. 89-114.
- Barr, W. F. 1971. A Syntactic and Semantic Analysis of Idealizations in Science. *Philosophy of Science* 38: 258-272.
- Barr, W. F. 1974. A Pragmatic Analysis of Idealization in Physics. *Philosophy of Science* 41: 48-64.
- Barrett, T. W. 2015. On the Structure of Classical Mechanics. *The British Journal for the Philosophy of Science* 66: 801-828.
- Barrett, T. W. 2020. Structure and Equivalence. *Philosophy of Science* 87: 1184-1196.
- Barrett, T. W. and H. Halvorson 2016. Morita Equivalence. *The Review of Symbolic Logic* 9: 556-582.
- Barrett, T. W. and H. Halvorson 2017a. From Geometry to Conceptual Relativity. *Erkenntnis* 82: 1043-1063.
- Barrett, T. W. and H. Halvorson 2017b. Quine's Conjecture on Many-Sorted Logic. *Synthese* 194: 3563-3582.
- Bartels, A. 2006. Defending the Structural Concept of Representation. *Theoria* 21: 7-19.
- Bartha, P. F. A. 2010. *By Parallel Reasoning. The Construction and Evaluation of Analogical Arguments*. Oxford and New York: Oxford University Press.
- Barwise, J. and S. Feferman (eds.) 1985. *Model-Theoretic Logics*. New York and Berlin: Springer.
- Basso, A., C. Lisciandra, and C. Marchionni 2017. Hypothetical Models in Social Science. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht Heidelberg: Springer, pp. 413-433.
- Batterman, R. W. 2002a. Asymptotics and the Role of Minimal Models. *The British Journal for the Philosophy of Science* 53: 21-38.

- Batterman, R. W. 2002b. *The Devil in the Details: Asymptotic Reasoning in Explanation, Reduction, and Emergence*. Oxford: Oxford University Press.
- Batterman, R. W. 2005. Response to Belot's 'Whose Devil? Which Details?'. *Philosophy of Science* 72: 154-163.
- Batterman, R. W. 2009. Idealization and Modeling. *Synthese* 169: 427-446.
- Batterman, R. W. 2019. Universality and Rg Explanations. *Perspectives on Science* 27: 26-47.
- Batterman, R. W. and C. C. Rice 2014. Minimal Model Explanations. *Philosophy of Science* 81: 349-376.
- Baumberger, C. and G. Brun 2017. Dimensions of Objectual Understanding. In S. Grimm, C. Baumberger, and S. Ammon (eds.), *Explaining Understanding: New Perspectives from Epistemology and Philosophy of Science*. New York: Routledge, pp. 165-189.
- Baur, M. 1990. On the Aim of Scientific Theories in Relating to the World: A Defence of the Semantic Account. *Dialogue* 29: 323-333.
- Beatty, J. 1980. Optimal-Design Models and the Strategy of Model Building in Evolutionary Biology. *Philosophy of Science* 47: 532-561.
- Beatty, J. 1981. What's Wrong with the Received View of Evolutionary Theory? In P. Asquith, and R. Giere (eds.), *Philosophy of Science (Proceedings)* (Vol. Vol. 2). East Lansing: Philosophy of Science Association, pp. 397-426.
- Beatty, J. 1987. On Behalf of the Semantic View. *Biology and Philosophy* 2: 17-23.
- Bechtel, W. 2009. Some Virtues of Modeling with Both Hands. *Adaptive Behavior* 17: 293-295.
- Bechtel, W. 2014. Cognitive Biology: Surprising Model Organisms for Cognitive Science. *Proceedings of the Annual Meeting of the Cognitive Science Society* 36: 158-163.
- Bedard, K. 1993. Partial Denotations of Theoretical Terms. *Nous* 27: 499-511.
- Bell, J. and M. Machover 1977. *A Course in Mathematical Logic*. Amsterdam: North-Holland.
- Belot, G. 2005. Whose Devil? Which Details? *Philosophy of Science* 72: 128-153.
- Ben-Menahem, Y. 1988. Models of Science: Fictions or Idealizations. *Science in Context* 2: 163-175.
- Berent, P. 1973. Theoretical Terms in Infinite Theories. *Philosophy of Science* 40: 129.
- Berkovitz, J., R. Frigg, and F. Kronz 2006. The Ergodic Hierarchy, Randomness and Chaos. *Studies in History and Philosophy of Modern Physics* 37: 661-691.
- Berry, M. 2002. Singular Limits. *Physics Today* 55: 10-11.
- Beth, E. W. 1949. Towards an up-to-Date Philosophy of the Natural Sciences. *Methodos* 1: 178-185.
- Betz, G. 2009. Underdetermination, Model-Ensembles and Surprises: On the Epistemology of Scenario-Analysis in Climatology. *Journal for General Philosophy of Science* 40: 3-21.
- Betz, G. 2015. Are Climate Models Credible Worlds? Prospects and Limitations of Possibilistic Climate Prediction. *European Journal for Philosophy of Science* 5: 191-215.
- Bhushan, N. and S. Rosenfeld 1995. Metaphorical Models in Chemistry. *Journal of Chemical Education* 72: 578-582.
- Bird, A. 1998. *Philosophy of Science*. London: Routledge.
- Bird, A. 2000. *Thomas Kuhn*. Princeton: Princeton University Press.
- Bishop, C. H. and G. Abramowitz 2013. Climate Model Dependence and the Replicate Earth Paradigm. *Climate Dynamics* 41: 885-900.
- Black, M. 1962a. Metaphor. In *Models and Metaphors: Studies in Language and Philosophy*. Ithaca and New York: Cornell University Press, pp. 25-47.

- Black, M. 1962b. Models and Archetypes. In *Models and Metaphors: Studies in Language and Philosophy*. Ithaca and New York: Cornell University Press, pp. 219-243.
- Black, M. 1973. How Do Pictures Represent? In E. Gombrich, J. Hochberg, and M. Black (eds.), *Art, Perception, and Reality*. Baltimore and London: Johns Hopkins University Press pp. 95-130.
- Bliss, R. and K. Trogon 2016. Metaphysical Grounding. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/win2016/entries/grounding/>.
- Boesch, B. 2017. There Is a Special Problem of Scientific Representation. *Philosophy of Science* 84: 970-981.
- Boesch, B. 2019a. The Means-End Account of Scientific, Representational Actions. *Synthese* 196: 2305–2322.
- Boesch, B. 2019b. Resolving and Understanding Differences between Agent-Based Accounts of Scientific Representation. *Journal for General Philosophy of Science* 50: 195-213.
- Boesch, B. 2021. Scientific Representation and Dissimilarity. *Synthese* 198: 5495–5513.
- Bogen, J. 2010. Noise in the World. *Philosophy of Science* 182: 778-791.
- Bogen, J. and J. Woodward 1988. Saving the Phenomena. *The Philosophical Review* 97: 303-352.
- Bohnert, H. G. 1968. In Defense of Ramsey's Elimination Method. *The Journal of Philosophy* 65: 275-281.
- Bokulich, A. 2003. Horizontal Models: From Bakers to Cats. *Philosophy of Science* 70: 609-627.
- Bokulich, A. 2008. *Reexamining the Quantum-Classical Relation: Beyond Reductionism and Pluralism* Cambridge: Cambridge University Press.
- Bokulich, A. 2009. Explanatory Fictions. In M. Suárez (ed.), *Fictions in Science. Philosophical Essays on Modelling and Idealization*. London and New York: Routledge, pp. 91-109.
- Bokulich, A. 2011. How Scientific Models Can Explain. *Synthese* 180: 33-45.
- Bokulich, A. 2017. Models and Explanation. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science* (Vol. 103-118). Dordrecht, Heidelberg, London and New York: Springer, pp.
- Bokulich, A. 2020. Towards a Taxonomy of the Model-Ladenness of Data. *Philosophy of Science* 87: 793-806.
- Bokulich, A. and N. Oreskes 2017. Models in Geosciences. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science* (Vol. 891-911). Dordrecht, Heidelberg, London and New York: Springer, pp.
- Bokulich, A. and W. S. Parker 2021. Data Models, Representation and Adequacy-for-Purpose. *European Journal for Philosophy of Science* 11: Article 31.
- Bolinska, A. 2013. Epistemic Representation, Informativeness and the Aim of Faithful Representation. *Synthese* 190: 219-234.
- Bolinska, A. 2016. Successful Visual Epistemic Representation. *Studies in History and Philosophy of Science* 56: 153-160.
- Boltzmann, L. 1911/1974. Model. In B. McGuinness (ed.), *Theoretical Physics and Philosophical Problems: Selected Writing*. Dordrecht and Boston: Reidel 1974, pp. 213-220.
- Boolos, G. S. and R. C. Jeffrey 1989. *Computability and Logic* (3rd ed.). Cambridge: Cambridge University Press.
- Boumans, M. 1999. Built-in Justification. In M. S. Morgan, and M. Morrison (eds.), *Models as Mediators: Perspectives on Natural and Social Science*. Cambridge: Cambridge University Press, pp. 66-96.

- Boumans, M. 2009. Understanding in Economics. Gray-Box Models. In H. W. de Regt, S. Leonelli, and K. Eigner (eds.), *Scientific Understanding, Philosophical Perspectives*. Pittsburgh: University of Pittsburgh Press, pp. 2011-2029.
- Bourbaki, N. 1957. *Eléments De Mathématique Xxii. Livre I: Théorie Des Ensembles*. Paris: Hermann.
- Bourbaki, N. 1968. *Theory of Sets*. Reading/MA: Addison-Wesley.
- Box, G. E. P. 1976. Science and Statistics. *Journal of the American Statistical Association* 71: 791-799.
- Braddon-Mitchell, D. and R. Nola 1997. Ramsification and Glymour's Counterexample. *Analysis* 57: 167-169.
- Brading, K. 2010. Autonomous Patterns and Scientific Realism. *Philosophy of Science* 77: 827-839.
- Brading, K. and E. Landry 2006. Scientific Structuralism: Presentation and Representation. *Philosophy of Science* 73: 571-581.
- Bradley, R. and K. Steele 2015. Making Climate Decisions. *Philosophy Compass* 10: 799-810.
- Bradley, S. and K. P. Y. Thébault 2019. Models on the Move: Migration and Imperialism. *Studies in History and Philosophy of Science* 77: 81-92.
- Braithwaite, R. B. 1953. *Scientific Explanation*. Cambridge: Cambridge University Press.
- Braithwaite, R. B. 1954a. The Nature of Theoretical Concepts and the Role of Models in an Advanced Science. *Revue Internationale de Philosophie* 8: 34-40.
- Braithwaite, R. B. 1954b. The Nature of Theoretical Concepts and the Role of Models in an Advanced Science. *Theoria* 2: 155-157.
- Braithwaite, R. B. 1962. Models in the Empirical Sciences. In E. Nagel, P. Suppes, and A. Tarski (eds.), *Logic, Methodology and Philosophy of Science*. Stanford: Stanford University Press, pp. 224-231.
- Brandom, R. B. 1994. *Making It Explicit: Reasoning, Representing and Discursive Commitment*. Cambridge MA: Harvard University Press.
- Braun, D. 2008. Names and Natural Kind Terms. In E. Lepore, and B. Smith (eds.), *The Oxford Handbook in Philosophy of Language*. Oxford: Oxford University Press, pp. 490-515.
- Brewer, W. F. 2012. The Theory Ladenness of the Mental Processes Used in the Scientific Enterprise: Evidence from Cognitive Psychology and the History of Science. In R. W. Proctor, and E. J. Capaldi (eds.), *Psychology of Science: Implicit and Explicit Processes* (Vol. 68, Vol. 4). Oxford: Oxford University Press, pp. 289-334.
- Brewer, W. F. 2015. Perception Is Theory Laden: The Naturalized Evidence and Philosophical Implications. *Journal for General Philosophy of Science* 46: 121-138.
- Brewer, W. F. and B. L. Lambert 2001. The Theory-Ladenness of Observation and the Theory-Ladenness of the Rest of the Scientific Process. *Philosophy of Science* 68: 176-186.
- Bridgman, P. W. 1927. *The Logic of Modern Physics*. New York: Macmillan.
- Brodbeck, M. 1959. Models, Meaning, and Theories. In L. Gross (ed.), *Symposium on Sociological Theory*. New York: Harper and Row, pp. 373-403.
- Brown, J. R. 1994. *Smoke and Mirrors. How Science Reflects Reality*. London and New York: Routledge.
- Brown, J. R. 1999. *Philosophy of Mathematics: An Introduction to the World of Proofs and Pictures*. London: Routledge.
- Brown, M. J. 2009. Scientific Perspectivism: Behind the Stage Door. *Studies in History and Philosophy of Science* 40: 213-220.

- Bueno, O. 1997. Empirical Adequacy: A Partial Structure Approach. *Studies in the History and Philosophy of Science* 28: 585-610.
- Bueno, O. 1999. What Is Structural Empiricism? Scientific Change in an Empiricist Setting. *Erkenntnis* 50: 59-85.
- Bueno, O. 2010. Models and Scientific Representations. In P. D. Magnus, and J. Busch (eds.), *New Waves in Philosophy of Science*. Hampshire: Palgrave MacMillan, pp. 94-111.
- Bueno, O. and M. Colyvan 2011. An Inferential Conception of the Application of Mathematics. *Nous* 45: 345-374.
- Bueno, O. and S. French 2011. How Theories Represent. *The British Journal for the Philosophy of Science* 62: 857-894.
- Bueno, O. and S. French 2018. *Applying Mathematics: Immersion, Inference, Interpretation*. New York: Oxford University Press.
- Bueno, O., S. French, and J. Ladyman 2002. On Representing the Relationship between the Mathematical and the Empirical. *Philosophy of Science* 69: 497-518.
- Bueno, O., S. French, and J. Ladyman 2012. Models and Structures: Phenomenological and Partial. *Studies in History and Philosophy of Modern Physics* 43: 43-46.
- Bunge, M. 1969. Analogy, Simulation, Representation. *Revue Internationale de Philosophie* 87: 16-33.
- Bunge, M. 1973. *Method, Model, and Matter*. Dordrecht: Reidel.
- Bushkovitch, A. V. 1974. Models, Theories, and Kant. *Philosophy of Science* 41: 86-88.
- Butterfield, J. 2011. Less Is Different: Emergence and Reduction Reconciled. *Foundations of Physics* 41: 1065-1135.
- Butterfield, J. 2014a. Our Mathematical Universe? A Discussion of Some Themes in Max Tegmark's Recent Book 'Our Mathematical Universe'.
<https://arxiv.org/abs/1406.4348>.
- Butterfield, J. 2014b. Reduction, Emergence and Renormalisation. *The Journal of Philosophy* 111: 5-49.
- Butterfield, J. 2018. On Dualities and Equivalences between Physical Theories.
<https://arxiv.org/pdf/1806.01505.pdf>.
- Butterfield, J. and N. Bouatta 2015. Renormalization for Philosophers. In T. Bigaj, and C. Wüthrich (eds.), *Metaphysics in Contemporary Physics* (Poznań Studies in the Philosophy of the Sciences and the Humanities 104). Amsterdam: Rodopi pp. 437-485.
- Butterfield, J. and H. Gomes 2021. Functionalism as a Species of Reduction. In C. Soto (ed.), *Current Debates in Philosophy of Science: In Honor of Roberto Torretti*. Cham: Springer pp. Forthcoming.
- Button, T. and S. Walsh 2018. *Philosophy and Model Theory*. Oxford: Oxford University Press.
- Byerly, H. 1969. Model-Structures and Model-Objects. *The British Journal for the Philosophy of Science* 20: 135-144.
- Callender, C. and J. Cohen 2006. There Is No Special Problem About Scientific Representation. *Theoria* 55: 7-25.
- Campbell, N. R. 1920. *Physics: The Elements*. Cambridge: Cambridge University Press. (Reprinted as *Foundations of Science*. New York: Dover 1957.).
- Carloye, J. C. 1971. An Interpretation of Scientific Models Involving Analogies. *Philosophy of Science* 38: 562-569.
- Carnap, R. 1923. Über Die Aufgabe Der Physik Und Die Anwendung Des Grundsatzes Der Einfachheit. *Kant Studien* 28: 90-107.
- Carnap, R. 1928. *Der Logische Aufbau Der Welt*. Hamburg: Felix Meiner 1998.

- Carnap, R. 1928/2003. *The Logical Structure of the World and Pseudoproblems in Philosophy*. Chicago and La Salle: Open Court.
- Carnap, R. 1931/1996. The Elimination of Metaphysics through Logical Analysis of Language. In S. Sarkar (ed.), *Logical Empiricism at Its Peak Schlick, Carnap, and Neurath*. New York and London: Garland Publishing, pp. 10-32.
- Carnap, R. 1932. Über Protokollsätze. *Erkenntnis* 3: 215-228.
- Carnap, R. 1936. Testability and Meaning. *Philosophy of Science* 3: 419-471.
- Carnap, R. 1937/2000. *Logical Syntax of Language*. London: Routledge.
- Carnap, R. 1938. Foundations of Logic and Mathematics. In O. Neurath, C. Morris, and R. Carnap (eds.), *International Encyclopaedia of Unified Science. Vol. 1*. Chicago: University of Chicago Press, pp. 139-213.
- Carnap, R. 1952. Meaning Postulates. *Philosophical Studies* 3: 65-73.
- Carnap, R. 1956a. *Meaning and Necessity. A Study in Semantics and Modal Logic* (2nd ed.). Chicago and London: Chicago University Press.
- Carnap, R. 1956b. The Methodological Character of Theoretical Concepts. In H. Feigl, and M. Scriven (eds.), *The Foundations of Science and the Concepts of Psychology and Psychoanalysis* (Vol. I, Minnesota Studies in the Philosophy of Science). Minneapolis: University of Minnesota Press, pp. 38-76.
- Carnap, R. 1958. Beobachtungssprache Und Theoretische Sprache. . *Dialectica* 12: 236-248.
- Carnap, R. 1961. On the Use of Hilbert's E-Operator in Scientific Theories. In Y. Bar-Hillel, E. I. J. Poznanski, M. O. Rabin, and A. Robinson (eds.), *Essays on the Foundations of Mathematics*. Jerusalem: Magnes Press, pp. 156-164.
- Carnap, R. 1966. *An Introduction to the Philosophy of Science*. New York: Dover 1995 (Reprint of *Philosophical Foundations of Physics: An Introduction to the Philosophy of Science*. New York: Basic Books 1966).
- Carnap, R. 1967. *The Logical Structure of the World and Pseudoproblems in Philosophy* (R. A. George, Trans., Reprint 2005). Chicago and La Salle: Open Court.
- Carnap, R. 1975. Observation Language and Theoretical Language. In J. Hintikka (ed.), *Rudolf Carnap, Logical Empiricist. Materials and Perspectives*. Dordrecht: Reidel, pp. 75-85.
- Carrier, M. and J. Lenhard 2019. Climate Models: How to Assess Their Reliability. *International Studies in the Philosophy of Science* 32: 81-100.
- Cartwright, N. 1983. *How the Laws of Physics Lie*. Oxford: Oxford University Press.
- Cartwright, N. 1988. Capacities and Abstractions. In P. Kitcher, and S. Salmon (eds.), *Scientific Explanation*. Minneapolis: University of Minnesota Press, pp. 349-356.
- Cartwright, N. 1989. *Nature's Capacities and Their Measurement*. Oxford: Oxford University Press.
- Cartwright, N. 1991a. Fables and Model. *Proceedings of the Aristotelian Society. Supplementary Volume* 65: 55-68.
- Cartwright, N. 1991b. Replicability, Reproducibility, and Robustness: Comments on Harry Collins. *History of Political Economy* 23: 143-155.
- Cartwright, N. 1997. Models: The Blueprints for Laws. *Philosophy of Science* 64: 292-303.
- Cartwright, N. 1999a. *The Dappled World: A Study of the Boundaries of Science*. Cambridge: Cambridge University Press.
- Cartwright, N. 1999b. Models and the Limits of Theory: Quantum Hamiltonians and the Bcs Models of Superconductivity. In M. Morgan, and M. Morrison (eds.), *Models as Mediators. Perspectives on Natural and Social Science*. Cambridge: Cambridge University Press, pp. 241-281.

- Cartwright, N. 2010. Models: Parables V Fables. In R. Frigg, and M. C. Hunter (eds.), *Beyond Mimesis and Convention. Representation in Art and Science*. Berlin and New York: Springer, pp. 19-32.
- Cartwright, N. and H. Mendell 1984. What Makes Physics' Objects Abstract? In J. Cushing, C. F. Delaney, and G. M. Gutting (eds.), *Science and Reality*. Notre Dame: University of Notre Dame Press, pp. 134-152.
- Cartwright, N., T. Shomar, and M. Suárez 1995. The Tool-Box of Science: Tools for the Building of Models with a Superconductivity Example. In W. E. Herfel, W. Krajewski, I. Niiniluoto, and R. Wojcicki (eds.), *Theories and Models in Scientific Processes* (Poznań Studies in the Philosophy of Science and the Humanities 44). Amsterdam: Rodopi, pp. 137-149.
- Casini, L. 2014. Not-So-Minimal Models: Between Isolation and Imagination. *Philosophy of the Social Sciences* 44: 646-672.
- Castle, D. G. A. 2001. A Semantic View of Ecological Theories. *Dialectica* 55: 51-65.
- Cat, J. 2001. On Understanding: Maxwell on the Methods of Illustration and Scientific Metaphor. *Studies in History and Philosophy of Science* 32: 295-441.
- Cat, J. 2005. Modeling Cracks and Cracking Models: Structures, Mechanisms, Boundary Conditions, Constraints, Inconsistencies and the Proper Domains of Natural Laws. *Synthese* 146: 447-487.
- Cat, J. 2006a. Protocol Sentences. In S. Sarkar, and J. Pfeifer (eds.), *The Philosophy of Science. An Encyclopedia*. New York: Taylor & Francis, pp. 610-613.
- Cat, J. 2006b. Scientific Metaphors. In S. Sarkar, and J. Pfeifer (eds.), *The Philosophy of Science. An Encyclopedia*. New York: Taylor & Francis, pp. 737-740.
- Cat, J. 2021. Synthesis and Similarity in Science: Analogy in the Application of Mathematics and Application of Mathematics to Analogy. In S. Wuppuluri, and A. C. Grayling (eds.), *Words and Worlds: Use and Abuse of Analogies and Metaphors with Sciences and Humanities*. Cham: Springer (forthcoming), pp.
- Cercignani, C. 2006. *Ludwig Boltzmann: The Man Who Trusted Atoms*. Oxford: Oxford University Press.
- Chakravartty, A. 2001. The Semantic or Model-Theoretic View of Theories and Scientific Realism. *Synthese* 127: 325-345.
- Chakravartty, A. 2010. Perspectivism, Inconsistent Models, and Contrastive Explanation. *Studies in History and Philosophy of Science* 41: 405-412.
- Chakravartty, A. 2017. *Scientific Ontology: Integrating Naturalized Metaphysics and Voluntarist Epistemology*. Oxford: Oxford University Press.
- Chalmers, A. F. 1986. The Heuristic Role of Maxwell's Mechanical Model of Electromagnetic Phenomena. *Studies in History and Philosophy of Science* 17: 415-427.
- Chang, C. C. and H. J. Keisler 1990. *Model Theory* (3rd ed.). Amsterdam: North-Holland.
- Chang, H. 2004. *Inventing Temperature: Measurement and Scientific Progress*. Oxford: Oxford University Press.
- Chang, H. 2012. *Is Water H₂O? Evidence, Realism and Pluralism*. Dordrecht: Springer.
- Chirimuuta, M. 2014. Minimal Models and Canonical Neural Computations: The Distinctness of Computational Explanation in Neuroscience. *Synthese* 191: 127-153.
- Churchland, P. M. 1982. The Ontological Status of Observables: In Praise of the Superempirical Virtues. In D. Rothbarth (ed.), *Science, Reason, and Reality. Issues in the Philosophy of Science*. Philadelphia: Harcourt Brace 1998, pp. 413-422
- Churchland, P. M. 1988. Perceptual Plasticity and Theoretical Neutrality: A Reply to Jerry Fodor. *Philosophy of Science* 55: 167-187.

- Churchland, P. M. 1989. *A Neurocomputational Perspective: The Nature of Mind and the Structure of Science*. Cambridge/MA: MIT Press.
- Coffey, K. 2014. Theoretical Equivalence as Interpretative Equivalence. *The British Journal for the Philosophy of Science* 65: 821-844.
- Cohen, B. I. 2002. Newton's Concepts of Force and Mass, with Notes on the Laws of Motion. In B. I. Cohen, and G. E. Smith (eds.), *The Cambridge Companion to Newton*. Cambridge and New York: Cambridge University Press, pp. 57-84.
- Cohen, J. 2009. *The Red and the Real. An Essay on Color Ontology*. Oxford: Oxford University Press.
- Cohen, J. and C. Callender 2009. A Better Best System Account of Lawhood. *Philosophical Studies* 145: 1-34.
- Collier, J. D. 2002. Critical Notice: Paul Thompson, the Structure of Biological Theories. *Canadian Journal of Philosophy* 22: 287-298.
- Colyvan, M. 2013. Idealisations in Normative Models. *Synthese* 190: 1337-1350.
- Colyvan, M. and L. R. Ginzburg 2003. The Galilean Turn in Population Ecology. *Biology and Philosophy* 18: 401-414.
- Colyvan, M. and L. R. Ginzburg 2006. Analogical Thinking in Ecology: Looking Beyond Disciplinary Boundaries. *The Quarterly Review of Biology* 85: 171-182.
- Contessa, G. 2006. Scientific Models, Partial Structures and the New Received View of Theories. *Studies in History and Philosophy of Science* 37: 370-377.
- Contessa, G. 2007. Scientific Representation, Interpretation, and Surrogate Reasoning. *Philosophy of Science* 74: 48-68.
- Contessa, G. 2010a. Empiricist Structuralism, Metaphysical Realism, and the Bridging Problem. *Analysis Reviews* 70: 514-525.
- Contessa, G. 2010b. Scientific Models and Fictional Objects. *Synthese* 172: 215-229.
- Contessa, G. 2016. It Ain't Easy: Fictionalism, Deflationism, and Easy Arguments in Ontology. *Mind* 125: 763-773.
- Copi, I. M. and C. Cohen 1998. *Introduction to Logic* (10th ed.). Upper Saddle River: Prentice Hall.
- Copi, I. M., C. Cohen, and K. McMahon 2016. *Introduction to Logic* (14th ed.). Harlow: Pearson.
- Corcoran, J. 1980. Categoricity. *History and Philosophy of Logic* 1: 187-207.
- Cornman, J. W. 1972. Craig's Theorem, Ramsey-Sentences, and Scientific Instrumentalism. *Synthese* 25: 82-128.
- Craig, W. 1953. On Axiomatizability within a System. *The Journal of Symbolic Logic* 18: 30-32.
- Craig, W. 1956. Replacement of Auxiliary Expressions. *The Philosophical Review* 65: 38-55.
- Craig, W. 2008. The Road to Two Theorems of Logic. *Synthese* 164: 333-339.
- Crasnow, S. L. 2001. Models and Reality: When Science Tackles Sex. *Hypatia* 16: 138-148.
- Craver, C. 2002. Theories and Models. In P. Machamer, and M. Silberstein (eds.), *The Blackwell Guide to the Philosophy of Science*. Malden/MA and Oxford: Blackwell, pp. 55-79.
- Craver, C. 2010. Prosthetic Models. *Philosophy of Science* 182: 840-851.
- Creath, R. 2017. Logical Empiricism. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/fall2017/entries/logical-empiricism/>.
- Cristalli, C. and J. Sánchez-Dorado 2021. Colligation in Modelling Practices: From Whewell's Tides to the San Francisco Bay Model. *Studies in History and Philosophy of Science* 85: 1-15.
- Crittenden, C. 1991. *Unreality: The Metaphysics of Fictional Objects*. Ithaca and London: Cornell University Press.

- Crowther, K., N. S. Linnemann, and C. Wüthrich 2021. What We Cannot Learn from Analogue Experiments. *Synthese*: 3701-3726.
- Curiel, E. 2014. Classical Mechanics Is Lagrangian; It Is Not Hamiltonian. *The British Journal for the Philosophy of Science* 65: 269-321.
- Currie, A. 2015. Philosophy of Science and the Curse of the Case Study. In C. Daly (ed.), *The Palgrave Handbook of Philosophical Methods*. Houndsmills and New York: Palgrave Macmillan, pp. 553-572.
- Cushing, J. T. 1982a. Models and Methodologies in Current Theoretical High-Energy Physics. *Synthese* 50: 5-101.
- Cushing, J. T. 1982b. Models, High-Energy Theoretical Physics and Realism. *Proceedings of the Biennial Meeting of the Philosophy of Science Association 1982* Vol. 2: 31-56.
- Da Costa, N. C. A. and R. Chuaqui 1988. On Suppes' Set Theoretical Predicates. *Erkenntnis* 29: 95-112.
- Da Costa, N. C. A. and S. French 1990. The Model-Theoretic Approach in the Philosophy of Science. *Philosophy of Science* 57: 248-265.
- Da Costa, N. C. A. and S. French 2000. Models, Theories, and Structures: Thirty Years On. *Philosophy of Science (Supplement)* 67: 116-127.
- Da Costa, N. C. A. and S. French 2003. *Science and Partial Truth: A Unitary Approach to Models and Scientific Reasoning*. Oxford: Oxford University Press.
- Da Costa, N. C. A., D. Krause, and O. Bueno 2010. Issues in the Foundations of Science, I: Languages, Structures, and Models. *Manuscrito* 33: 123-141.
- Dardashti, R., S. Hartmann, K. P. Y. Thébault, and E. Winsberg 2019. Hawking Radiation and Analogue Experiments: A Bayesian Analysis. *Studies in History and Philosophy of Modern Physics* 67: 1-11.
- Dardashti, R., K. P. Y. Thébault, and E. Winsberg 2017. Confirmation Via Analogue Simulation: What Dumb Holes Could Tell Us About Gravity. *The British Journal for the Philosophy of Science* 68: 55-89.
- Darden, L. 1982. Artificial Intelligence and Philosophy of Science: Reasoning by Analogy in Theory Construction. *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association 1982* Vol. 2: 147-165.
- Darden, L. and R. Rada 1988. Hypothesis Formation Using Part-Whole Interrelations. In D. H. Helman (ed.), *Analogical Reasoning: Perspectives of Artificial Intelligence, Cognitive Science, and Philosophy*. Dordrecht: Kluwer, pp. 341-375.
- Darrigol, O. 2008. The Modular Structure of Physical Theories. *Synthese* 162: 195-223.
- Darrigol, O. 2010a. The Analogy between Light and Sound in the History of Optics from the Ancient Greeks to Isaac Newton. Part 1. *Centaurus* 52: 117-155.
- Darrigol, O. 2010b. The Analogy between Light and Sound in the History of Optics from the Ancient Greeks to Isaac Newton. Part 2. *Centaurus* 52: 206-257.
- Darrigol, O. 2016. Models, Structure, and Generality in Clerk Maxwell's Theory of Electromagnetism. In K. Chemla, R. Chorlay, and D. Rabouin (eds.), *The Oxford Handbook of Generality in Mathematics and the Sciences*. Oxford: Oxford University Press, pp. 345-356.
- Davidsson, P., F. Klügl, and H. Verhagen 2017. Simulation of Complex Systems. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 783-797.
- Davies, T. R. 1988. Determination, Uniformity, and Relevance: Normative Criteria for Generalization and Reasoning by Analogy. In D. H. Helman (ed.), *Analogical Reasoning: Perspectives of Artificial Intelligence, Cognitive Science, and Philosophy*. Dordrecht: Kluwer, pp. 227-250.
- Davison, A. C. 2003. *Statistical Models*. Cambridge: Cambridge University Press.

- de Chadarevian, S. 2004. Models and the Making of Molecular Biology. In S. de Chadarevian, and N. Hopwood (eds.), *Models: The Third Dimension of Science*. Stanford: Stanford University Press, pp. 339-368.
- de Donato Rodriguez, X. and J. Zamora Bonilla 2009. Credibility, Idealisation, and Model Building: An Inferential Approach. *Erkenntnis* 70: 101-118.
- de Regt, H. W. 1999. Ludwig Boltzmann's "Bildtheorie" and Scientific Understanding. *Synthese* 119: 113-134.
- de Regt, H. W. 2017. *Understanding Scientific Understanding*. Oxford: Oxford University Press.
- Decock, L. and I. Douven 2011. Similarity after Goodman. *Review of Philosophy and Psychology* 2: 61-75.
- Del Re, G. 2000. Models and Analogies in Science. *Hyle* 6: 5-15.
- Demopoulos, W. 2007. Carnap on the Rational Reconstruction of Scientific Theories. In M. Friedman, and R. Creath (eds.), *The Cambridge Companion to Carnap*. Cambridge: Cambridge University Press, pp. 248-272.
- Demopoulos, W. 2013. *Logicism and Its Philosophical Legacy*. Cambridge: Cambridge University Press.
- Demopoulos, W. and M. Friedman 1985. Bertrand Russell's the Analysis of Matter: Its Historical Context and Contemporary Interest. *Philosophy of Science* 52: 621-639.
- Dennett, D. C. 1995. Cognitive Science as Reverse Engineering: Several Meanings of "Top-Down" and "Bottom-Up". In D. Prawitz, B. Skyrms, and D. Westerstahl (eds.), *Logic, Methodology and Philosophy of Science IX*. Amsterdam: North Holland, pp. 680-689.
- Deutsch, K. W. 1948. Some Notes on Research on the Role of Models in the Natural and Social Sciences. *Synthese* 7: 506-533.
- Deutsch, K. W. 1951. Mechanism, Organism, and Society: Some Models in Natural and Social Science. *Philosophy of Science* 18: 230-252.
- Devitt, M. and R. Hanley (eds.) 2006. *The Blackwell Guide to the Philosophy of Language*. Oxford: Blackwell.
- Dewar, N. 2019. Ramsey Equivalence. *Erkenntnis* 84: 77-99.
- Dhaene, G., C. Gourieroux, and O. Scaillet 1998. Instrumental Models and Indirect Encompassing. 66: 673-688.
- Diederich, W. 1994. The Semantic Conception of Theories and Scientific Realism Byfrederick Suppe. *Erkenntnis* 41: 421-426.
- Dieks, D. 2009. Understanding in Physics: Bottom-up Versus Top-Down. In H. W. de Regt, S. Leonelli, and K. Eigner (eds.), *Scientific Understanding, Philosophical Perspectives*. Pittsburgh: University of Pittsburgh Press, pp. 230-248.
- Díez, J. A. 1997a. A Hundred Years of Numbers. An Historical Introduction to Measurement Theory 1887-1990. Part I. *Studies in History and Philosophy of Science* 28: 167-185.
- Díez, J. A. 1997b. A Hundred Years of Numbers. An Historical Introduction to Measurement Theory 1887-1990. Part II. *Studies in History and Philosophy of Science* 28: 231-265.
- Díez, J. A. 2002. A Program for the Individuation of Scientific Concepts. *Synthese* 130: 13-48.
- Díez, J. A. 2005. The Ramsey Sentence and Theoretical Content. In M. J. Frápolli (ed.), *F.P. Ramsey: Critical Reassessments*: Continuum Publishing Group, pp. 70-103.
- Díez, J. A. 2006. Rivalry and Comparability: Looking Outside the Theories. In G. Ernst, and K. G. Niebergall (eds.), *Philosophie Der Wissenschaft – Wissenschaft Der Philosophie*. Berlin: Mentis, pp. 31-50.
- Díez, J. A. 2014. Scientific W-Explanation as Ampliative, Specialized Embedding: A Neo-Hempel Account. *Erkenntnis* 79: 1413-1443.

- Diez, J. A. 2020. An Ensemble-Plus-Standing-for Account of Scientific Representation: No Need for (Unnecessary) Abstract Objects. In C. Martínez-Vidal, and J. L. Falguera (eds.), *Abstract Objects. For and Against*. Cham: Springer, pp. 133-149.
- Dizadji-Bahmani, F., R. Frigg, and S. Hartmann 2010. Who's Afraid of Nagelian Reduction. *Erkenntnis* 73: 393-412.
- Dodig-Crnkovic, G. and A. Cicchetti 2017. Computational Aspects of Model-Based Reasoning. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 695-718.
- Doi, M. and S. F. Edwards 1986. *The Theory of Polymer Dynamics*. Oxford: Clarendon Press.
- Douglas, H. E. 2009. *Science, Policy, and the Value-Free Ideal* Pittsburgh: University of Pittsburgh Press.
- Downes, S. M. 1992. The Importance of Models in Theorizing: A Deflationary Semantic View. *Proceedings of the Biennial Meeting of the Philosophy of Science Association 1992* Vol. 1: 142-153.
- Downes, S. M. 2011. Scientific Models. *Philosophy Compass* 6 6: 757-764.
- Downes, S. M. 2021. *Models and Modeling in the Sciences: A Philosophical Introduction*. New York and London: Routledge.
- Draper, N. R. and H. Smith 1966. *Applied Regression Analysis*. New York: John Wiley & Sons.
- Dretske, F. 1969. *Seeing and Knowing*. London: Routledge and Keagan Paul.
- Ducheyne, S. 2007. Abstraction Vs. Idealization. *The Reasoner* 1: 9-10.
- Ducheyne, S. 2008. Towards an Ontology of Scientific Models. *Metaphysica* 9: 119-127.
- Ducheyne, S. 2012. Scientific Representations as Limiting Cases. *Erkenntnis* 76: 73-89.
- Duhem, P. 1906. *La Théorie Physique, Son Objet Et Sa Structure*. 2nd ed., Chevalier & Rivière: Paris 1914 (Engl. trans. by Philip P. Wiener: *The aim and Structure of Physical Theory*. Princeton 1954).
- Dutilh Novaes, C. 2019. Axiomatizations of Arithmetic and the First-Order/Second-Order Divide. *Synthese* 196: 2583-2597.
- Dutilh Novaes, C. and E. Reck 2017. Carnapian Explication, Formalisms as Cognitive Tools, and the Paradox of Adequate Formalization. *Synthese* 194: 195-215.
- Earman, J. 2005. The Emperor's New Theory: The Semantic/Models View of Theories. *Draft*.
- Earman, J. 2019. The Role of Idealizations in the Aharonov–Bohm Effect. *Synthese* 196: 1991-2019.
- Edwards, P. N. 2010. *A Vast Machine. Computer Models, Climate Data, and the Politics of Global Warming*. Cambridge, MA: MIT Press.
- Elgin, C. Z. 1983. *With Reference to Reference*. Indianapolis and Cambridge: Hackett Publishing Company.
- Elgin, C. Z. 1996. *Considered Judgment*. Princeton: Princeton University Press.
- Elgin, C. Z. 2004. True Enough. *Philosophical Issues* 14: 113-131.
- Elgin, C. Z. 2010. Telling Instances. In R. Frigg, and M. C. Hunter (eds.), *Beyond Mimesis and Convention. Representation in Art and Science*. Berlin and New York: Springer, pp. 1-17.
- Elgin, C. Z. 2017. *True Enough*. Cambridge/MA and London: MIT Press.
- Elkins, J. 1999. *The Domain of Images*. Ithaca and London: Cornell University Press.
- Elkins, J. (ed.) 2007. *Visual Practices across the University*. Berlin: Wilhelm Fink.
- Elliott-Graves, A. 2020. What Is a Target System? *Biology and Philosophy* 35: Article 28.
- Elliott-Graves, A. and M. Weisberg 2014. Idealization. *Philosophy Compass* 9: 176-185.

- Emch, G. G. 2007a. Models and the Dynamics of Theory-Building in Physics. Part I - Modeling Strategies. *Studies in History and Philosophy of Modern Physics* 38: 558-585.
- Emch, G. G. 2007b. Models and the Dynamics of Theory-Building in Physics. Part II - Case Studies. *Studies in History and Philosophy of Modern Physics* 38: 683-723.
- Emch, G. G. and C. Liu 2002. *The Logic of Thermostatistical Physics*. Berlin: Springer.
- Enç, B. 1976. Reference of Theoretical Terms. *Nous* 10: 261-282.
- Enderton, H. B. 2001. *A Mathematical Introduction to Logic* (2nd ed.). San Diego and New York: Harcourt.
- English, J. 1973. Underdetermination: Craig and Ramsey. *The Journal of Philosophy* 70: 453-462.
- Ereshefsky, M. 1991. The Semantic Approach to Evolutionary Theory. *Biology and Philosophy* 6: 59-80.
- Eronen, M. I. 2015. Robustness and Reality. *Synthese* 192: 3961-3977.
- Estany, A. 2001. The Thesis of Theory-Laden Observation in the Light of Cognitive Psychology. *Philosophy of Science* 68: 203-217.
- Evagorou, M., S. Erduran, and T. Mäntylä 2015. The Role of Visual Representations in Scientific Practices: From Conceptual Understanding and Knowledge Generation to 'Seeing' How Science Works. *International Journal of STEM Education* 2: 1-13.
- Evans, P. W. and K. P. Y. Thébault 2020. What Can Bouncing Oil Droplets Tell Us About Quantum Mechanics? *European Journal for Philosophy of Science* 10: Article 39.
- Falguera, J. L. 2006. Foundherentist Philosophy of Science. In G. Ernst, and K. G. Niebergall (eds.), *Philosophie Der Wissenschaft – Wissenschaft Der Philosophie*. Berlin: Mentis, pp. 67-86.
- Fang, W. 2017. Holistic Modeling: An Objection Toweisberg's Weighted Feature-Matching Account. *Synthese* 194: 1743-1764.
- Farre, G. L. 1967. Remarks on Swanson's Theory of Models. *The British Journal for the Philosophy of Science* 18: 140-144.
- Feigl, H. 1950. Existential Hypotheses. Realistic Versus Phenomenalistic Interpretations. *Philosophy of Science* 17: 35-62.
- Feigl, H. 1970. The "Orthodox" View of Theories: Remarks in Defense as Well as Critique. In M. Radner, and S. Winokur (eds.), *Analyses of Theories and Methods of Physics and Psychology*. (Vol. IV, Minnesota Studies in the Philosophy of Science). Minneapolis: University of Minnesota Press, pp. 3-16.
- Fetzer, J. 2021. Carl Hempel. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/spr2021/entries/hempel/>.
- Feyerabend, P. K. 1960. Patterns of Discovery. *The Philosophical Review* 69: 247-252.
- Feyerabend, P. K. 1965. Problems of Empiricism. In R. G. Colodny (ed.), *Beyond the Edge of Certainty*. Englewood Cliffs (NJ): Prentice Hall, pp. 145-260.
- Feyerabend, P. K. 1981. Explanation, Reduction and Empiricism. Philosophical Papers, Volume 1. In P. K. Feyerabend (ed.), *Realism, Rationalism and Scientific Method*. Cambridge: Cambridge University Press, pp. 44-96.
- Field, H. 1980. *Science without Numbers*. Princeton: Princeton University Press.
- Fisher, I. 1911. *The Purchasing Power of Money: Its Determination and Relation to Credit and Crisis*. New York: Macmillan.
- Fletcher, S. C. 2019. Minimal Approximations and Norton's Dome. *Synthese* 196: 1749-1760.
- Fletcher, S. C. 2020. The Principle of Stability. *Philosopher's Imprint* 20: 1-22.
- Floridi, L. 2012. Big Data and Their Epistemological Challenge. *Philosophy and Technology* 25: 435-437.

- Fodor, J. 1984. Observation Reconsidered. *Philosophy of Science* 51: 23-43.
- Fogelin, R. 2011. *Figuratively Speaking* (2nd ed.). Oxford: Oxford University Press.
- Forge, J. 1991. The Semantic Conception of Theories and Scientific Realism by Frederick Suppe. *Isis* 82: 607-608.
- Forster, M. R. 2002. Predictive Accuracy as an Achievable Goal of Science. *Philosophy of Science* 69.
- Forster, M. R. and E. Sober 1994. How to Tell When Simpler, More Unified, or Less Ad Hoc Theories Will Provide More Accurate Predictions. *The British Journal for the Philosophy of Science* 45: 1-35.
- Fowler, A. C. 1997. *Mathematical Models in the Applied Sciences* (Cambridge Texts in Applied Mathematics). Cambridge Cambridge University Press.
- Franklin, A. 1986. *The Neglect of Experiment*. Cambridge: Cambridge University Press.
- Franklin, A. 2015. The Theory-Ladenness of Experiment. *Journal for General Philosophy of Science* 46: 155-166.
- Frege, G. 1892. Über Sinn Und Bedeutung. *Zeitschrift für Philosophie und philosophische Kritik* 100: 25-50.
- French, S. 2000. The Reasonable Effectiveness of Mathematics: Partial Structures and the Application of Group Theory to Physics. *Synthese* 125: 103-120.
- French, S. 2003. A Model-Theoretic Account of Representation (or, I Don't Know Much About Art...But I Know It Involves Isomorphism). *Philosophy of Science* 70: 1472-1483.
- French, S. 2008. The Structure of Scientific Theories. In S. Psillos, and M. Curd (eds.), *The Routledge Companion to Philosophy of Science*. London and New York: Routledge, pp. 269-280.
- French, S. 2010. Keeping Quiet on the Ontology of Models. *Synthese* 172.
- French, S. 2014. *The Structure of the World. Metaphysics and Representation*. Oxford: Oxford University Press.
- French, S. 2017. Identity Conditions, Idealisations and Isomorphisms: A Defence of the Semantic Approach. *Synthese*, <https://doi.org/10.1007/s11229-017-1564-z>.
- French, S. 2020. *There Are No Such Things as Theories*. Oxford: Oxford University Press.
- French, S. and J. Ladyman 1997. Superconductivity and Structures: Revisiting the London Account. *Studies in History and Philosophy of Modern Physics* 28: 363-393.
- French, S. and J. Ladyman 1998. Semantic Perspective on Idealisation in Quantum Mechanics. In N. Shanks (ed.), *Idealization Ix: Idealisation in Contemporary Physics. Posnan Studies in the Philosophy of the Sciences and the Humanities* (Vol. 63). Amsterdam: Rodopi, pp. 51-73.
- French, S. and J. Ladyman 1999. Reinflating the Semantic Approach. *International Studies in the Philosophy of Science* 13: 103-121.
- French, S. and J. Saatsi 2006. Realism About Structure: The Semantic View and Nonlinguistic Representations. *Philosophy of Science* 73: 548-559.
- French, S. and P. Vickers 2011. Are There No Things That Are Scientific Theories? *The British Journal for the Philosophy of Science* 62 771-804.
- Frey, G. 1961. Symbolische Und Ikonische Modelle. In H. Freudenthal (ed.), *The Concept and the Role of the Model in Mathematics and Natural and Social Sciences*. Dordrecht: Reidel, pp. 89-97.
- Fridland, E. R. 2015. Skill, Nonpropositional Thought, and the Cognitive Penetrability of Perception. *Journal for General Philosophy of Science* 46: 105-120.
- Friedman, M. 1982. Review of 'the Scientific Image'. *The Journal of Philosophy* 79: 274-283.
- Friedman, M. 2011. Carnap on Theoretical Terms: Structuralism without Metaphysics. *Synthese* 180: 249-263.

- Friend, S. 2007. Fictional Characters. *Philosophy Compass* 2: 141-156.
- Frigg, R. 2002. Models and Representation: Why Structures Are Not Enough. *Measurement in Physics and Economics Project Discussion Paper Series, DP MEAS 25/02*.
- Frigg, R. 2006. Scientific Representation and the Semantic View of Theories. *Theoria* 55: 49-65.
- Frigg, R. 2008. A Field Guide to Recent Work on the Foundations of Statistical Mechanics. In D. Rickles (ed.), *The Ashgate Companion to Contemporary Philosophy of Physics*. London: Ashgate, pp. 99-196.
- Frigg, R. 2010a. Fiction and Scientific Representation. In R. Frigg, and M. Hunter (eds.), *Beyond Mimesis and Convention: Representation in Art and Science*. Berlin and New York: Springer, pp. 97-138.
- Frigg, R. 2010b. Fiction in Science. In J. Woods (ed.), *Fictions and Models: New Essays*. Munich: Philosophia Verlag, pp. 247-287.
- Frigg, R. 2010c. Models and Fiction. *Synthese* 172 251-268.
- Frigg, R. 2021. Scientific Modelling and Make-Believe. In S. Sedivy (ed.), *Art, Representation, and Make-Believe. Essays on the Philosophy of Kendall L. Walton*. London: Routledge, pp. 367-383.
- Frigg, R., S. Bradley, H. Du, and L. A. Smith 2014. The Adventures of Laplace's Demon and His Apprentices. *Philosophy of Science* 81: 31-59.
- Frigg, R. and S. Hartmann 2020. Models in Science. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, pp.
- Frigg, R. and J. Nguyen 2016. The Fiction View of Models Reloaded. *The Monist* 99: 225-242.
- Frigg, R. and J. Nguyen 2017a. Models and Representation. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 49-102.
- Frigg, R. and J. Nguyen 2017b. Scientific Representation Is Representation-As. In H.-K. Chao, and J. Reiss (eds.), *Philosophy of Science in Practice: Nancy Cartwright and the Nature of Scientific Reasoning* (Synthese Library). Dordrecht, Heidelberg, London and New York: Springer, pp. 149-179.
- Frigg, R. and J. Nguyen 2018. The Turn of the Valve: Representing with Material Models. *European Journal for Philosophy of Science* 8: 205-224.
- Frigg, R. and J. Nguyen 2020. *Modelling Nature: An Opinionated Introduction to Scientific Representation* (Synthese Library). Berlin and New York: Springer.
- Frigg, R. and J. Nguyen 2021a. Mirrors without Warnings. *Synthese* 198: 2427-2447
- Frigg, R. and J. Nguyen 2021b. Seven Myths About the Fiction View of Models. In A. Cassini, and J. Redmond (eds.), *Idealizations in Science: Fictional and Artifactual Approaches*. Berlin and New York: Springer, pp. 133-157.
- Frigg, R. and J. Reiss 2009. The Philosophy of Simulation: Hot New Issues or Same Old Stew? *Synthese* 169: 593-613.
- Frigg, R., L. A. Smith, and D. A. Stainforth 2015. An Assessment of the Foundational Assumptions in High-Resolution Climate Projections: The Case of UKCP09. *Synthese* 192: 3979-4008.
- Frigg, R., E. Thompson, and C. Werndl 2015. Philosophy of Climate Science Part II: Modelling Climate Change. *Philosophy Compass* 10: 965-977.
- Frigg, R. and I. Votsis 2011. Everything You Always Wanted to Know About Structural Realism but Were Afraid to Ask. *European Journal for Philosophy of Science* 1: 227-276.
- Frisch, M. 1998. *Theories, Models, and Explanation*. : PhD Dissertation, University of California, Berkely.

- Frisch, M. 2005. *Inconsistency, Asymmetry, and Non-Locality: A Philosophical Investigation of Classical Electrodynamics*. Oxford: Oxford University Press.
- Frisch, M. 2014. Models and Scientific Representations Or: Who Is Afraid of Inconsistency? *Synthese* 191: 3027-3040.
- Frisch, M. 2015. Users, Structures, and Representation. *The British Journal for the Philosophy of Science* 66: 285-306.
- Fülöp, A., Z. Turócz, D. Garbaisz, L. Harsányi, and A. Szijártó 2013. Experimental Models of Hemorrhagic Shock: A Review. *European Surgical Research* 50: 57-70.
- Fumagalli, R. 2015. No Learning from Minimal Models. *Philosophy of Science* 82: 798-809.
- Fumagalli, R. 2016. Why We Cannot Learn from Minimal Models. *Erkenntnis* 81: 433-455.
- Gähde, U. 2002. Holism, Underdetermination, and the Dynamics of Empirical Theories. *Synthese* 130: 69-90.
- Gaifman, H. 1984. Why Language? In W. Balzer (ed.), *Reduction in Science*. Dordrecht: Reidel, pp. 319-330.
- Gaifman, H., D. N. Osherson, and S. Weinstein 1990. A Reason for Theoretical Terms. *Erkenntnis* 32: 149-159.
- Gale, G. 1998. Idealization in Cosmology: A Case Study. In N. Shanks (ed.), *Idealization IX: Idealization in Contemporary Physics. Poznań Studies in the Philosophy of the Sciences and the Humanities, Vol. 63*. Amsterdam: Rodopi, pp. 165-182.
- Gallegos Ordorica, S. A. 2016. The Explanatory Role of Abstraction Processes in Models: The Case of Aggregations. *Studies in History and Philosophy of Science* 56: 161-167.
- Gelfert, A. 2011. Mathematical Formalisms in Scientific Practice: From Denotation to Model-Based Representation. *Studies in History and Philosophy of Science* 42: 272-286.
- Gelfert, A. 2013. Strategies of Model-Building in Condensed Matter Physics: Trade-Offs as a Demarcation Criterion between Physics and Biology? *Synthese* 190: 253-272.
- Gelfert, A. 2016. *How to Do Science with Models: A Philosophical Primer*. Cham: Springer
- Gelfert, A. 2017. The Ontology of Models. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 5-23.
- Gelfert, A. 2019. Probing Possibilities: Toy Models, Minimal Models, and Exploratory Models. In Á. Nepomuceno-Fernández, L. Magnani, F. J. Salguero-Lamillar, C. Barés-Gómez, and M. Fontaine (eds.), *Model-Based Reasoning in Science and Technology. Inferential Models for Logic, Language, Cognition and Computation*. Cham: Springer, pp. 3-19.
- Gentner, D. 1982. Are Scientific Analogies Metaphors? In D. S. Miall (ed.), *Metaphor: Problems and Perspectives*. Brighton: Harvester Press, pp. 106-132.
- Gentner, D., B. Falkenhainer, and J. Skorstad 1988. Viewing Metaphor as Analogy. In D. H. Helman (ed.), *Analogical Reasoning: Perspectives of Artificial Intelligence, Cognitive Science, and Philosophy*. Dordrecht: Kluwer, pp. 171-177.
- Gerritsen, C. and T. Bosse 2017. Model-Based Reasoning in Crime Prevention. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht Heidelberg: Springer, pp. 1051-1063.
- Gibbard, A. and H. R. Varian 1978. Economic Models. *The Journal of Philosophy* 75: 664-677.
- Giere, R. N. 1985. Constructive Realism. In P. M. Churchland, and C. A. Hooker (eds.), *Images of Science: Essays on Realism and Empiricism with a Reply from Bas C. Van Fraassen*. Chicago and London, pp. 75-98.
- Giere, R. N. 1988. *Explaining Science: A Cognitive Approach*. Chicago: Chicago University Press.

- Giere, R. N. 1994. The Cognitive Structure of Scientific Theories. *Philosophy of Science* 61: 276-296.
- Giere, R. N. 1996. Visual Models and Scientific Judgement In B. S. Baigrie (ed.), *Picturing Knowledge: Historical and Philosophical Problems Concerning the Use of Art in Science*. Toronto University of Toronto Press, pp. 269-302.
- Giere, R. N. 1997. *Understanding Scientific Reasoning* (4th ed.). Orlando/FL: Harcourt Brace.
- Giere, R. N. 1999a. *Science without Laws*. Chicago: University of Chicago Press.
- Giere, R. N. 1999b. Visual Models. In R. N. Giere (ed.), *Science without Laws*. Chicago: University of Chicago Press, pp. 118-146.
- Giere, R. N. 2000. Theories. In W. H. Newton-Smith (ed.), *A Companion to the Philosophy of Science*. Oxford: Wiley-Blackwell, pp. 515-524.
- Giere, R. N. 2001. The Nature and Function of Models. *Behavioral and Brain Sciences* 24: 1060.
- Giere, R. N. 2004. How Models Are Used to Represent Reality. *Philosophy of Science* 71: 742-752.
- Giere, R. N. 2006. *Scientific Perspectivism*. Chicago and London: University of Chicago Press.
- Giere, R. N. 2009a. Essay Review: Scientific Representation and Empiricist Structuralism. *Philosophy of Science* 76: 101-111.
- Giere, R. N. 2009b. Scientific Perspectivism: Behind the Stage Door. *Studies in History and Philosophy of Science* 40: 221-223.
- Giere, R. N. 2009c. Why Scientific Models Should Not Be Regarded as Works of Fiction. In M. Suárez (ed.), *Fictions in Science. Philosophical Essays on Modelling and Idealization*. London: Routledge, pp. 248-258.
- Giere, R. N. 2010. An Agent-Based Conception of Models and Scientific Representation. *Synthese* 172: 269-281.
- Giere, R. N. 2018. Models of Experiments. In I. Peschard, and B. C. van Fraassen (eds.), *The Experimental Side of Modeling*. Minnesota: University of Minnesota Press, pp. 59-70.
- Gilboa, I., A. Postlewaite, L. Samuelson, and D. Schmeidler 2014. Economic Models as Analogies. *The Economic Journal* 124: 513-533.
- Gillies, D. 1972. Operationalism. *Synthese* 25: 1-24.
- Gillies, D. 1993. *Philosophy of Science in the Twentieth Century. Four Central Themes*. Oxford: Blackwell.
- Girill, T. R. 1971. Formal Models and Achinstein's Analogies. *Philosophy of Science* 38: 96-104.
- Girill, T. R. 1972. Analogies and Models Revisited. *Philosophy of Science* 39: 241-244.
- Glennan, S. and P. Illari (eds.) 2017. *The Routledge Handbook of Mechanisms and Mechanical Philosophy*. London: Routledge.
- Glymour, B. 2000. Data and Phenomena: A Distinction Reconsidered. *Erkenntnis* 52: 29-37.
- Glymour, C. 1971. Theoretical Realism and Theoretical Equivalence. In R. C. Buck, and R. Cohen (eds.), *Proceeding of the 1970 Biennial Meeting Philosophy of Science Association*. (Vol. VIII, Boston Studies in the Philosophy of Science). Dordrecht: Reidel, pp. 275-288.
- Glymour, C. 1992. *Realism and the Nature of Theories* (Introduction to the Philosophy of Science). Indianapolis and Cambridge: Hackett.
- Glymour, C. 2013. Equivalence and the Semantic View of Theories. *Philosophy of Science* 80: 286-297.
- Godfrey-Smith, P. 2006. The Strategy of Model-Based Science. *Biology and Philosophy* 21: 725-740.

- Godfrey-Smith, P. 2009. Abstractions, Idealizations, and Evolutionary Biology. In A. Barberousse, M. Morange, and T. Pradeu (eds.), *Mapping the Future of Biology: Evolving Concepts and Theories. Boston Studies in the Philosophy and History of Science, Vol. 266*. Dordrecht: Springer, pp. 47-56.
- Godfrey-Smith, P. 2020a. Dewey and Anti-Representationalism. In S. Fesmire (ed.), *The Oxford Handbook of Dewey*. Oxford: Oxford University Press, pp. 151-172.
- Godfrey-Smith, P. 2020b. Models, Fictions and Conditions. In A. Levy, and P. Godfrey-Smith (eds.), *The Scientific Imagination. Philosophical and Psychological Perspectives*. Cambridge: Cambridge University Press, pp. 154-177.
- Goldstein, H. 1980. *Classical Mechanics*. Reading/MA: Addison Wesley.
- González, W. J. 2014. On Representation and Models in Bas Van Fraassen's Approach. In W. J. González (ed.), *Bas Van Fraassen's Approach to Representation and Models in Science*. Dordrecht: Springer, pp. 3-37.
- Goodman, N. 1972. Seven Strictures on Similarity. In N. Goodman (ed.), *Problems and Projects*. Indianapolis and New York: Bobbs-Merrill, pp. 437-446.
- Goodman, N. 1976. *Languages of Art*. 2nd ed., Indianapolis and Cambridge: Hackett.
- Goossens, L. H. J., R. M. Cooke, A. R. Hale, and L. Rodić-Wiersma 2008. Fifteen Years of Expert Judgement at Tufelst. *Safety Science* 46: 234-244.
- Graham Kennedy, A. 2012. A Non Representationalist View of Model Explanation. *Studies in History and Philosophy of Science* 43: 326-332.
- Grandori, A. 2010. A Rational Heuristic Model of Economic Decision Making. *Rationality and Society* 22: 477-504.
- Gratzl, N. and G. Schiemer 2017. Two Types of Indefinites: Hilbert & Russell. *IfCoLog Journal of Logics and their Applications* 4: 333-348.
- Green, S. 2013. When One Model Is Not Enough: Combining Epistemic Tools in Systems Biology. *Studies in History and Philosophy of Biological and Biomedical Science*: 170-180.
- Grobler, A. 1995. The Representational and the Non-Representational in Models of Scientific Theories. In W. E. Herfel, W. Krajewski, I. Niiniluoto, and R. Wojcicki (eds.), *Theories and Models in Scientific Processes* (Poznań Studies in the Philosophy of Science and the Humanities 44). Amsterdam: Rodopi, pp. 37-48.
- Groddeck, W. 1995. *Reden Über Rhetorik. Zu Einer Stilistik Des Lesens*. Basel: Stroemfeld.
- Groenewold, H. J. 1961. The Model in Physics. In H. Freudenthal (ed.), *The Concept and the Role of the Model in Mathematics and Natural and Social Sciences*. Dordrecht: Reidel, pp. 98-103.
- Grüne-Yanoff, T. 2009. Learning from Minimal Economic Models. *Erkenntnis* 70: 81-99.
- Grüne-Yanoff, T. 2011. Isolation Is Not Characteristic of Models. *Erkenntnis* 25: 119-137.
- Grüne-Yanoff, T. 2013. Appraising Models Nonrepresentationally. *Philosophy of Science* 80: 850-861.
- Grüne-Yanoff, T. and C. Marchionni 2018. Modeling Model Selection in Model Pluralism. *Journal of Economic Methodology* 25 265-275.
- Gruner, S. 2013. Eric Winsberg: Science in the Age of Computer Simulation. *Minds & Machines* 23: 251-254.
- Guala, F. and A. Salanti 2002. On the Robustness of Economic Models. *Quaderni di ricerca del Dipartimento di Scienze Economiche "Hyman P. Minsky"* 8: 1-24.
- Gueguen, M. 2020. On Robustness in Cosmological Simulations. *Philosophy of Science* 87: 1197-1208.
- Gyenis, B. 2017. Maxwell and the Normal Distribution: A Colored Story of Probability, Independence, and Tendency toward Equilibrium. *Studies in History and Philosophy of Modern Physics* 57: 53-65.

- Hacking, I. 1981. Do We See through a Microscope? *Pacific Philosophical Quarterly* 62: 305-322.
- Hacking, I. 1983. *Representing and Intervening*. Cambridge: Cambridge University Press.
- Haefner, J. W. 2005. *Modeling Biological Systems. Principles and Applications*. New York: Springer.
- Hale, B. and C. Wright 2017. Putnam's Model-Theoretic Argument against Metaphysical Realism. In B. Hale, C. Wright, and A. Miller (eds.), *A Companion to the Philosophy of Language* (2nd ed.). New York: John Wiley & Sons, pp. 703-733.
- Hale, S. 1988. Spacetime and the Abstract/Concrete Distinction. *Philosophical Studies* 53: 85-102.
- Halvorson, H. 2012. What Scientific Theories Could Not Be. *Philosophy of Science* 79: 183-206.
- Halvorson, H. 2013. The Semantic View, If Plausible, Is Syntactic. *Philosophy of Science* 80: 475-478.
- Halvorson, H. 2016. Scientific Theories. In P. Humphreys (ed.), *The Oxford Handbook of Philosophy of Science*. Oxford: Oxford University Press, pp. 585-608.
- Halvorson, H. 2019. The Logic in Philosophy of Science. In. Cambridge: Cambridge University Press, pp. 402-429.
- Halvorson, H. 2020. Concluding Unscientific Image. *Metascience* 29: 177-185.
- Halvorson, H. and D. Tsementzis 2017. Categories of Scientific Theories. In E. Landry (ed.), *Categories for the Working Philosopher*. Oxford: Oxford University Press, pp. 402-429.
- Hansen, A. J. 1982. The Meeting of Parallel Lines: Science, Fiction, and Science Fiction. In G. E. Slusser, E. S. Rabkin, and R. Scholes (eds.), *Bridges to Fantasy*. Carbondale and Edwardsville: Southern Illinois University Press, pp. 51-58.
- Hanson, N. R. 1958. *Patterns of Discovery*. Cambridge: Cambridge University Press.
- Hanson, N. R. 1969. Logical Positivism and the Interpretation of Scientific Theories. In P. Achinstein, and S. F. Barker (eds.), *The Legacy of Logical Positivism*. Baltimore Johns Hopkins Press, pp. 57-84.
- Harding, S. 1986. *The Science Question in Feminism*. Ithaca and London: Cornell University Press.
- Hardy, L. 2011. Reformulating and Reconstructing Quantum Theory. <https://arxiv.org/abs/1104.2066>.
- Harré, R. 1960. Metaphor, Model and Mechanism. *Proceedings of the Aristotelian Society* 60: 101-122.
- Harré, R. 1970. *The Principles of Scientific Thinking*. Chicago: The University of Chicago Press.
- Harré, R. 1988. Where Models and Analogies Really Count. *International Studies in the Philosophy of Science* 2: 118-133.
- Harré, R. 2004. *Modeling: Gateway to the Unknown*. Amsterdam: Elsevier.
- Harris, M. 2020. Ambiguous Artefacts: On the Epistemic Value of Robustness Analysis. *Synthese* forthcoming.
- Harris, M. 2021a. Conceptualizing Uncertainty: The IPCC, Model Robustness and The weight of Evidence. *PhD Thesis London School of Economics*.
- Harris, M. 2021b. Schupbach's Account of Robustness. *Manuscript*.
- Harris, T. 1999. A Hierarchy of Models and Electron Microscopy. In L. Magnani, N. Nersessian, and P. Thagard (eds.), *Model-Based Reasoning in Scientific Discovery*. New York: Kluwer Academic/Plenum Publishers, pp. 139-148.
- Harris, T. 2003. Data Models and the Acquisition and Manipulation of Data. *Philosophy of Science* 70: 1508-1517.

- Hartmann, S. 1995a. Modelle Und Forschungsdynamik: Strategien Der Zeitgenössischen Physik. *Praxis der Naturwissenschaften - Physik* 44: 33-41.
- Hartmann, S. 1995b. Models as a Tool for Theory Construction: Some Strategies of Preliminary Physics. In W. E. Herfel, W. Krajewski, I. Niiniluoto, and R. Wojcicki (eds.), *Theories and Models in Scientific Processes* (Poznań Studies in the Philosophy of Science and the Humanities 44). Amsterdam: Rodopi, pp. 49-67.
- Hartmann, S. 1997. Modelling and the Aims of Science. In P. Weingartner, G. Schurz, and G. Dorn (eds.), *The Role of Pragmatics in Contemporary Philosophy: Contributions of the Austrian Ludwig Wittgenstein Society*. Wien und Kirchberg: Digi-Buch, pp. 380-385.
- Hartmann, S. 1999. Models and Stories in Hadron Physics. In M. Morgan, and M. Morrison (eds.), *Models as Mediators. Perspectives on Natural and Social Science*. Cambridge: Cambridge University Press, pp. 326-346.
- Hartmann, S., C. Hofer, and L. Bovens (eds.) 2008. *Nancy Cartwright's Philosophy of Science*. New York: Routledge
- Hartshorne, C. and P. Weiss (eds.) 1931-1935. *Collected Papers of Charles Sanders Peirce. Volumes I - VI*. Cambridge, MA: Harvard University Press.
- Heesen, R., L. K. Bright, and A. Zucker 2019. Vindicating Methodological Triangulation. *Synthese* 196: 3067-3081.
- Heidelberger, M. 2003. Theory-Ladenness and Scientific Instruments in Experimentation. In H. Radder (ed.), *The Philosophy of Scientific Experimentation*. Pittsburgh: Pittsburgh University Press, pp. 138-151.
- Heidelberger, M. 2006. Applying Models in Fluid Dynamics. *International Studies in the Philosophy of Science* 20: 49-67.
- Hellman, G. 1989. *Mathematics without Numbers: Towards a Modal-Structural Interpretation*. Oxford: Oxford University Press.
- Hellman, G. and S. Shapiro 2019. *Mathematical Structuralism*. Cambridge: Cambridge University Press.
- Hempel, C. G. 1950. Problems and Changes in the Empiricist Criterion of Meaning. *Revue Internationale de Philosophie* 11: 41-63.
- Hempel, C. G. 1951. The Concept of Cognitive Significance: A Reconsideration. *Proceedings of the American Society of Arts and Science* 80: 61-77.
- Hempel, C. G. 1952. *Fundamentals of Concept Formation in Empirical Science* (Vol. 2.7, International Encyclopedia of Unified Science). Chicago and London: University of Chicago Press.
- Hempel, C. G. 1965. *Aspects of Scientific Explanation and Other Essays in the Philosophy of Science*. New York: Free Press.
- Hempel, C. G. 1966. *Philosophy of Natural Science*. Princeton: Princeton University Press.
- Hempel, C. G. 1969. On the Structure of Scientific Theories. In C. G. Hempel (ed.), *The Isenberg Memorial Lecture Series*. East Lansing: Michigan State University Press, pp. 11-38.
- Hempel, C. G. 1970. On the "Standard Conception" of Scientific Theories. In M. Radner, and S. Winokur (eds.), *Minnesota Studies in the Philosophy of Science Vol. 4*. Minneapolis: University of Minnesota Press, pp. 142-163.
- Hempel, C. G. 1973. The Meaning of Theoretical Terms: A Critique of the Standard Empiricist Construal. In P. Suppes, L. Henkin, A. Joja, and G. C. Moisil (eds.), *Logic, Methodology and Philosophy of Science Vol. Iv*. Amsterdam: North Holland, pp. 367-378.
- Hempel, C. G. 1977. Formulation and Formalization of Scientific Theories. In S. 1977b (ed.), pp. 244-254.

- Hendry, R. F. 1998. Models and Approximations in Quantum Chemistry. In N. Shanks (ed.), *Idealization Ix: Idealization in Contemporary Physics* (Poznań Studies in the Philosophy of the Sciences and the Humanities 63). Amsterdam: Rodopi, pp. 123-142.
- Hendry, R. F. 1999a. Structure as Abstraction. *Philosophy of Science* 83: 1070-1081.
- Hendry, R. F. 1999b. Theories and Models: The Interactive View. In R. Patan, and I. Neilsan (eds.), *Visual Representations and Interpretations*. London: Springer, pp. 121-130.
- Hendry, R. F. and S. Psillos 2007. How to Do Things with Theories: An Interactive View of Language and Models in Science. In J. Brzezinski, A. Klawiter, T. A. F. Kuipers, K. Łastowski, K. Paprzycka, and P. Przybysz (eds.), *The Courage of Doing Philosophy: Essays Dedicated to Lezek Nowak*. Amsterdam and New York: Rodopi, pp. 123-157.
- Herfel, W. E. 1995. Nonlinear Dynamical Models as Concrete Construction. In W. E. Herfel, W. Krajewski, I. Niiniluoto, and R. Wojcicki (eds.), *Theories and Models in Scientific Processes* (Poznań Studies in the Philosophy of Science and the Humanities 44). Amsterdam: Rodopi, pp. 69-84.
- Hesse, M. B. 1952. Operational Definition and Analogy in Physical Theories. *The British Journal for the Philosophy of Science* 2: 281-294.
- Hesse, M. B. 1953. Models in Physics. *The British Journal for the Philosophy of Science* 4: 198-214.
- Hesse, M. B. 1961. *Forces and Fields. The Concept of Action at a Distance in the History of Physics* London and Edinburgh: Thomas Nelson and Sons.
- Hesse, M. B. 1963. *Models and Analogies in Science*. London: Sheed and Ward.
- Hesse, M. B. 1964. Analogy and Confirmation Theory. *Philosophy of Science* 31: 319-327.
- Hesse, M. B. 1967. Models and Analogy in Science. In P. Edwards (ed.), *Encyclopedia of Philosophy*. New York: Macmillan, pp. 354-359.
- Hesse, M. B. 1969. Positivism and the Logic of Scientific Theories. In P. Achinstein, and S. F. Barker (eds.), *The Legacy of Logical Positivism*. Baltimore: Johns Hopkins Press, pp. 85-114.
- Hesse, M. B. 1974. *The Structure of Scientific Inference*. London: Macmillan.
- Hesse, M. B. 1988. Theories, Family Resemblances and Analogy. In D. H. Helman (ed.), *Analogical Reasoning: Perspectives of Artificial Intelligence, Cognitive Science, and Philosophy*. Dordrecht: Kluwer, pp. 317-340.
- Hesse, M. B. 2000. Models and Analogies. In W. H. Newton-Smith (ed.), *A Companion to the Philosophy of Science*. Oxford: Blackwell, pp. 299-307.
- Hettema, H. and T. A. F. Kuipers 1988. The Periodic Table – Its Formalization, Status, and Relation to Atomic Theory. *Erkenntnis* 28: 387-408.
- Hills, D. 2016. Metaphor. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/fall2016/entries/metaphor/>.
- Hindriks, F. 2013. Explanation, Understanding, and Unrealistic Models. *Studies in History and Philosophy of Science* 44: 523-531.
- Hirsch, M. W., S. Smale, and R. L. Devaney 2004. *Differential Equations, Dynamical Systems, and an Introduction to Chaos* (2nd ed.). San Diego: Elsevier.
- Hodges, W. 1997. *A Shorter Model Theory*. Cambridge: Cambridge University Press.
- Hodges, W. 2018. Model Theory. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/fall2018/entries/model-theory/>.
- Hofer, C. 2003. For Fundamentalism. *Philosophy of Science* 70: 1401-1412.
- Hofer, C. and G. Martí 2019. Water Has a Microstructural Essence after All. *European Journal for Philosophy of Science* 9: 1-15.
- Hofer, C. and G. Martí 2020. Realism, Reference & Perspective. *European Journal for Philosophy of Science* 10: 1-22.

- Hofbauer, J. and K. Sigmund 1998. *Evolutionary Games and Population Dynamics*. Cambridge: Cambridge University Press.
- Holgate, S. J., A. Matthews, P. L. Woodworth, L. J. Rickards, M. E. Tamisiea, E. Bradshaw, et al. 2013. New Data Systems and Products at the Permanent Service for Mean Sea Level. *Journal of Coastal Research* 29: 493-504.
- Holyoak, K. and P. Thagard 1995. *Mental Leaps: Analogy in Creative Thought*. Cambridge, Mass.: Bradford.
- Horgan, J. 1994. Icon and Bild: A Note on the Analogical Structure of Models - the Role of Models in Experiment and Theory. *The British Journal for the Philosophy of Science* 45: 599-604.
- Horgan, T. and J. Woodward 1985. Folk Psychology Is Here to Stay. *The Philosophical Review* 94: 197-226.
- Horwich, P. 2006. The Nature of Meaning. In M. Devitt, and R. Hanley (eds.), *The Blackwell Guide to the Philosophy of Language*. Oxford: Blackwell, pp. 43-57.
- Houkes, W. and K. Vaesen 2012. Robust! Handle with Care. *Philosophy of Science* 79: 345-364.
- Hoyningen-Huene, P. 1993. *Reconstructing Scientific Revolutions: Thomas S. Kuhn's Philosophy of Science*. Chicago: Chicago University Press.
- Hudetz, L. 2018. How to Present the Formalism of a Theory? *Manuscript*.
- Hudetz, L. 2019a. Definable Categorical Equivalence. *Philosophy of Science* 86: 47-75.
- Hudetz, L. 2019b. The Semantic View of Theories and Higher-Order Languages. *Synthese* 196: 1131-1149.
- Hughes, R. I. G. 1997. Models and Representation. *Philosophy of Science* Vol. 64, Supplement: 325-336.
- Hughes, R. I. G. 1998. Laws of Nature, Laws of Physics, and the Representational Account of Theories. *ProtoSociology* 12: 113-143.
- Hughes, R. I. G. 1999. The Ising Model, Computer Simulation, and Universal Physics. In M. Morgan, and M. Morrison (eds.), *Models as Mediators*. Cambridge: Cambridge University Press, pp. 97-145.
- Hughes, R. I. G. 2010. *The Theoretical Practises of Physics: Philosophical Essays*. Oxford: Oxford University Press.
- Hume, D. 1748/2007. *An Enquiry Concerning Human Understanding*. Oxford: Oxford University Press.
- Humphrey, T. M. 1974. The Quantity Theory of Money: Its Historical Evolution and Role in Policy Debates. *Economic Review*: 2-19.
- Humphreys, P. 1995. Abstract and Concrete. *Philosophy and Phenomenological Research* LV: 157-161.
- Humphreys, P. 2002. Computational Models. *Philosophy of Science* 69.
- Humphreys, P. 2004. *Extending Ourselves: Computational Science, Empiricism, and Scientific Method*. Oxford: Oxford University Press.
- Hüttemann, A. 2014. Ceteris Paribus Laws in Physics. *Erkenntnis* 79: 1715-1728.
- Hutten, E. H. 1954. The Rôle of Models in Physics. *The British Journal for the Philosophy of Science* 4: 284-301.
- Hutten, E. H. 1956. *The Language of Modern Physics. An Introduction to the Philosophy of Science* (2nd ed.). London: Novello.
- Ibarra, A. and T. Mormann 2006. Scientific Theories as Intervening Representations. *Theoria* 21: 21-38.
- Illari, P. 2019. Mechanisms, Models and Laws in Understanding Supernovae. *Journal for General Philosophy of Science* 50: 63-84.

- Imbert, C. 2017. Computer Simulations and Computational Models in Science. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 735-781.
- Institute of Imagination 2021. Try out Junk Modelling at Home. <https://ioi.london/latest/new-video-try-out-junk-modelling-at-home/> (accessed 25 August 2021).
- Ippoliti, E. 2017. Dark Data. Some Methodological Issues in Finance. In E. Ippoliti, and P. Chen (eds.), *Methods and Finance*. Cham: Springer, pp. 179-194.
- Ippoliti, E. 2018. Building Theories: The Heuristic Way. In D. Danks, and E. Ippoliti (eds.), *Building Theories. Heuristics and Hypotheses in Sciences*. Cham: Springer, pp. 3-20.
- Ippoliti, E. 2019. Models and Data in Finance: *Les Liaisons Dangereuses*. In Á. Nepomuceno-Fernández, L. Magnani, F. J. Salguero-Lamillar, C. Barés-Gómez, and M. Fontaine (eds.), *Model-Based Reasoning in Science and Technology. Inferential Models for Logic, Language, Cognition and Computation*. Cham: Springer, pp. 393-406.
- Jebeile, J. 2020. The Kac Ring or the Art of Making Idealisations. *Foundations of Physics* 50: 1152-1170.
- Jebeile, J. and A. Barberousse 2016. Empirical Agreement in Model Validation. *Studies in History and Philosophy of Science*: 168-174.
- Jebeile, J. and A. Graham Kennedy 2016. Explaining with Models: The Role of Idealizations. *International Studies in the Philosophy of Science* 29: 383-392.
- Jeng, M. 2006. A Selected History of Expectation Bias in Physics. *American Journal of Physics* 74: 578-583.
- Johnson, M. 1988. Some Constraints on Embodied Analogical Understanding. In D. H. Helman (ed.), *Analogical Reasoning: Perspectives of Artificial Intelligence, Cognitive Science, and Philosophy*. Dordrecht: Kluwer, pp. 25-40.
- Jones, M. 2005. Idealization and Abstraction: A Framework. In M. Jones, and N. Cartwright (eds.), *Idealization Xii: Correcting the Model-Idealization and Abstraction in the Sciences* (Poznań Studies in the Philosophy of the Sciences and the Humanities 86). Amsterdam: Rodopi, pp. 173-217.
- Jones, N. 2008. Is All Abstracting Idealizing? *The Reasoner* 2: 4-5.
- Juhl, C. and E. Loomis 2010. *Analyticity*. London: Routledge.
- Jun, M. Y., R. Knutti, and D. W. Nychka 2008a. Local Eigenvalue Analysis of Cmpip3 Climate Model Errors. *Tellus A: Dynamic Meteorology and Oceanography* 60: 992-1000.
- Jun, M. Y., R. Knutti, and D. W. Nychka 2008b. Spatial Analysis to Quantify Numerical Model Bias and Dependence: How Many Climate Models Are There? *Journal of the American Statistical Association* 103: 934-947.
- Justus, J. 2006. Cognitive Significance. In S. Sarkar, and J. Pfeifer (eds.), *The Philosophy of Science. An Encyclopedia*. New York and London: Routledge, pp. 131-140.
- Justus, J. 2012. The Elusive Basis of Inferential Robustness. *Philosophy of Science* 79: 795-807.
- Justus, J. 2014. Carnap's Forgotten Criterion of Empirical Significance. *Mind* 123: 415-436.
- Kaiser, M. 1991. From Rocks to Graphs - the Shaping of Phenomena. *Synthese* 89: 111-133.
- Kalderon, M. E. (ed.) 2005. *Fictionalism in Metaphysics*. Oxford: Clarendon Press.
- Kargon, R. 1969. Model and Analogy in Victorian Science: Maxwell's Critique of the French Physicists. *Journal of the History of Ideas* 30: 423-436.
- Karlin, S. and J. McGregor 1965. Ehrenfest Urn Models. *Journal of Applied Probability* 2: 352-376.
- Katzav, J. 2013. Hybrid Models, Climate Models, and Inference to the Best Explanation. *The British Journal for the Philosophy of Science* 64: 107-129.

- Katzav, J. 2014. The Epistemology of Climate Models and Some of Its Implications for Climate Science and the Philosophy of Science. *Studies in History and Philosophy of Modern Physics* 46: 228-238.
- Kaushal, R. S. 1999. The Role of Structural Analogy in Physical Sciences: A Philosophical Perspective. *Indian Philosophical Quarterly* 26: 543-573.
- Kedar-Cabelli, S. 1988. Analogy - from a Unified Perspective. In D. H. Helman (ed.), *Analogical Reasoning: Perspectives of Artificial Intelligence, Cognitive Science, and Philosophy*. Dordrecht: Kluwer, pp. 65-103.
- Kellen, D. 2019. A Model Hierarchy for Psychological Science. <https://psyarxiv.com/yk45u/>.
- Kellert, S. 1993. *In the Wake of Chaos*. Chicago: Chicago University Press.
- Ketland, J. 2004. Empirical Adequacy and Ramsification *The British Journal for the Philosophy of Science* 55: 287-300.
- Ketland, J. 2006. Craig's Theorem. In D. Borchert (ed.), *Encyclopedia of Philosophy. Volume 2* (2nd Revised Edition ed.). Farmington Hills: Macmillan Reference USA, pp. 583-584.
- Keynes, J. M. 1921. *A Treatise on Probability*. London: McMillan & Co.
- Khalifa, K. 2017. *Understanding, Explanation, and Scientific Knowledge*. Cambridge: Cambridge University Press.
- Khan, A., K. Waqar, A. Shafique, R. Irfan, and A. Gul 2017. In Vitro and in Vivo Animal Models: The Engineering Towards Understanding Human Diseases and Therapeutic Interventions. In D. Barh, and V. Azevedo (eds.), *Omics Technologies and Bio-Engineering: Towards Improving Quality of Life*. Amsterdam: Academic Press (Elsevier), pp. 431-448.
- Khosrowi, D. 2020. Getting Serious About Shared Features. *The British Journal for the Philosophy of Science* 71: 523-546.
- Kim, J. 1999. Making Sense of Emergence 95. *Philosophical Studies* 95: 3-36.
- Kingsland, S. E. 1985. *Modelling Nature. Episodes in the History of Population Ecology*. Chicago: University of Chicago Press.
- Kitcher, P. 2008. Carnap and the Caterpillar. *Philosophical Topics* 36: 111-127.
- Klein, C. 2013. Multiple Realizability and the Semantic View of Theories. *Philosophical Studies* 163: 683-695.
- Knox, E. 2016. Abstraction and Its Limits: Finding Space for Novel Explanation. *Nous* 50: 41-60.
- Knutti, R. 2010. The End of Model Democracy? *Climate Change* 102: 395-404.
- Knutti, R., R. Furrer, C. Tebaldi, J. Cermak, and G. A. Meehl 2010. Challenges in Combining Projections from Multiple Climate Models. *Journal of Climate* 23: 2739-2758.
- Knutti, R. and J. Sedláček 2013. Robustness and Uncertainties in the New Cmp5 Climate Model Projections. *Nature Climate Change* 3: 369-373.
- Knuuttila, T. (2005). *Models as Epistemic Artefacts: Toward a Non-Representationalist Account of Scientific Representation*. Department of Philosophy, University of Helsinki, Helsinki,
- Knuuttila, T. 2011. Modelling and Representing: An Artefactual Approach to Model-Based Representation. *Studies in History and Philosophy of Science* 42: 262-271.
- Knuuttila, T. 2017. Imagination Extended and Embedded: Artifactual Versus Fictional Accounts of Models. *Synthese*, <https://doi.org/10.1007/s11229-017-1545-2>.
- Knuuttila, T. 2021. Epistemic Artifacts and the Modal Dimension of Modeling. *European Journal for Philosophy of Science* 11: Article 65.
- Knuuttila, T. and A. Loettgers 2014. Varieties of Noise: Analogical Reasoning in Synthetic Biology. *Studies in History and Philosophy of Science* 68: 76-88.

- Knuuttila, T. and A. Loettgers 2016. Model Templates within and between Disciplines: From Magnets to Gases – and Socio-Economic Systems. *European Journal for Philosophy of Science* 6: 377-400.
- Knuuttila, T. and A. Loettgers 2017. Modelling as Indirect Representation? The Lotka–Volterra Model Revisited. *The British Journal for the Philosophy of Science* 68: 1007-1036.
- Knuuttila, T. and M. S. Morgan 2019. Deidealization: No Easy Reversals. *Philosophy of Science* 68: 641-661.
- Koperski, J. 1998. Models, Confirmation, and Chaos. *Philosophy of Science* 65: 624-648.
- Koperski, J. 2006. Models. *Internet Encyclopedia of Philosophy*, <https://iep.utm.edu/models/>.
- Kosso, P. 1988. Dimensions of Observability. *The British Journal for the Philosophy of Science* 39: 449-467.
- Kosso, P. 1989. *Observability and Observation in Physical Science*. Dordrecht: Kluwer Academic Publishers.
- Kosso, P. 1992. *Reading the Book of Nature: An Introduction to the Philosophy of Science*. Cambridge: Cambridge University Press.
- Kovaka, K. 2020. Mate Choice and Null Models. *Philosophy of Science* 87: 1096-1106.
- Kraft, V. 1950. *Der Wiener Kreis. Der Ursprung Des Neopositivismus*. Wien: Springer.
- Kraft, V. 1953. *The Vienna Circle: The Origins of Neo-Positivism*. New York: Philosophical Library.
- Krajewski, W. 1977. Idealization and Factualization in Science. *Erkenntnis* 11: 323-339.
- Krantz, D. H., R. D. Luce, P. Suppes, and A. Tversky 1971. *Foundations of Measurement: Volume I, Additive and Polynomial Representations*. New York and London.
- Krause, D. and J. R. B. Arenhart 2017. *The Logical Foundations of Scientific Theories. Languages, Structures, and Models*. New York and London: Routledge.
- Krause, D. and O. Bueno 2007. Scientific Theories, Models, and the Semantic Approach. *Principia* 11: 187-201.
- Kripke, S. 1980. *Naming and Necessity*. Cambridge/MA: Harvard University Press.
- Kroes, P. 1989. Structural Analogies between Physical Systems. *The British Journal for the Philosophy of Science* 40: 145-154.
- Kroon, F. W. 1985. Theoretical Terms and the Causal View of Reference. *Australasian Journal of Philosophy* 63: 143-166.
- Kroon, F. W. 1987. Causal Descriptivism. *Australasian Journal of Philosophy* 65: 1-17.
- Kroon, F. W. and A. Voltolini 2018. Fictional Entities. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* <https://plato.stanford.edu/archives/win2018/entries/fictional-entities/>.
- Kuhn, T. S. 1970. *The Structure of Scientific Revolutions* (2nd ed.). Chicago: Chicago University Press.
- Kuipers, T. A. F. 2001. Structures in Science. Heuristic Patterns Based on Cognitive Structures. An Advanced Textbook in Neo-Classical Philosophy of Science. In J. Hintikka (ed.), *Synthese Library*. Dordrecht: Springer, pp. 3-24.
- Künne, W. 2003. *Conceptions of Truth*. Oxford: Clarendon Press.
- Kuokannen, M. and T. Tuomivaara 1992. On the Structure of Idealizations. In J. Brzezinski, and L. Nowak (eds.), *Idealization Iii: Approximation and Truth* (Poznań Studies in the Philosophy of the Sciences and the Humanities 25). Amsterdam: Rodopi, pp. 67-102.
- Kuorikoski, J. and A. Lehtinen 2009. Incredible Worlds, Credible Results. *Erkenntnis* 70: 119-131.
- Kuorikoski, J., A. Lehtinen, and C. Marchionni 2010. Economic Modelling as Robustness Analysis. *The British Journal for the Philosophy of Science* 61: 541-567.

- Kuorikoski, J., A. Lehtinen, and C. Marchionni 2012. Robustness Analysis Disclaimer: Please Read the Manual before Use! *Biology and Philosophy* 27: 891-902.
- Kuorikoski, J. and C. Marchionni 2016. Evidential Diversity and the Triangulation of Phenomena. *Philosophy of Science* 83: 227-247.
- Kusch, M. 2015. Microscopes and the Theory-Ladenness of Experience in Bas Van Fraassen's Recent Work. *Journal for General Philosophy of Science* 46: 167-182.
- Ladyman, J. 1998. What Is Structural Realism? *Studies in the History and Philosophy of Science* 29: 109-124.
- Lakatos, I. 1970. Falsificationism and the Methodology of Scientific Research Programmes. In I. Lakatos, and A. Musgrave (eds.), *Criticism and the Growth of Knowledge*. Cambridge: Cambridge University Press, pp. 91-196.
- Landry, E. 2007. Shared Structure Need Not Be Shared Set-Structure. *Synthese* 158: 1-17.
- Landry, E. 2011. How to Be a Structuralist All the Way Down. *Synthese* 179: 435-454.
- Landry, E. (ed.) 2017. *Categories for the Working Philosopher*. Oxford: Oxford University Press.
- Lange, M. 2015. On 'Minimal Model Explanations': A Reply to Batterman and Rice. *Philosophy of Science* 82: 292-305.
- Laszlo, P. 2000. Playing with Molecular Models. *Hyle* 6: 85-97.
- Lavis, D. A. 2008. Boltzmann, Gibbs, and the Concept of Equilibrium. *Philosophy of Science* 75: 682-696.
- Lavis, D. A. 2015. *Equilibrium Statistical Mechanics of Lattice Models*. Cham: Springer.
- Lawler, I. 2019. Scientific Understanding and Felicitous Legitimate Falsehoods. *Synthese* Online First, DOI:10.1007/s11229-019-02495-0.
- Lawler, I. and E. Sullivan 2021. Model Explanation Versus Model-Induced Explanation. *Foundations of Science* 26: 1049-1074, DOI:https://doi.org/10.1007/s10699-020-09649-1.
- Laymon, R. 1982. Scientific Realism and the Hierarchical Counterfactual Path from Data to Theory. *Proceedings of the Biennial Meeting of the Philosophy of Science Association* Vol. 1: 107-121.
- Laymon, R. 1987. Using Scott Domains to Explicate the Notions of Approximation and Idealised Data. *Philosophy of Science* 54: 194-221.
- Laymon, R. 1990. Computer Simulations, Idealizations and Approximations. *Proceedings of the Biennial Meeting of the Philosophy of Science Association*, Vol. 2: 519-534.
- Laymon, R. 1991. Thought Experiments by Stevin, Mach and Gouy: Thought Experiments as Ideal Limits and as Semantic Domains. In T. Horowitz, and G. J. Massey (eds.), *Thought Experiments in Science and Philosophy*. Savage, MD: Rowman and Littlefield, pp. 167-191.
- Laymon, R. 1995. Experimentation and the Legitimacy of Idealization. *Philosophical Studies* 77: 353-375.
- Le Bihan, S. 2012. Defending the Semantic View: What It Takes. *European Journal for Philosophy of Science* 2: 249-274.
- Le Poidevin, R. 1991. Abstraction and Explanation in Physics. *Proceedings of the Aristotelian Society. Supplementary Volume* 65: 69-82.
- Leatherdale, W. H. 1974. *The Role of Analogy, Model and Metaphor in Science*. Amsterdam: North Holland Publishing Company.
- Leggett, D. 2013. Replication, Re-Placing and Naval Science in Comparative Context, C. 1868-1904. *The British Journal for the History of Science* 46: 1-21.
- Lehtinen, A. 2016. Allocating Confirmation with Derivational Robustness. *Philosophical Studies* 173: 2487-2509.

- Lehtinen, A. 2018. Derivational Robustness and Indirect Confirmation. *Erkenntnis* 83: 2487-2509.
- Leitgeb, H. 2011. New Life for Carnap's *Aufbau*? *Synthese* 180: 265-299.
- Leng, M. 2010. *Mathematics and Reality*. Oxford: Oxford University Press.
- Leonelli, S. 2008. Performing Abstraction: Two Ways of Modelling arabisidopsis Thaliana. *Biology and Philosophy* 23: 509-528.
- Leonelli, S. 2016. *Data- Centric Biology: A Philosophical Study*. Chicago and London: University of Chicago Press.
- Leonelli, S. 2019. What Distinguishes Data from Models? *European Journal for Philosophy of Science* 9: Article 22.
- Leplin, J. 1980. The Role of Models in Theory Construction. In T. Nickles (ed.), *Scientific Discovery, Logic, and Rationality*. Dordrecht: Reidel, pp. 267-283.
- Leung, Y. F., D. S. C. Lam, and C. P. Pang 2001. *In Silico* Biology: Observation, Modeling, Hypothesis and Verification. *TRENDS in Genetics* 17: 622-623.
- Levins, R. 1966. The Strategy of Model Building in Population Biology. *American Scientist* 54: 421-431.
- Levins, R. 1993. A Response to Orzack and Sober: Formal Analysis and the Fluidity of Science. *The Quarterly Review of Biology* 68: 547-555.
- Levy, A. 2012a. Makes a Difference. Review of Michael Strevens' *Depth: An Account of Scientific Explanation*. Harvard University Press, Cambridge, Ma, 2008. *Biology and Philosophy* 26: 459-467.
- Levy, A. 2012b. Models, Fictions, and Realism: Two Packages. *Philosophy of Science* 79: 738-748.
- Levy, A. 2015. Modeling without Models. *Philosophical Studies* 152: 781-798.
- Levy, A. 2018. Idealization and Abstraction: Refining the Distinction. *Synthese* <https://doi.org/10.1007/s11229-018-1721-z>.
- Levy, A. 2020. Models and Fictions: Not So Similar after All? *Philosophy of Science* 87: 819-828.
- Levy, A. and W. Bechtel 2013. Abstraction and the Organization of Mechanisms. *Philosophy of Science* 80: 241-261.
- Levy, A. and A. Currie 2015. Model Organisms Are Not (Theoretical) Models. *The British Journal for the Philosophy of Science* 66: 327-348
- Lewis, D. K. 1970. How to Define Theoretical Terms. *The Journal of Philosophy* 67: 427-446.
- Lewis, D. K. 1972. Psychophysical and Theoretical Identifications. *Australasian Journal of Philosophy* 50: 249-258.
- Lewis, D. K. 1973. *Counterfactuals*. Oxford: Blackwell.
- Lewis, D. K. 1994. Humean Supervenience Debugged. *Mind* 103: 473-490.
- Lewis, D. K. 1999. *Papers in Metaphysics and Epistemology*. Cambridge: Cambridge University Press.
- Lichter, T. 1995. Bill Clinton Is the First Lady of the USA: Making and Unmaking Analogies. *Synthese* 104: 285-297.
- Lind, H. 1993. A Note on Fundamental Theory and Idealizations in Economics and Physics. *The British Journal for the Philosophy of Science* 44: 493-503.
- Linnebo, Ø. 2011. Higher-Order Logic. In L. Horsten (ed.), *Continuum Companion to Philosophical Logic*. London, pp. 105-127.
- Lipton, P. 2004. *Inference to the Best Explanation*. Second Edition, London: Routledge.
- Lisciandra, C. 2017. Robustness Analysis and Tractability in Modeling. *European Journal for Philosophy of Science* 7: 79-95.

- Lisciandra, C. and J. Korbmacher 2021. Multiple Models, One Explanation. *Journal of Economic Methodology* 28: 186-206.
- Liu, C. 1997. Models and Theories I: The Semantic View Revisited. *International Studies in the Philosophy of Science* 11: 147-164.
- Liu, C. 1999. Approximation, Idealization, and Laws of Nature. *Synthese* 118: 229-256.
- Liu, C. 2013. Deflationism on Scientific Representation. In V. Karakostas, and D. Dieks (eds.), *Essays on Perspectives and Foundational Problems in Philosophy of Science*. Berlin and New York: Springer, pp. 93-102.
- Liu, C. 2015a. Re-Inflating the Conception of Scientific Representation. *International Studies in the Philosophy of Science* 29: 41-59.
- Liu, C. 2015b. Symbolic Versus Modelistic Elements in Scientific Modeling. *Theoria* 30: 287-300.
- Liu, C. 2016. Against the New Fictionalism: A Hybrid View of Scientific Models. *International Studies in the Philosophy of Science* 30: 39-54.
- Lloyd, E. A. 1984. A Semantic Approach to the Structure of Population Genetics. *Philosophy of Science* 51: 242-264.
- Lloyd, E. A. 1989. A Structural Approach to Defining Units of Selection. *Philosophy of Science* 56: 395-418.
- Lloyd, E. A. 1994. *The Structure and Confirmation of Evolutionary Theory*. Princeton: Princeton University Press.
- Lloyd, E. A. 2006. Theories. In S. Sarkar, and J. Pfeifer (eds.), *The Philosophy of Science: An Encyclopedia*: Routledge, pp. 822-828.
- Lloyd, E. A. 2009. Varieties of Support and Confirmation of Climate Models. *Proceedings of the Aristotelian Society* Supplementary Volume: 213-232.
- Lloyd, E. A. 2010. Confirmation and Robustness of Climate Models. *Philosophy of Science* 77: 971-984.
- Lloyd, E. A. 2015. Model Robustness as a Confirmatory Virtue: The Case of Climate Science. *Studies in History and Philosophy of Science* 49: 58-68.
- Lockhart, J. M. and W. R. Davidson 1999. Evaluation of C3h/HeJ Mice for Xenodiagnosis of Infection with *Ehrlichia Chaffeensis*. *Journal of Veterinary Diagnostic Investigation* 11: 55-59.
- Lofgren, E. T., K. M. Collins, T. C. Smith, and R. A. Cartwright 2016. Equations of the End: Teaching Mathematical Modeling Using the Zombie Apocalypse. *Journal of Microbiology & Biology Education* 17: 137-142.
- Lopes, D. 2004. *Understanding Pictures*. Oxford: Oxford University Press.
- Lorenzano, P. 2013. The Semantic Conception and the Structuralist View of Theories: A Critique of Suppe's Criticisms. *Studies in History and Philosophy of Science* 44: 600-607.
- Lotka, A. J. 1925. *Elements of Physical Biology*. Baltimore: Williams & Wilkins Company.
- Love, A. C. and M. J. Nathan 2015. The Idealization of Causation in Mechanistic Explanation. *Philosophy of Science* 82: 761-774.
- Love, A. C. and M. Trivisano 2013. Microbes Modeling Ontogeny. *Biology and Philosophy* 28: 161-188.
- Luczak, J. 2017. Talk About Toy Models. *Studies in History and Philosophy of Modern Physics* 57: 1-7.
- Luke, Y. L. 1975. *Mathematical Functions and Their Approximations*. New York, San Francisco and London: Academic Press.
- Lund, M. D. 2010. *N. R. Hanson. Observation, Discovery, and Scientific Change*. New York: Humanity Books.

- Lupyan, G. 2015. Cognitive Penetrability of Perception in the Age of Prediction: Predictive Systems Are Penetrable Systems. *Review of Philosophy and Psychology* 6: 547-569.
- Lusk, G. 2021. Saving the Data. *The British Journal for the Philosophy of Science* 72: 277-298, <https://doi.org/10.1093/bjps/axy072>.
- Lutz, S. 2012a. Artificial Language Philosophy of Science. *European Journal for Philosophy of Science* 2: 181-203.
- Lutz, S. 2012b. On a Straw Man in the Philosophy of Science: A Defence of the Received View. *HOPOS* 2: 77-120.
- Lutz, S. 2014a. Empirical Adequacy in the Received View. *Philosophy of Science* 81: 1171-1183.
- Lutz, S. 2014b. Generalizing Empirical Adequacy I: Multiplicity and Approximation. *Synthese* 191: 3195-3225.
- Lutz, S. 2014c. The Semantics of Scientific Theories. In A. Brożek, and J. Jadacki (eds.), *Księga Pamiątkowa Marianowi Przełęckiemu W Darze Na 90-Lecie Urodzin*. Lublin: Norbertinum., pp. 33-67.
- Lutz, S. 2014d. What's Right with the Syntactic Approach to Theories and Models? *Erkenntnis* 79: 1475-1492.
- Lutz, S. 2015. Partial Model Theory as Model Theory. *Ergo* 2: 563-580.
- Lutz, S. 2017. What Was the Syntax-Semantics Debate in the Philosophy of Science About? *Philosophy and Phenomenological Research* 95: 319-352.
- Lutz, S. 2019. Generalizing Empirical Adequacy II: Partial Structures. *Synthese* 198: 1351-1380.
- Lycan, W. G. 2008. *Philosophy of Language. A Contemporary Introduction* (2nd ed.). New York and London: Routledge.
- Lyon, A. 2016. Data. In P. Humphreys (ed.), *The Oxford Handbook of Philosophy of Science*. Oxford: Oxford University Press, pp. 738-758.
- Machamer, P. (ed.) 2011. *Phenomena, Data and Theories* (Special Issue of *Synthese* 182 (1)). Berlin: Springer.
- Machamer, P., L. Darden, and C. F. Craver 2000. Thinking About Mechanisms. *Philosophy of Science* 67: 1-25.
- Machover, M. 1996. *Set Theory, Logic and Their Limitations*. Cambridge: Cambridge University Press.
- Magnani, L. 1999. Model-Based Creative Abduction. In L. Magnani, N. Nersessian, and P. Thagard (eds.), *Model-Based Reasoning in Scientific Discovery*. New York: Kluwer Academic/Plenum Publishers, pp. 219-238.
- Mäki, U. 1994. Isolation, Idealization and Truth in Economics. In B. Hamminga, and N. B. De Marchi (eds.), *Idealization VI: Idealization in Economics* (Poznań Studies in the Philosophy of the Sciences and the Humanities 38). Amsterdam: Rodopi, pp. 147-168.
- Mäki, U. 2009. Realistic Realism About Unrealistic Models. In H. Kincaid, and D. Ross (eds.), *The Oxford Handbook of Philosophy of Economics*. Oxford: Oxford University Press, pp. 68-98.
- Mäki, U. 2011. Models and the Locus of Their Truth. *Synthese* 180: 47-63.
- Mannheim, K. 1954. *Ideology and Utopia*. New York: Harcourt, Brace & Co.
- Manzano, M. 1996. *Extensions of First Order Logic*. Cambridge University Press: Cambridge University Press.
- Marquis, J.-P. 2015. Category Theory. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/win2015/entries/category-theory/>.
- Martini, C. and M. Boumans (eds.) 2014. *Experts and Consensus in Social Science*. New York: Springer.

- Maslin, M. 2004. *Global Warming a Very Short Introduction*. Oxford: Oxford University Press.
- Massimi, M. 2012. Scientific Perspectivism and Its Foes. *Philosophica* 84: 25-52.
- Massimi, M. 2017. Perspectivism. In J. Saatsi (ed.), *The Routledge Handbook of Scientific Realism*. London and New York: Routledge, pp. 164-175.
- Massimi, M. 2018a. Four Kinds of Perspectival Truth. *Philosophy and Phenomenological Research* 96: 342-359.
- Massimi, M. 2018b. Perspectival Modeling. *Philosophy of Science* 85: 335-359.
- Massimi, M. 2018c. A Perspectivalist Better Best System Account of Lawhood. In W. Ott, and L. Patton (eds.), *Laws of Nature*. Oxford: Oxford University Press, pp. 139-157.
- Massimi, M. 2019a. Realism, Perspectivism, and Disagreement in Science. *Synthese*, <https://doi.org/10.1007/s11229-019-02500-6>.
- Massimi, M. 2019b. Two Kinds of Exploratory Models. *Philosophy of Science* 86: 869-881.
- Massimi, M. (ed.) 2020. *Perspectivism in Science: Metaphysical and Epistemological Reflections*: Topical Collection of European Journal for Philosophy of Science, Volume 10.
- Massimi, M. 2022. *Perspectival Realism*. New York: Oxford University Press.
- Massimi, M. and C. D. McCoy 2020a. Introduction. In M. Massimi, and C. D. McCoy (eds.), *Understanding Perspectivism*. New York: Routledge, pp. 1-9.
- Massimi, M. and C. D. McCoy (eds.) 2020b. *Understanding Perspectivism*. New York: Routledge.
- Matthewson, J. 2011. Trade-Offs in Model-Building: A More Target-Oriented Approach. *Studies in History and Philosophy of Science* 42: 324-333.
- Matthewson, J. and M. Weisberg 2009. The Structure of Tradeoffs in Model Building. *Synthese* 170: 169-190.
- Mattingly, J. and W. Warwick 2009. Projectible Predicates in Analogue and Simulated Systems. *Synthese* 169: 465-482.
- Maxwell, G. 1962. The Ontological Status of Theoretical Entities. In M. Curd, and J. A. Cover (eds.), *Philosophy of Science. The Central Issues*. New York and London 1998: Norton, pp. 1052-1062.
- Maxwell, J. C. 1855/1965. On Faraday's Lines of Force. In W. D. Niven (ed.), *The Scientific Papers of James Clerk Maxwell*. New York: Dover Publications, pp. 155-229.
- May, R. 1976. A Simple Mathematical Equation with Very Complicated Dynamics. *Nature* 261: 459-469.
- Mayo, D. 1996. *Error and the Growth of Experimental Knowledge*. Chicago: University of Chicago Press.
- McAllister, J. W. 1997. Phenomena and Patterns in Data Sets. *Erkenntnis* 47: 217-228.
- McAllister, J. W. 2010. The Ontology of Patterns in Empirical Data. *Philosophy of Science* 77: 804-814.
- McCauley, R. N. 2015. Maturationally Natural Cognition, Radically Counter-Intuitive Science, and the Theory-Ladenness of Perception. *Journal for General Philosophy of Science* 46: 183-199.
- McCoy, C. D. and M. Massimi 2018. Simplified Models: A Different Perspective on Models as Mediators. *European Journal for the Philosophy of Science* 8: 99-123.
- McCullough-Benner, C. 2020. Representing the World with Inconsistent Mathematics. *The British Journal for Philosophy of Science* 71: 1331-1358.
- McGuffie, K. and A. Henderson-Sellers 2005. *A Climate Modelling Primer* (3rd ed.). New York: Wiley.
- McGuinness, B. (ed.) 1979. *Ludwig Wittgenstein and the Vienna Circle. Conversations Recorded by Friedrich Waismann*. Oxford: Basil Blackwell.

- McKinsey, J. C. C., A. Sugar, and P. Suppes 1953. Axiomatic Foundations of Classical Particle Mechanics. *Journal of Rational Mechanics and Analysis* 2: 253-272.
- McKinsey, J. C. C. and P. Suppes 1953. Transformations of Systems of Classical Particle Mechanics. *Journal of Rational Mechanics and Analysis* 2: 273-289.
- McLoone, B. 2019. Thumper the Infinitesimal Rabbit: A Fictionalist Perspective on Some “Unimaginable” Model Systems in Biology. *Philosophy of Science* 86: 662-671.
- McMullin, E. 1968. What Do Physical Models Tell Us? In B. van Rootselaar, and J. F. Staal (eds.), *Logic, Methodology and Science Iii*. Amsterdam: North Holland, pp. 385-396.
- McMullin, E. 1985. Galilean Idealization. *Studies in the History and Philosophy of Science* 16: 247-273.
- Meinel, C. 2004. Molecules and Croquet Balls. In S. de Chadarevian, and N. Hopwood (eds.), *Models: The Third Dimension*. Stanford: Stanford University Press, pp. 242-275.
- Meinke, K. and J. V. Tucker (eds.) 1993. *Many-Sorted Logic and Its Applications* Chichester and New York: John Wiley and Sons.
- Meinong, A. 1904. Über Gegenstandstheorie. In A. Meinong (ed.), *Untersuchungen Zur Gegenstandstheorie Und Psychologie*. Leipzig: Barth, pp. 1-50.
- Mellor, D. H. 1968. Models and Analogies in Science: Duhem Versus Campbell? *Isis* 59: 282-290.
- Mendelson, B. 1962. *Introduction to Topology*. Boston: Allyn and Bacon.
- Merriam-Webster 2017. Metaphor. <https://www.merriam-webster.com/dictionary/metaphor> (Retrieved 26 March 2017).
- Meyer, H. 1951. On the Heuristic Value of Scientific Models. *Philosophy of Science* 18: 111-123.
- Meyer, U. 2002. Is Science First-Order? *Analysis* 62: 305-308.
- Meynell, L. 2014. Imagination and Insight: A New Account of the Content of Thought Experiments. *Synthese* 191: 4149-4168.
- Michaelson, E. and M. Reimer 2019. Reference. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/spr2019/entries/reference/>.
- Mikenberg, I., N. C. A. Da Costa, and S. French 1986. Pragmatic Truth and Approximation to Truth. *Journal of Symbolic Logic* 51: 201-221.
- Mill, J. S. 1843/1974. Of Names. In J. M. Robson (ed.), *He Collected Works of John Stuart Mill, Vol. Vii*. Toronto: University of Toronto Press and Routledge & Keagan Paul, pp. 24-45.
- Miller, A. 2007. *Philosophy of Language* (2nd ed.). London and New York: Routledge.
- Mitchell, S. D. 2002. Integrative Pluralism. *Biology and Philosophy* 17: 55-70.
- Mitchell, S. D. 2020. Perspectives, Representation, and Integration. In M. Massimi, and C. D. McCoy (eds.), *Understanding Perspectivism*. New York: Routledge, pp. 178-193.
- Montague, R. 1974. Deterministic Theories. In R. H. Thomason (ed.), *Formal Philosophy. Selected Papers of Richard Montague*. New Haven and London: Yale University Press, pp. 303-359.
- Montuschi, E. 2000. Metaphor in Science. In W. H. Newton-Smith (ed.), *A Companion Do the Philosophy of Science*. Malden and Oxford: Blackwell, pp. 277-282.
- Moore, A. W. 1997. *Points of View*. Oxford: Clarendon Press.
- Moore, G. H. 1988. The Emergence of First-Order Logic. In W. Aspray, and P. Kitcher (eds.), *History and Philosophy of Modern Mathematicas. Minnesota Studies in the Philosophy of Science Vol Xi*. Minnesota: University of Minnesota Press, pp. 95-135.
- Morgan, M. S. 1997. The Technology of Analogical Models: Irving Fisher's Monetary Worlds. *Philosophy of Science (Supplement)* 64: 304-314.

- Morgan, M. S. 1999. Learning from Models. In M. S. Morgan, and M. Morrison (eds.), *Models as Mediators: Perspectives on Natural and Social Science*. Cambridge: Cambridge University Press, pp. 347-388.
- Morgan, M. S. 2012. *The World in the Model. How Economists Work and Think*. Cambridge: Cambridge University Press.
- Morgan, M. S. 2014. What If? Models, Fact and Fiction in Economics. *Journal of the British Academy* 2: 231-268.
- Morgan, M. S. and M. Boumans 2004. The Secrets Hidden by Two-Dimensionality: The Economy as a Hydraulic Machine. In d. S. Chadarevian, and N. Hopwood (eds.), *Model: The Third Dimension of Science* Stanford: Stanford University Press, pp. 369-401.
- Morgan, M. S. and M. Morrison 1999a. Models as Mediating Instruments. In M. Morgan, and M. Morrison (eds.), *Models as Mediators: Perspectives on Natural and Social Science*. Cambridge: Cambridge University Press, pp. 10-37.
- Morgan, M. S. and M. Morrison (eds.) 1999b. *Models as Mediators: Perspectives on Natural and Social Science*. Cambridge: Cambridge University Press.
- Morganti, M. 2018. The Structure of Physical Reality: Beyond Foundationalism. In R. Bliss, and G. Priest (eds.), *Reality and Its Structure. Essays in Fundamentality*. Oxford: Oxford University Press, pp. 254-272.
- Morganti, M. 2020a. Fundamentality in Metaphysics and the Philosophy of Physics. Part I: Metaphysics. *Philosophy Compass* e12690.
- Morganti, M. 2020b. Fundamentality in Metaphysics and the Philosophy of Physics. Part II: The Philosophy of Physics. *Philosophy Compass* e12703.
- Mormann, T. 1975. Topologische Aspekte Strukturalistischer Rekonstruktionen. *Erkenntnis* 23: 319-359.
- Mormann, T. 2007. The Structure of Scientific Theories in Logical Empiricism. In A. Richardson, and T. Uebel (eds.), *The Cambridge Companion to Logical Empiricism*. Cambridge: Cambridge University Press, pp. 136-162.
- Morreau, M. 2010. It Simply Does Not Add Up: The Trouble with Overall Similarity. *The Journal of Philosophy* 107: 469-490.
- Morrison, M. 1997. Physical Models and Biological Contexts. *Philosophy of Science (Supplement)* 64: 315-324.
- Morrison, M. 1998. Modelling Nature: Between Physics and the Physical World. *Philosophia Naturalis* 35: 65-85.
- Morrison, M. 1999. Models as Autonomous Agents. In M. S. Morgan, and M. Morrison (eds.), *Models as Mediators*. Cambridge: Cambridge University Press, pp. 38-65.
- Morrison, M. 2000. *Unifying Scientific Theories*. Cambridge: Cambridge University Press.
- Morrison, M. 2007. Where Have All the Theories Gone? *Philosophy of Science* 74: 195-228.
- Morrison, M. 2008. Models as Representational Structures In S. Hartmann, C. Hofer, and L. Bovens (eds.), *Nancy Cartwright's Philosophy of Science* (Routledge Studies in the Philosophy of Science, Vol. 3). New York: Routledge pp. 67-90.
- Morrison, M. 2011. One Phenomenon, Many Models: Inconsistency and Complementarity. *Studies in History and Philosophy of Science* 42: 342-353.
- Morrison, M. 2015. *Reconstructing Reality: Models, Mathematics, and Simulations*. New York: Oxford University Press.
- Morrison, M. 2016. Models and Theories. In P. Humphreys (ed.), *The Oxford Handbook of Philosophy of Science*. Oxford: Oxford University Press, pp. 378-396.
- Morrot, G., F. Brochet, and D. Dubourdieu 2001. The Color of Odors. *Brain and Language* 79: 309-320.

- Moulines, C.-U. 1985. Theoretical Terms and Bridge Principles: A Critique of Hempel's (Self-)Criticisms. *Erkenntnis* 22: 97-117.
- Moulines, C.-U. 1996. Structuralist: The Basic Ideas. In W. Balzer, and C. U. Moulines (eds.), *The Structuralist Theory of Science: Focal Issues, New Results*. Berlin and New York: De Gruyter, pp. 1-13.
- Moulines, C.-U. 2002. Introduction: Structuralism as a Program for Modelling Theoretical Science. *Synthese* 130: 1-11.
- Moulines, C.-U. 2006. The Role of Empirical Operations and Model Construction in the Ontological Commitments of Science. In C. Thiel (ed.), *Operations and Constructions in Scienc.* Erlangen: Erlanger Forschungen, pp. 21-39.
- Moulines, C.-U. and J. D. Sneed 1979. Suppe's Philosophy of Physics. In R. Bogdan (ed.), *Patrick Suppes*. Dordrecht: Reidel, pp. 59-91.
- Muller, F. A. 1997a. The Equivalence Myth of Quantum Mechanics - Part I. *Studies in History and Philosophy of Modern Physics* 28: 35-61.
- Muller, F. A. 1997b. The Equivalence Myth of Quantum Mechanics - Part II. *Studies in History and Philosophy of Modern Physics* 28: 219-241.
- Muller, F. A. 2004. Review of Patrick Suppes' "Representation and Invariance in Scientific Structures". *Studies in History and Philosophy of Modern Physics* 35: 713-720.
- Muller, F. A. 2009. The Insidiously Enchanted Forrest. Essay Review of 'Scientific Representation' by Bas. C Van Fraassen. *Studies in History and Philosophy of Modern Physics* 40: 268-272.
- Muller, F. A. 2011. Reflections on the Revolution at Stanford. *Synthese* 183: 87-114.
- Muller, F. A. and B. C. van Fraassen 2008. How to Talk About Unobservables. *Analysis* 68: 197-205.
- Mundy, B. 1986. On the General Theory of Meaningful Representation. *Synthese* 67: 391-437.
- Mundy, B. 1987. Scientific Theory as Partially Interpreted Calculus. *Erkenntnis* 27: 173-196.
- Murphy, A. 2020a. *Thought Experiments and the Scientific Imagination*. PhD Thesis, University of Leeds.
- Murphy, A. 2020b. Towards a Pluralist Account of the Imagination in Science. *Philosophy of Science* 87: 957-967.
- Musgrave, A. 1981. Unreal Assumptions' in Economic Theory: The F-Twist Untwisted. *Kyklos* 34: 377-387.
- Myrvold, W. C. and W. L. Harper 2002. Model Selection, Simplicity, and Scientific Inference. *Philosophy of Science* 69.
- Nagel, E. 1961. *The Structure of Science*. London: Routledge and Keagan Paul.
- Nappo, F. 2021. Close Encounters with Scientific Analogies of the Third Kind. *European Journal for Philosophy of Science* 11: Article 82.
- Nelson, R. A. and M. G. Olsson 1986. The Pendulum - Rich Physics from a Simple System. *American Journal of Physics* 54: 112-121.
- Nersessian, N. 1984. Aether/Or: The Creation of Scientific Concepts. *Studies in History and Philosophy of Science* 15: 175-212.
- Nersessian, N. 2007. Thought Experimenting as Mental Modeling: Empiricism without Logic. *Croatian Journal of Philosophy* 7: 125-154.
- Newman, M. H. A. 1928. Mr. Russell's "Causal Theory of Perception". *Mind* 37: 137-148.
- Newton, I. 1726/1999. *The Principia. Mathematical Principles of Natural Philosophy. The Authoritative Translation by I. Bernard Cohen and Anne Whitman Assisted by Julia Budenz* (A. Motte, Trans.). Oakland: University of California Press.
- Nguyen, J. 2016. On the Pragmatic Equivalence between Representing Data and Phenomena *Philosophy of Science* 83: 171-191.

- Nguyen, J. 2017. Scientific Representation and Theoretical Equivalence. *Philosophy of Science* 84: 982-995.
- Nguyen, J. 2020. It's Not a Game: Accurate Representation with Toy Models. *The British Journal for the Philosophy of Science* 71: 1013-1041.
- Nguyen, J. and R. Frigg 2017. Mathematics Is Not the Only Language in the Book of Nature. *Synthese*, <https://doi.org/10.1007/s11229-017-1526-5>.
- Nguyen, J. and R. Frigg 2020. Unlocking Limits. *Argumenta* 6: 31-45.
- Nguyen, J. and R. Frigg 2022. *Scientific Representation*. Cambridge: Cambridge University Press.
- Nguyen, J., N. Teh, and L. Wells 2018. Why Surplus Structure Is Not Superfluous. *The British Journal for the Philosophy of Science* 71: 665-695.
- Nickles, T. 2021. Whatever Happened to the Logic of Discovery? From Transparent Logic to Alien Reasoning. In W. J. González (ed.), *Current Trends in Philosophy of Science. A Prospective for the near Future* (Synthese Library). Cham: Springer, pp. TBA.
- Niiniluoto, I. 1984. *Is Science Progressive?* (Synthese Library). Dordrecht: Springer.
- Niiniluoto, I. 1986. Theories, Approximations, and Idealizations. In R. Barcan Marcus, G. J. W. Dorn, and P. Weingartner (eds.), *Logic, Methodology and Philosophy of Science Vii: Proceedings of the Seventh International Congress of Logic, Methodology and Philosophy of Science, Salzburg, 1983*. Amsterdam, New York, Oxford and Tokyo: Elsevier Science Publishers B.V., pp. 255-289.
- Niiniluoto, I. 1988. Analogy and Similarity in Scientific Reasoning. In D. H. Helman (ed.), *Analogical Reasoning: Perspectives of Artificial Intelligence, Cognitive Science, and Philosophy*. Dordrecht: Kluwer, pp. 271-298.
- Nola, R. 1980. Fixing the Reference of Theoretical Terms. *Philosophy of Science* 47: 505-531.
- Nola, R. 2011. Michael Strevens: Depth: An Account of Scientific Explanation. *Science and Education* 20: 201-206.
- North, J. 2009. The "Structure" of Physics: A Case Study. *The Journal of Philosophy* 106: 57-88.
- Norton, J. D. 2003. Causation as Folk Science. *Philosopher's Imprint* 3: 1-22.
- Norton, J. D. 2008. The Dome: An Unexpectedly Simple Failure of Determinism. *Philosophy of Science* 75: 786-798.
- Norton, J. D. 2012. Approximation and Idealization: Why the Difference Matters. *Philosophy of Science* 79: 207-232.
- Nowak, L. 1972. Laws of Science, Theories, Measurement: (Comments on Ernest Nagel's the Structure of Science). *Philosophy of Science* 39: 533-548.
- Nowak, L. 1980. *The Structure of Idealization: Towards a Systematic Interpretation of the Marxian Idea of Science*. Dordrecht: Reidel.
- Nowak, L. 1991. The Method of Relevant Variables and Idealization. In E. Eells, and T. Maruszewski (eds.), *Probability and Rationality. Studies on L. Jonathan Cohen's Philosophy of Science* (Poznań Studies in the Philosophy of the Sciences and the Humanities 21). Amsterdam: Rodopi, pp. 41-63.
- Nowak, L. 1992. The Idealization Approach to Science: A Survey. In J. Brzezinski, and L. Nowak (eds.), *Idealization Iii: Approximation and Truth* (Poznań Studies in the Philosophy of the Sciences and the Humanities 25). Amsterdam: Rodopi, pp. 9-63.
- Nowak, L. 2000. The Idealization Approach to Science: A New Survey. In I. Nowakowa, and L. Nowak (eds.), *Idealization X: The Richness of Idealization* (Poznań Studies in the Philosophy of the Sciences and the Humanities 69). Amsterdam: Rodopi, pp. 109-184.

- Nowakowa, I. and L. Nowak 1998. Model(S) and Experiment(S) as Homogeneous Families of Notions. In N. Shanks (ed.), *Idealization IX: Idealization in Contemporary Physics* (Poznań Studies in the Philosophy of the Sciences and the Humanities 63). Amsterdam: Rodopi, pp. 35-50.
- Nowakowa, I. and L. Nowak 2000a. Introduction. Science as a Caricature of Reality. In I. Nowakowa, and L. Nowak (eds.), *Idealization X: The Richness of Idealization* (Poznań Studies in the Philosophy of the Sciences and the Humanities 69). Amsterdam: Rodopi, pp. 9-14.
- Nowakowa, I. and L. Nowak 2000b. On Multiplicity of Idealization. In I. Nowakowa, and L. Nowak (eds.), *Idealization X: The Richness of Idealization* (Poznań Studies in the Philosophy of the Sciences and the Humanities 69). Amsterdam: Rodopi, pp. 213-232.
- O'Connor, C. and J. O. Weatherall 2016. Black Holes, Black-Scholes, and Prairie Voles: An Essay Review of Simulation and Similarity, by Michael Weisberg. *Philosophy of Science* 83: 613-626.
- O'Regan, D. 1997. *Existence Theory for Nonlinear Ordinary Differential Equations*. . Dordrecht: Springer.
- Oddie, G. 2016. Truthlikeness. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/win2016/entries/truthlikeness/>.
- Odenbaugh, J. 2003. Complex Systems, Trade-Offs, and Theoretical Population Biology: Richard Levin's 'Strategy of Model Building in Population Biology' Revisited. *Philosophy of Science* 70: 1496-1507.
- Odenbaugh, J. 2006. The Strategy of "the Strategy of Model Building in Population Biology". *Biology and Philosophy* 21: 607-621.
- Odenbaugh, J. 2008. Models. In S. Sarkar, and A. Plutynski (eds.), *A Companion to the Philosophy of Biology*. Malden/MA: Wiley-Blackwell, pp. 506-534.
- Odenbaugh, J. 2011. True Lies: Realism, Robustness, and Models. *Philosophy of Science* 78: 177-188.
- Odenbaugh, J. 2015. Semblance or Similarity? Reflections on Simulation and Similarity. *Biology and Philosophy* 30: 277-291.
- Odenbaugh, J. 2018a. Building Trust, Removing Doubt? Robustness Analysis and Climate Modeling. In E. A. Lloyd, and E. Winsberg (eds.), *Climate Modelling. Philosophical and Conceptual Issues*. Cham: Palgrave Macmillan, pp. 297-321.
- Odenbaugh, J. 2018b. Models, Models, Models: A Deflationary View. *Synthese Online First*. DOI:10.1007/s11229-017-1665-8.
- Odenbaugh, J. and A. Alexandrova 2011. Buyer Beware: Robustness Analyses in Economics and Biology. *Biology and Philosophy* 26: 757-771.
- Ohsawa, Y., T. Hayashi, and H. Kido 2017. Restructuring Incomplete Models in Innovators Marketplace and Data Jackets. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 1015-1031.
- Okruhlik, K. 2009. Critical Notice. Bas C. Van Fraassen. Scientific Representation: Paradoxes of Perspective. Oxford: Oxford University Press 2008. *Canadian Journal of Philosophy* 39: 671-694.
- Okruhlik, K. 2014. Bas Van Fraassen's Philosophy of Science and His Epistemic Voluntarism. *Philosophy Compass* 9: 653-661.
- Olby, R. 1974. *The Path to the Double Helix. The Discovery of DNA*. Seattle: University of Washington Press.
- openmod 2021. Open Models. https://wiki.openmod-initiative.org/wiki/Open_Models (accessed 25 August 2021).

- Oppenheimer, R. 1956. Analogy in Science. *American Psychologist* 11: 127-135.
- Orzack, S. H. 2005. What, If Anything, Is “the Strategy of Model Building in Population Biology?” a Comment on Levins (1966) and Odenbaugh (2003). *Philosophy of Science* 72: 479-485.
- Orzack, S. H. and E. Sober 1993. A Critical Assessment of Levins's the Strategy of Model Building in Population Biology (1966). *The Quarterly Review of Biology* 68: 533-546.
- Ott, E. 1993. *Chaos in Dynamical Systems*. Cambridge: Cambridge University Press.
- Padovani, F. 2012. Bas C. Van Fraassen: Scientific Representation: Paradoxes of Perspective. *Science and Education* 21: 1199-1204.
- Padovani, F. 2017. Coordination and Measurement: What We Get Wrong About What Reichenbach Got Right. In M. Massimi, R. Jan-Willem, and S. Gerhard (eds.), *Epsa15 Selected Papers. The 5th Conference of the European Philosophy of Science Association in Düsseldorf* (Vol. 49-60). Cham: Springer, pp.
- Palacios, P. 2019. Phase Transitions: A Challenge for Intertheoretic Reduction? *Philosophy of Science* 86: 612-640.
- Papineau, D. 1996. Theory-Dependent Terms. *Philosophy of Science* 63: 1-20.
- Parker, M. W. 1998. Did Poincaré Really Discover Chaos? *Studies in History and Philosophy of Modern Physics* 29: 575-588.
- Parker, W. 2020. Model Evaluation: An Adequacy-for-Purpose View. *Philosophy of Science* 87: 457-477.
- Parker, W. S. 2011. When Climate Models Agree: The Significance of Robust Model Predictions. *Philosophy of Science* 78: 579-600.
- Parker, W. S. 2013. Ensemble Modeling, Uncertainty and Robust Predictions. *Wiley Interdisciplinary Reviews: Climate Change* 4: 213-223.
- Parker, W. S. 2015. Getting (Even More) Serious About Similarity. *Biology and Philosophy* 30: 267-276.
- Parker, W. S. 2016. Reanalyses and Observations. What’s the Difference? *Bulletin of the American Meteorological Society* 97: 1565-1572.
- Parker, W. S. 2018. The Significance of Robust Climate Projections. In E. A. Lloyd, and E. Winsberg (eds.), *Climate Modelling. Philosophical and Conceptual Issues*. Cham: Palgrave Macmillan, pp. 273-296.
- Parker, W. S. 2020. Local Model-Data Symbiosis in Meteorology and Climate Science. *Philosophy of Science* 97: 807-818.
- Pemberton, J. 2005. Why Idealized Models in Economics Have Limited Use. In M. R. Jones, and N. Cartwright (eds.), *Correcting the Model. Idealization and Abstraction in the Sciences* (Poznań Studies in the Philosophy of the Sciences and the Humanities 86). Amsterdam: Rodopi, pp. 35-46.
- Percival, P. 2000. Theoretical Terms: Meaning and Reference. In W. H. Newton-Smith (ed.), *A Companion to the Philosophy of Science*. Oxford: Wiley-Blackwell, pp. 495-514.
- Perini, L. 2005. The Truth in Pictures. *Philosophy of Science* 72: 262-285.
- Perini, L. 2010. Scientific Representation and the Semiotics of Pictures. In P. D. Magnus, and J. Busch (eds.), *New Waves in the Philosophy of Science*. New York: Macmillan, pp. 131-154.
- Pero, F. and M. Suárez 2016. Varieties of Misrepresentation and Homomorphism. *European Journal for Philosophy of Science* 6: 71-90.
- Peschard, I. 2011. Making Sense of Modeling: Beyond Representation *European Journal for Philosophy of Science* 1: 335-352.
- Phillips, A. W. 1950. Mechanical Models in Economic Dynamics. *Economica* 17: 283-305.
- Pincock, C. 2005. Overextending Partial Structures: Idealization and Abstraction. *Philosophy of Science* 72: 1248-1259.

- Pincock, C. 2007. Mathematical Idealization. *Philosophy of Science* 74: 957-967.
- Pincock, C. 2011. Modeling Reality. *Synthese* 180: 19-32.
- Pincock, C. 2012. *Mathematics and Scientific Representation*. Oxford: Oxford University Press.
- Pincock, C. 2014. How to Avoid Inconsistent Idealizations. *Synthese* 191: 2957-2972.
- Pincock, C. 2019. Concrete Scale Models, Essential Idealization and Causalexplanation. *The British Journal for the Philosophy of Science*, <https://doi.org/10.1093/bjps/axz019>.
- Pitt, D. 2018. Mental Representation. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/win2018/entries/mental-representation/>.
- Plutynski, A. 2006. Strategies of Model Building in Population Genetics. *Philosophy of Science* 73: 755-764.
- Popper, K. R. 1959. *The Logic of Scientific Discovery*. London: Routledge 2002.
- Portides, D. 2005a. Scientific Models and the Semantic View of Theories. *Philosophy of Science (Supplement)* 72: 1287-1298.
- Portides, D. 2005b. A Theory of Scientific Model Construction: The Conceptual Process of Abstraction and Concretisation. *Foundations of Science* 10: 67-88.
- Portides, D. 2006. The Evolutionary History of Models as Representational Agents. In L. Magnani (ed.), *Model-Based Reasoning in Science and Engineering, Texts in Logic, Vol. 2*. London: College Publications, pp. 87-106.
- Portides, D. 2007. The Relation between Idealisation and Approximation in Scientific Model Construction. *Science & Education* 16: 699-724.
- Portides, D. 2008. Models. In S. Psillos, and M. Curd (eds.), *The Routledge Companion to Philosophy of Science*. Abingdon: Routledge, pp. 385-395.
- Portides, D. 2011. Seeking Representations of Phenomena: Phenomenological Models. *Studies in History and Philosophy of Science* 42: 334-341.
- Portides, D. 2017. Models and Theories. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht Heidelberg: Springer, pp. 25-48.
- Portides, D. 2018. Idealization and Abstraction in Scientific Modeling. *Synthese*, <https://doi.org/10.1007/s11229-018-01919-7>.
- Potochnik, A. 2017. *Idealization and the Aims of Science*. Chicago: The University of Chicago Press.
- Potochnik, A. 2020. Idealization and Many Aims. *Philosophy of Science* 87: 933-943.
- Povich, M. 2018. Minimal Models and the Generalized Ontic Conception of Scientific Explanation. *The British Journal for the Philosophy of Science* 69: 117-137.
- Poznic, M. 2016a. Make-Believe and Model-Based Representation in Science: The Epistemology of Frigg's and Toon's Fictionalist Views of Modeling. *Theorema* 35: 201-218, [10.1007/s10838-015-9307-7](https://doi.org/10.1007/s10838-015-9307-7).
- Poznic, M. 2016b. Representation and Similarity: Suárez on Necessary and Sufficient Conditions of Scientific Representation. *Journal for General Philosophy of Science* 47: 331-347, [10.1007/s10838-015-9307-7](https://doi.org/10.1007/s10838-015-9307-7).
- Poznic, M. 2018. Thin Versus Thick Accounts of Scientific Representation. *Synthese* 195: 3433-3451.
- Price, H. 2011. *Naturalism without Mirrors*. Oxford: Oxford University Press.
- Pronin, S., L. Wellacott, J. Pimentel, R. C. Molioli, and P. A. Vargas 2021. Neurorobotic Models of Neurological Disorders: A Mini Review. <https://doi.org/10.3389/fnbot.2021.634045>.
- Przełęcki, M. 1974. A Set Theoretic Versus a Model Theoretic Approach to the Logical Structure of Physical Theories. *Studia Logica* 33: 91-105.

- Psillos, S. 1995. The Cognitive Interplay between Theories and Models: The Case of 19th Century Physics. In W. E. Herfel, W. Krajewski, I. Niiniluoto, and R. Wojcicki (eds.), *Theories and Models in Scientific Processes* (Poznań Studies in the Philosophy of Science and the Humanities 44). Amsterdam and Atlanta/GA: Rodopi, pp. 105-133.
- Psillos, S. 1999. *Scientific Realism: How Science Tracks Truth*. London: Routledge.
- Psillos, S. 2000a. Carnap, the Ramsey Sentence and Realistic Empiricism *Erkenntnis* 52: 253-279.
- Psillos, S. 2000b. Rudolf Carnap's 'Theoretical Concepts in Science'. *Studies in History and Philosophy of Science* 31: 151-172.
- Psillos, S. 2006. Ramsey's Ramsey-Sentences. In M. C. Galavotti (ed.), *Cambridge and Vienna: Frank P. Ramsey and the Vienna Circle* (Vienna Circle Institute Yearbook, Vol. 12). Berlin: Springer, pp. 67-90.
- Psillos, S. 2008. Cartwright's Realist Toil: From Entities to Capacities. In S. Hartmann, C. Hofer, and L. Bovens (eds.), *Nancy Cartwright's Philosophy of Science*. London: Routledge, pp. 167-194.
- Psillos, S. 2012. Causal Descriptivism and the Reference of Theoretical Terms. In A. Raftopoulos, and P. Machamer (eds.), *Perception, Realism and the Problem of Reference*. Cambridge: Cambridge University Press, pp. 212-238.
- Psillos, S. and D. Christopoulou 2009. The a Priori: Between Conventions and Implicit Definitions In N. Kompa, C. Nimtz, and C. Suhm (eds.), *The a Priori and Its Role in Philosophy*. Paderborn: Mentis, pp. 205-220.
- Putnam, H. 1962. What Theories Are Not. In E. Nagel, P. Suppes, and A. Tarski (eds.), *Logic, Methodology, and the Philosophy of Science*. reprinted in *Hilary Putnam: Mathematics, Matter and Method. Philosophical Papers Vol. 1*. Cambridge: Cambridge University Press, pp. 215-227.
- Putnam, H. 1965. Craig's Theorem. *The Journal of Philosophy* 62: 251-260.
- Putnam, H. 1973. Meaning and Reference. *The Journal of Philosophy* 70: 699-711.
- Putnam, H. 1981. *Reason, Truth, and History*. Cambridge: Cambridge University Press.
- Pylyshyn, Z. 2003. *Seeing and Visualizing. It's Not What You Think*. Cambridge, Massachusetts: MIT Press.
- Quine, W. V. O. 1951. Two Dogmas of Empiricism. *The Philosophical Review* 60: 20-43.
- Quine, W. V. O. 1953. *From a Logical Point of View*. Cambridge/MA: Harvard University Press.
- Quine, W. V. O. 1964. Implicit Definition Sustained. *The Journal of Philosophy* 61: 71-74.
- Quine, W. V. O. 1969. *Ontological Relativity and Other Essays*. New York: Columbia University Press.
- Quine, W. V. O. 1975. On Empirically Equivalent Systems of the World. *Erkenntnis* 9: 313-328.
- Raerinne, J. 2013. Robustness and Sensitivity of Biological Models. *Philosophical Studies* 166: 285-303.
- Raftopoulos, A. 2001a. Is Perception Informationally Encapsulated? The Issue of the Theory-Ladenness of Perception. *Cognitive Science* 25: 423-451.
- Raftopoulos, A. 2001b. Reentrant Neural Pathways and the Theory-Ladenness of Perception. *Philosophy of Science* 68: 187-199.
- Raftopoulos, A. 2015. The Cognitive Impenetrability of Perception and Theory-Ladenness. *Journal for General Philosophy of Science* 46: 87-103.
- Ramsey, F. P. 1929/1950. Theories. In R. Braithwaite (ed.), *The Foundations of Mathematics and Other Logical Essays* (2nd ed.). London: Routledge and Kegan Paul, pp. 212-236.
- Ramsey, J. L. 1992. Towards an Expanded Epistemology for Approximations. *Proceedings of the Biennial Meeting of the Philosophy of Science Association* 1: 154-164.

- Ramsey, J. L. 2006. Approximation. In S. Sarkar, and J. Pfeifer (eds.), *The Philosophy of Science: An Encyclopedia*. New York: Routledge, pp. 24-27.
- Räz, T. 2017. The Volterra Principle Generalized. *Philosophy of Science* 84: 737-760.
- Rédei, M. 1998. *Quantum Logic in Algebraic Approach*. Dordrecht: Springer.
- Rédei, M. 2020. On the Tension between Physics and Mathematics. *Journal for General Philosophy of Science* 51: 411-425.
- Rédei, M. and M. Stöltzner 2006. Soft Axiomatisation: John Von Neumann on Method and Von Neumann's Method in the Physical Sciences. In E. Carson, and R. Huber (eds.), *Intuition and the Axiomatic Method*. Dordrecht: Springer, pp. 235-249.
- Redhead, M. 1980. Models in Physics. *The British Journal for the Philosophy of Science* 31: 145-163.
- Redhead, M. 2001. The Intelligibility of the Universe. In A. O'Hear (ed.), *Philosophy at the New Millennium*. Cambridge: Cambridge University Press, pp. 73-90.
- Reichenbach, H. 1929. The Aims and Methods of Physical Knowledge. In M. Reichenbach, and R. Cohen (eds.), *Selected Writings 1909-1953. Volume 2*. Dordrecht: Reidel 1953, pp. 120-225.
- Reiss, J. 2008. Social Capacities. In S. Hartmann, C. Hofer, and L. Bovens (eds.), *Nancy Cartwright's Philosophy of Science*. London: Routledge, pp. 265-288.
- Reiss, J. 2012a. The Explanation Paradox. *Journal of Economic Methodology*, 19: 43-62.
- Reiss, J. 2012b. Idealization and the Aims of Economics: Three Cheers for Instrumentalism. *Economics and Philosophy*: 363-383.
- Reiss, J. 2013. *Philosophy of Economics. A Contemporary Introduction*. New York and London: Routledge.
- Reiss, J. 2014. Models, Representation, and Economic Practice. In U. Gähde, S. Hartmann, and J. H. Wolf (eds.), *Models, Simulations, and the Reduction of Complexity*. Hamburg: De Gruyter, pp. 107-116.
- Reiss, J. 2016. Are There Social Scientific Laws? In L. McIntyre, and A. Rosenberg (eds.), *The Routledge Companion to Philosophy of Social Science*. New York: Routledge, pp. 295-309.
- Reiss, J. 2017. *Causation, Evidence, and Inference* London and New York: Routledge.
- Reiss, J. 2018. Thought Experiments and Idealisations. In M. Stuart, Y. Fehige, and J. Brown (eds.), *The Routledge Companion to Thought Experiments*. London: Routledge, pp. 469-483.
- Resnik, M. D. 1997. *Mathematics as a Science of Patterns*. Oxford: Oxford University Press.
- Reutlinger, A. 2017. Do Renormalization Group Explanations Conform to the Commonality Strategy? *Journal for General Philosophy of Science* 48: 143-150.
- Reutlinger, A., D. Hangleiter, and S. Hartmann 2018. Understanding (with) Toy Models. *The British Journal for the Philosophy of Science* 69: 1069-1099.
- Reutlinger, A., G. Schurz, and A. Hüttemann 2015. Ceteris Paribus Laws. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <http://plato.stanford.edu/archives/fall2015/entries/ceteris-paribus>.
- Rey, G. 2018. The Analytic/Synthetic Distinction. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/win2020/entries/analytic-synthetic/>.
- Rice, C. 2015. Moving Beyond Causes: Optimality Models and Scientific Explanation. *Nous* 49: 589-615.
- Rice, C. 2018. Idealized Models, Holistic Distortions, and Universality. *Synthese* 195: 2795-2819.
- Rice, C. 2019. Models Don't Decompose That Way: A Holistic View of Idealized Models. *The British Journal for the Philosophy of Science* 70: 179-208.

- Rice, C. 2020a. Universality and Modeling Limiting Behaviors. *Philosophy of Science* 87: 829-840.
- Rice, C. 2020b. Universality and the Problem of Inconsistent Models. In M. Massimi, and C. D. McCoy (eds.), *Understanding Perspectivism*. New York: Routledge, pp. 85-109.
- Rice, C. 2021. *Leveraging Distortions. Explanation, Idealization, and Universality in Science*. Cambridge, MA: MIT Press.
- Richardson, A. 1997. *Carnap's Construction of the World: The Aufbau and the Emergence of Logical Empiricism*. Cambridge: Cambridge University Press.
- Richardson, A. 2006. Rational Reconstruction. In S. Sarkar, and J. Pfeifer (eds.), *The Philosophy of Science. An Encyclopedia*. New York and London: Routledge, pp. 681-685.
- Richardson, A. 2007. "That Sort of Everyday Image of Logical Positivism" Thomas Kuhn and the Decline of Logical Empiricist Philosophy of Science. In A. Richardson, and T. Uebel (eds.), *The Cambridge Companion to Logical Empiricism*. Cambridge: Cambridge University Press, pp. 346-369.
- Richardson, A. and T. Uebel (eds.) 2007. *The Cambridge Companion to Logical Empiricism*. Cambridge: Cambridge University Press.
- Rickart, C. E. 1995. *Structuralism and Structure: A Mathematical Perspective*. Singapore: World Scientific.
- Rickles, D. 2020. *What Is Philosophy of Science?* Cambridge: Polity Press.
- Rodgers, R. L. 1971. *Mathematical Logic and Formalized Theories*. Amsterdam: North Holland.
- Romeijn, J.-W. 2017. Philosophy of Statistics. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/spr2017/entries/statistics/>.
- Rorty, R. M. (ed.) 1967. *The Linguistic Turn. Essays in Philosophical Method*. Chicago: Chicago University Press.
- Rosen, G. 1994. What Is Constructive Empiricism? *Philosophical Studies* 74: 143-178.
- Rosenberg, A. 2000. *Philosophy of Science: A Contemporary Introduction*. London: Routledge.
- Rosenblueth, A. and N. Wiener 1945. The Role of Models in Science. *Philosophy of Science* 12: 316-321.
- Rosenthal, R. and K. L. Fode 1963. The Effect of Experimenter Bias on the Performance of the Albino Rat. *Behavioural Science* 8: 183-189.
- Rossi, B. 2015. *From Slavery to Aid. Politics, Labour, and Ecology in the Nigerien Sahel, 1800-2000*. Cambridge: Cambridge University Press.
- Roussos, J., R. Bradley, and R. Frigg 2021a. Environmental Decision-Making under Uncertainty. In W. J. González (ed.), *Current Trends in Philosophy of Science. A Prospective for the near Future* (Synthese Library). Cham: Springer, pp. TBA.
- Roussos, J., R. Bradley, and R. Frigg 2021b. Making Confident Decisions with Model Ensembles *Philosophy of Science* 88: 439-460.
- Rowbottom, D. P. 2009. Models in Biology and Physics: What's the Difference? *Foundations of Science* 14: 281-294.
- Rowbottom, D. P. 2011. Approximations, Idealizations and 'Experiments' at the Physics–Biology Interface. *Studies in History and Philosophy of Biological and Biomedical Sciences* 42: 145-154.
- Rudner, R. S. 1966. *Philosophy of Social Science*. Eaglewood Cliffs: Prentice Hall.
- Rueger, A. 2005. Perspectival Models and Theory Unification. *The British Journal for the Philosophy of Science* 56: 579-594.

- Rueger, A. 2014. Idealized and Perspectival Representations: Some Reasons for Making a Distinction. *Synthese* 191: 1831-1845.
- Rueger, A. 2016. Perspectival Realism and Incompatible Models. *Axiomathes* 26: 401-410.
- Rueger, A. and D. Sharp 1998. Idealization and Stability: A Perspective from Nonlinear Dynamics. In N. Shanks (ed.), *Idealization IX: Idealization in Contemporary Physics* (Poznań Studies in the Philosophy of the Sciences and the Humanities 63). Amsterdam: Rodopi, pp. 201-216.
- Ruelle, D. 2004. *Thermodynamic Formalism: The Mathematical Structures of Classical Equilibrium Statistical Mechanics*. Cambridge: Cambridge University Press.
- Ruetsche, L. 2011. *Interpreting Quantum Theories*. Oxford: Oxford University Press.
- Ruse, M. 1973. The Nature of Scientific Models : Formal V Material Analogy. *Philosophy of the Social Sciences* 3: 63-80.
- Russell, B. 1905. On Denoting. *Mind* 14: 479-493.
- Russell, B. 1919/1993. *Introduction to Mathematical Philosophy*. London and New York: Routledge.
- Russell, G. 2007. Fictional Characters. *Philosophy Compass* 2: 712-729.
- Russell, S. 1988. Analogy by Similarity. In D. H. Helman (ed.), *Analogical Reasoning: Perspectives of Artificial Intelligence, Cognitive Science, and Philosophy*. Dordrecht: Kluwer, pp. 251-269.
- Russo, F. 2017. Model-Based Reasoning in the Social Sciences. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 953-970.
- Ruyant, Q. 2020. Perspectival Realism and Norms of Scientific Representation. *European Journal for Philosophy of Science* 10: Article 20.
- Ruyant, Q. 2021. True Griceanism: Filling the Gaps in Callender and Cohen's Account of Scientific Representation. *Philosophy of Science* 88: 533-553.
- Saatsi, J. 2011a. The Enhanced Indispensability Argument: Representational Versus Explanatory Role of Mathematics in Science. *The British Journal for the Philosophy of Science* 62: 143-154.
- Saatsi, J. 2011b. Idealized Models as Inferentially Veridical Representations. In P. Humphreys, and C. Imbert (eds.), *Models, Simulations, and Representations*. New York: Routledge, pp. 234-249.
- Saatsi, J. 2016. Models, Idealisations, and Realism. In E. Ippoliti, F. Sterpetti, and T. Nickles (eds.), *Models and Inferences in Science*. Cham: Springer, pp. 173-189.
- Saha, P. K. 1988. Metaphorical Style as Message. In D. H. Helman (ed.), *Analogical Reasoning: Perspectives of Artificial Intelligence, Cognitive Science, and Philosophy*. Dordrecht: Kluwer, pp. 41-61.
- Salis, F. 2013. Fictional Entities. *Online Companion to Problems in Analytical Philosophy*, <http://compendioemlinha.lettras.ulisboa.pt>.
- Salis, F. 2016. The Nature of Model-World Comparisons. *The Monist* 99: 243-259.
- Salis, F. 2020a. Of Predators and Prey: Imagination in Scientific Modeling. In K. Moser, and A. C. Sukla (eds.), *Imagination and Art: Explorations in Contemporary Theory*. Leiden and Boston: Brill Rodopi, pp. 451-474.
- Salis, F. 2020b. Scientific Discovery through Fictionally Modelling Reality. *Topoi* 39: 927-937.
- Salis, F. 2021. The New Fiction View of Models. *The British Journal for the Philosophy of Science* 72: 717-742.
- Salis, F. and R. Frigg 2020. Capturing the Scientific Imagination. In P. Godfrey-Smith, and A. Levy (eds.), *The Scientific Imagination. Philosophical and Psychological Perspectives*. Oxford: Oxford University Press, pp. 17-50.

- Salis, F., R. Frigg, and J. Nguyen 2020. Models and Denotation. In C. Martínez-Vidal, and J. L. Falguera (eds.), *Abstract Objects: For and Against*. Cham: Springer, pp. 197-219.
- Salmon, W. C. 1984. *Scientific Explanation and the Causal Structure of the World*. Princeton, NJ: Princeton University Press.
- Salmon, W. C. 2000. Logical Empiricism. In W. H. Newton-Smith (ed.), *A Companion to the Philosophy of Science*. Malden: Blackwell, pp. 233-242.
- Saltelli, A., S. Tarantola, F. Campolongo, and M. Ratto 2004. *Sensitivity Analysis in Practice. A Guide to Assessing Scientific Models*. Chichester: John Wiley & Sons Ltd.
- Sánchez-Dorado, J. 2017. Methodological Lessons for the Integration of Philosophy of Science and Aesthetics. The Case of Representation. In O. Bueno, G. Darby, S. French, and D. Rickles (eds.), *Thinking About Science, Reflecting on Art*. London: Routledge, pp. 10-26.
- Sarlemijn, A. 1987. Analogy Analysis and Transistor Research. *Methodology and Science* 20: 40-61.
- Sarlemijn, A. and P. A. Kroes 1988. Technological Analogies and Their Logical Nature. In P. T. Durbin (ed.), *Technology and Contemporary Life*. Dordrecht: Reidel, pp. 237-255.
- Savage, C. W. 1998. The Semantic (Mis)Conception of Theories. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.14.6280&rep=rep1&type=pdf>.
- Scerri, E. R. 1997. Has the Periodic Table Been Successfully Axiomatised? *Erkenntnis* 47: 229-243.
- Schaffner, K. F. 1969. Correspondence Rules. *Philosophy of Science* 36: 280-290.
- Scheffler, I. 1957a. Prospects of a Modest Empiricism, I. *Review of Metaphysics* 10: 383-400.
- Scheffler, I. 1957b. Prospects of a Modest Empiricism, II. *Review of Metaphysics* 10: 602-625.
- Scheffler, I. 1968. Reflections on the Ramsey Method. *The Journal of Philosophy* 65: 269-274.
- Schellenberg, S. 2018. *The Unity of Perception. Content, Consciousness, Evidence*. Oxford: Oxford University Press.
- Schelling, T. C. 1978. *Micromotives and Macrobehavior*. New York: Norton.
- Schiemer, G. and N. Gratzl 2016. The Epsilon-Reconstruction of Theories and Scientific Structuralism. *Erkenntnis* 81: 407-432.
- Schier, F. 1986. *Deeper in Pictures: An Essay on Pictorial Representation*. Cambridge: Cambridge University Press.
- Schilpp, P. A. (ed.) 1963. *The Philosophy of Rudolf Carnap* (Vol. XI, The Library of Living Philosophers). La Salle: Open Court.
- Schindler, S. 2007. Rehabilitating Theory: Refusal of the 'Bottom-up' Construction of Scientific Phenomena. *Studies in History and Philosophy of Science* 38: 160-184.
- Schindler, S. 2008. Model, Theory and Evidence in the Discovery of the DNA Structure. *The British Journal for the Philosophy of Science* 59: 619-658.
- Schindler, S. 2011. Bogen and Woodward's Data-Phenomena Distinction, Forms of Theory-Ladenness, and the Reliability of Data. *Synthese* 182: 39-55.
- Schindler, S. 2013a. Observation and Theory-Ladenness. In B. Kaldis (ed.), *Encyclopedia of Philosophy and the Social Sciences*. Los Angeles: Sage, pp. 694-697.
- Schindler, S. 2013b. Theory-Laden Experimentation. *Studies in History and Philosophy of Science* 44: 89-101.
- Schindler, S. 2014. Explanatory Fictions—for Real? *Synthese* 191: 1741-1755.
- Schlick, M. 1925. *Allgemeine Erkenntnislehre* (2nd ed.). Berlin Springer.
- Schlick, M. 1936. Meaning and Verification. *The Philosophical Review* 45: 339-369.

- Schlimm, D. 2006. Axiomatics and Progress in the Light of 20th Century Philosophy of Science and Mathematics. In B. Löwe, V. Peckhaus, and T. Räscher (eds.), *Foundations of the Formal Sciences Iv. The History of the Concept of the Formal Sciences*. London: College Publications, pp. 233-253.
- Schlimm, D. 2008. Two Ways of Analogy: Extending the Study of Analogies to Mathematical Domains. *Philosophy of Science* 75: 178-200.
- Schlimm, D. 2011. On the Creative Role of Axiomatics. The Discovery of Lattices by Schröder, Dedekind, Birkhoff, and Others. *Synthese* 183: 47-68.
- Schlimm, D. 2013. Axioms in Mathematical Practice. *Philosophia Mathematica* 21: 37-92.
- Schmidt, J. C. 2017. Science in an Unstable World. On Pierre Duhem's Challenge to the Methodology of Exact Sciences. In W. Pietsch, J. Wernecke, and M. Ott (eds.), *Berechenbarkeit Der Welt? Philosophie Und Wissenschaft Im Zeitalter Von Big Data*. Wiesbaden: Springer, pp. 403-434.
- Schupbach, J. N. 2015. Robustness, Diversity of Evidence, and Probabilistic Independence. In U. Mäki, I. Votsis, S. Ruphy, and G. Schurz (eds.), *Recent Developments in the Philosophy of Science: Epsa13 Helsinki*. Cham: Springer, pp. 305-318.
- Schupbach, J. N. 2018. Robustness Analysis as Explanatory Reasoning. *The British Journal for the Philosophy of Science* 69: 275-300.
- Schurz, G. 2015. Ostensive Learnability as a Test Criterion for Theory-Neutral Observation Concepts. *Journal for General Philosophy of Science* 46: 139-153.
- Schwartz, R. J. 1978. Idealizations and Approximations in Physics. *Philosophy of Science* 45: 595-603.
- Shapere, D. 1969. Notes Towards a Post-Positivist Interpretation of Science. In P. Achinstein, and S. F. Barker (eds.), *The Legacy of Logical Positivism*. Baltimore: Johns Hopkins Press, pp. 115-160.
- Shapere, D. 1982. The Concept of Observation in Science and Philosophy. *Philosophy of Science* 49: 485-525.
- Shapiro, S. 1983. Mathematics and Reality. *Philosophy of Science* 50: 523-548.
- Shapiro, S. 1991. *Foundations without Foundationalism: A Case for Second-Order Logic*. Oxford.
- Shapiro, S. 2000. *Thinking About Mathematics*. Oxford.
- Shech, E. 2015. Scientific Misrepresentation and Guides to Ontology: The Need for Representational Code and Contents. *Synthese* 192: 3463-3485.
- Shech, E. 2018a. Idealizations, Essential Self-Adjointness, and Minimal Model Explanation in the Aharonov–Bohm Effect. *Synthese* 195: 4839-4863.
- Shech, E. 2018b. Infinite Idealizations in Physics. *Philosophy Compass* 13: e12514.
- Shelley, C. 1999. Multiple Analogies in Archaeology. *Philosophy of Science* 66: 579-605.
- Shepard, R. N. 1980. Multidimensional Scaling, Tree-Fitting, and Clustering *Science* 210: 390-398.
- Shive, J. N. and R. L. Weber 1982. *Similarity in Physics*. New York: Wiley.
- Sintonen, M. 1991. How Evolutionary Theory Faces the Reality. *Synthese* 89: 163-183.
- Sjölin Wirling, Y. and T. Grüne-Yanoff 2021. The Epistemology of Modal Modeling. *Philosophy Compass* e12775: 1-11.
- Sklar, L. 1993a. Idealization and Explanation: A Case Study from Statistical Mechanics. *Midwest Studies in Philosophy* 18: 258-270.
- Sklar, L. 1993b. *Physics and Chance. Philosophical Issues in the Foundations of Statistical Mechanics*. Cambridge: Cambridge University Press.
- Sklar, L. 2003. Dappled Theories in a Uniform World. *Philosophy of Science* 70: 424-441.
- Skorupski, J. 1997. Meaning, Use, Verification. In B. Hale, and C. Wright (eds.), *A Companion to the Philosophy of Language*. Oxford: Blackwell, pp. 29-59.

- Sloep, P. and W. van der Steen 1987. The Nature of Evolutionary Theory: The Semantic Challenge. *Biology and Philosophy* 2: 1-15.
- Smith, L. A. 2007. *Chaos. A Very Short Introduction*. Oxford: Oxford University Press.
- Smith, L. A. and N. Stern 2011. Uncertainty in Science and Its Role in Climate Policy. *Philosophical Transactions of the Royal Society A* 369: 1-24
- Smith, P. 1998. *Explaining Chaos*. Cambridge: Cambridge University Press.
- Smith, P. 2003. *An Introduction to Formal Logic* (2nd ed.). Cambridge: Cambridge University Press.
- Smith, P. 2013. *An Introduction to Gödel's Theorems* (2nd ed.). Cambridge: Cambridge University Press.
- Smith, S. R. 2001. Models and the Unity of Classical Physics: Nancy Cartwright's Dappled World. *Philosophy of Science* 68: 456-475.
- Sneed, J. D. 1971. *The Logical Structure of Mathematical Physics* (2nd revised ed.). Dordrecht: Reidel.
- Sober, E. 1999. Multiple Realizability Argument against Reductionism. *Philosophy of Science* 66: 542-564.
- Sober, E. 2002. Instrumentalism, Parsimony, and the Akaike Framework. *Philosophy of Science* 69.
- Sober, E. 2004. Likelihood, Model Selection, and the Duhem-Quine Problem. *The Journal of Philosophy* 101: 221-241.
- Sober, E. 2015. *Ockham's Razors. A User's Manual*. Cambridge: Cambridge University Press.
- Solomon, G. 1990. What Became of Russell's Relation-Arithmetic? *Russell* 9: 168-173.
- Soto, C. and O. Bueno 2019. A Framework for an Inferential Conception of Physical Laws. *Principia* 23: 423-444.
- Spector, M. 1965. Models and Theories. *The British Journal for the Philosophy of Science* 16: 121-142.
- Spiegelhalter, D. J. and H. Riesch 2011. Don't Know, Can't Know: Embracing Deeper Uncertainties When Analysing Risks. *Phil. Trans. R. Soc. A* 369: 4730-4750.
- Spieler, O., D. B. Dingwell, and M. Alidibirov 2004. Magma Fragmentation Speed: An Experimental Determination. *Journal of Volcanology and Geothermal Research* 129: 109-123.
- Spirtes, P. 2005. Graphical Models, Causal Inference, Andeconometric Models. *Journal of Economic Methodology* 12: 1-22.
- Spivak, M. 1994. *Calculus* (3rd ed.). Houston: Publish or Perish.
- Sprenger, J. 2012. Environmental Risk Analysis: Robustness Is Essential for Precaution. *Philosophy of Science* 79: 881-892.
- Stachowiak, H. 1973. *Allgemeine Modelltheorie*. Vienna and New York: Springer.
- Stadler, F. 2001. *The Vienna Circle: Studies in the Origins, Development and Influence of Logical Empiricism*. Berlin and New York: Springer.
- Stainforth, D. A., T. E. Downing, R. Washington, A. Lopez, and M. New 2007. Issues in the Interpretation of Climate Model Ensembles to Inform Decisions. *Philosophical Transactions of the Royal Society A* 365: 2163-2177.
- Starr, W. 2019. Counterfactuals. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/fall2019/entries/counterfactuals/>.
- Stegenga, J. 2009. Robustness, Discordance, Andrelevance. *Philosophy of Science* 76: 650-661.
- Stegmüller, W. 1976. *The Structure and Dynamics of Theories*. New York and Berlin: Springer.

- Stegmüller, W. 1979. *The Structuralist View of Theories. A Possible Analogue of the Bourbaki Programme in Physical Science*. New York and Berlin: Springer.
- Sterratt, D., B. Graham, A. Gilles, and D. Willshaw 2011. *Principles of Computational Modelling in Neuroscience*. Cambridge: Cambridge University Press.
- Sterrett, S. G. 1998. Sounds Like Light: Einstein's Special Theory of Relativity and Mach's Work in Acoustics and Aerodynamics. *Studies in History and Philosophy of Science Part B: Studies in History and Philosophy of Modern Physics* 29: 1-35.
- Sterrett, S. G. 2002. Physical Models and Fundamental Laws: Using One Piece of the World to Tell About Another. *Mind and Society* 3: 51-66.
- Sterrett, S. G. 2006. Models of Machines and Models of Phenomena. *International Studies in the Philosophy of Science* 20: 69-80.
- Sterrett, S. G. 2017a. Experimentation on Analogue Models. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 857-878.
- Sterrett, S. G. 2017b. Physically Similar Systems – a History of the Concept. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 377-411.
- Sterrett, S. G. 2021. Scale Modeling. In D. Michelfelder, and N. Doorn (eds.), *Routledge Handbook of Philosophy of Engineering*. London, pp. 394-408.
- Steup, M. and R. Neta 2020. Epistemology. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/fall2020/entries/epistemology/>.
- Stich, S. and T. Warfield (eds.) 1994. *Mental Representation. A Reader*. Oxford Blackwell.
- Stobierski, T. 2019. What Is Statistical Modelling for Data Analysis. *Northeastern University Graduate Programs Blog*, <https://www.northeastern.edu/graduate/blog/statistical-modeling-for-data-analysis/>.
- Stocker, T. F., D. Qin, G.-K. Plattner, M. M. B. Tignor, S. K. Allen, J. Boschung, et al. (eds.) 2013. *Climate Change 2013. The Physical Science Basis. Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.
- Stöltzner, M. 2001. Opportunistic Axiomatics - Von Neumann on the Methodology of Mathematical Physics. In M. Rédei, and M. Stöltzner (eds.), *John Von Neumann and the Foundation of Quantum Physics*. Dordrecht: Kluwer, pp. 235-249.
- Strawson, G. 2014. *The Secret Connexion. Causation, Realism, and David Hume* (2nd ed.). Oxford: Oxford University Press.
- Strevens, M. 2008. *Depth: An Account of Scientific Explanation*. Cambridge/MA: Harvard University Press.
- Strevens, M. 2019. The Structure of Asymptotic Idealization. *Synthese* 196: 1713-1731.
- Strevens, M. 2021. Permissible Idealizations for the Purpose of Prediction. *Studies in History and Philosophy of Science*: 92-100.
- Stuart, M. T. 2017. Imagination: A Sine Qua Non of Science. *Croatian Journal of Philosophy* 17: 9-32.
- Stuart, M. T. 2020. The Productive Anarchy of Scientific Imagination. *Philosophy of Science* 87: 968-978.
- Stuart, M. T., Y. Fehige, and J. R. Brown (eds.) 2018. *The Routledge Companion to Thought Experiments* London: Routledge.
- Suárez, M. 1999a. The Role of Models in the Application of Scientific Theories: Epistemological Implications. In M. S. Morgan, and M. Morrison (eds.), *Models as Mediators: Perspectives on Natural and Social Science*. Cambridge: Cambridge University Press, pp. 168-195.

- Suárez, M. 1999b. Theories, Models, and Representations. In L. Magnani, N. Nersessian, and P. Thagard (eds.), *Model-Based Reasoning in Scientific Discovery*. Dordrecht: Kluwer, pp. 75-83.
- Suárez, M. 2003. Scientific Representation: Against Similarity and Isomorphism. *International Studies in the Philosophy of Science* 17: 225-244.
- Suárez, M. 2004. An Inferential Conception of Scientific Representation. *Philosophy of Science (Supplement)* 71: 767-779.
- Suárez, M. 2005. The Semantic View, Empirical Adequacy, and Application. *Crítica* 37: 29-63.
- Suárez, M. 2009. Scientific Fiction as Rules of Inference. In M. Suárez (ed.), *Fictions in Science. Philosophical Essays on Modelling and Idealization*. London and New York: Routledge, pp. 158-178.
- Suárez, M. 2013. Fictions, Conditionals, and Stellar Astrophysics. *International Studies in the Philosophy of Science* 27: 235-252.
- Suárez, M. 2015. Deflationary Representation, Inference, and Practice. *Studies in History and Philosophy of Science* 49: 36-47.
- Suárez, M. and N. Cartwright 2008. Theories: Tools Versus Models. *Studies in History and Philosophy of Modern Physics* 39: 62-81.
- Suárez, M. and F. Pero 2019. The Representational Semantic Conception. *Philosophy of Science* 86: 344-365.
- Suárez, M. and A. Solé 2006. On the Analogy between Cognitive Representation and Truth. *Theoria* 55: 39-48.
- Summers, S. J. 2016. A Perspective on Constructive Quantum Field Theory. <https://arxiv.org/abs/1203.3991>.
- Suppe, F. 1971. On Partial Interpretation. *The Journal of Philosophy* 68: 57-76.
- Suppe, F. 1972a. Theories, Their Formulations, and the Operational Imperative. *Synthese* 25: 129-164.
- Suppe, F. 1972b. What's Wrong with the Received View on the Structure of Scientific Theories? *Philosophy of Science* 39: 1-19.
- Suppe, F. 1974. Theories and Phenomena. In W. Leinfellner, and E. Köhler (eds.), *Developments in the Methodology of Social Science*. Dordrecht: Reidel, pp. 45-91.
- Suppe, F. 1977a. The Search for Philosophical Understanding of Scientific Theories. In F. Suppe (ed.), *The Structure of Scientific Theories*. Urbana and Chicago: University of Illinois Press, pp. 3-241.
- Suppe, F. (ed.) 1977b. *The Structure of Scientific Theories*. Urbana and Chicago: University of Illinois Press.
- Suppe, F. 1979. Theory Structure. In P. D. Asquith, and H. E. J. Kyburg (eds.), *Current Research in Philosophy of Science: Proceedings of the P.S.A. Critical Research Problems Conference*. East Lansing: Philosophy of Science Association, pp. 317-338.
- Suppe, F. 1989. *The Semantic Conception of Theories and Scientific Realism*. Urbana and Chicago: University of Illinois Press.
- Suppe, F. 1998. Theories, Scientific. In E. Craig (ed.), *Routledge Encyclopedia of Philosophy* (Vol. 2008). London: Routledge, pp. 344-355.
- Suppe, F. 2000a. Axiomatization. In W. H. Newton-Smith (ed.), *A Companion to the Philosophy of Science*. Oxford: Wiley-Blackwell, pp. 9-11.
- Suppe, F. 2000b. Craig's Theorem. In W. H. Newton-Smith (ed.), *A Companion to the Philosophy of Science*. Oxford: Wiley-Blackwell, pp. 65-67.
- Suppe, F. 2000c. Theory Identity. In W. H. Newton-Smith (ed.), *A Companion to the Philosophy of Science*. Oxford: Wiley-Blackwell, pp. 525-527.

- Suppe, F. 2000d. Understanding Scientific Theories: An Assessment of Developments, 1969-1998. *Philosophy of Science* 67: 102-115.
- Suppes, P. 1957. *Introduction to Logic*. New York: D. Van Nostrand Company.
- Suppes, P. 1960. A Comparison of the Meaning and Uses of Models in Mathematics and the Empirical Sciences. In P. Suppes (ed.), *Studies in the Methodology and Foundations of Science: Selected Papers from 1951 to 1969*. Dordrecht Reidel 1969, pp. 10-23.
- Suppes, P. 1962. Models of Data. In P. Suppes (ed.), *Studies in the Methodology and Foundations of Science: Selected Papers from 1951 to 1969*. Dordrecht: Dordrecht 1969, pp. 24-35.
- Suppes, P. 1967. What Is a Scientific Theory. In S. Morgenbesser (ed.), *Philosophy of Science Today*. New York: Basic Books, pp. 66-67.
- Suppes, P. 1968. The Desirability of Formalization in Science. *The Journal of Philosophy* 65: 651-664.
- Suppes, P. 1977. The Structure of Theories and the Analysis of Data. In F. Suppe (ed.), *The Structure of Scientific Theories*. Urbana and Chicago: Univeristy of Illionois Press, pp. 266-288.
- Suppes, P. 1988. Representation Theory and the Analysis of Structure. *Philosophia Naturalis* 25: 254-268.
- Suppes, P. 1992. Axiomatic Methods in Science. In M. E. Carvallo (ed.), *Nature, Cognition and System Ii. Current Systems-Scientific Research on Natural and Cognitive Systems. Volume 2: On Complementarity and Beyond*. Dordrecht: Springer, pp. 205-232.
- Suppes, P. 2002. *Representation and Invariance of Scientific Structures*. Stanford: CSLI Publications.
- Suppes, P. 2007. Statistical Concepts in Philosophy of Science. *Synthese* 154: 485-496.
- Suppes, P. 2011. Future Development of Scientific Structures Closer to Experiments: Response to F.A. Muller. *Synthese* 183: 115-126.
- Swanson, J. W. 1966. On Models. *The British Journal for the Philosophy of Science* 17: 297-311.
- Swoyer, C. 1991. Structural Representation and Surrogate Reasoning. *Synthese* 87: 449-508.
- Tabor, M. 1989. *Chaos and Integrability in Nonlinear Dynamics. An Introduction*. New York: Wiley.
- Tal, E. 2011. From Data to Phenomena and Back Again: Computer-Simulated Signatures. *Synthese* 182: 117-129.
- Tal, E. 2013. Old and New Problems in Philosophy of Measurement. *Philosophy Compass* 8: 1159-1173.
- Tal, E. 2016. Making Time: A Study in the Epistemology of Measurement. *British Journal for the Philosophy of Science* 67: 297-335.
- Tal, E. 2017. Measurement in Science. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <http://plato.stanford.edu/archives/sum2015/entries/measurement-science/>.
- Tarski, A. 1953. *Undecidable Theories*. Amsterdam: North-Holland Publishing Company.
- Tee, S.-H. 2020a. Abstraction as an Autonomous Process in Scientific Modeling. *Philosophia* 48: 789-801.
- Tee, S.-H. 2020b. Generative Models. *Erkenntnis* Online First, <https://doi.org/10.1007/s10670-020-00338-w>.
- Tegmark, M. 2008. The Mathematical Universe. *Foundations of Physics* 38: 101-150.
- Teira, D. 2013. A Contractarian Solution to the Experimenter's Regress. *Philosophy of Science* 80: 709-720.
- Teller, P. 2001a. Twilight of the Perfect Model Model. *Erkenntnis* 55: 393-415.

- Teller, P. 2001b. Whither Constructive Empiricism. *Philosophical Studies* 106: 123-150.
- Teller, P. 2004. How We Dapple the World. *Philosophy of Science* 71: 425-447.
- Teller, P. 2010a. 'Saving the Phenomena' Today. *Philosophy of Science* 77: 815-826.
- Teller, P. 2010b. "Saving the Phenomena" Today. *Philosophy of Science* 77: 815-826.
- Teller, P. 2018a. Making Worlds with Symbols. *Synthese*, <https://doi.org/10.1007/s11229-018-1811-y>.
- Teller, P. 2018b. Referential and Perspectival Realism. *Spontaneous Generations* 9: 151-164.
- Thébault, K. P. Y., S. Bradley, and A. Reutlinger 2018. Modelling Inequality. *The British Journal for the Philosophy of Science* 69: 691-718.
- Thoma, J. 2012. On the Robustness of Economic Models. *Master Thesis in Philosophy and Economics (University of Rotterdam)*, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwiEodOX_NjxAhWX_7sIHSunBt4QFjABegQIBBAD&url=https%3A%2F%2Fthesis.eur.nl%2Fpub%2F11440%2FMA-thesis%2520Thoma.pdf&usg=AOvVaw0_VmkLXyXXRI-vQ0Yrif1U.
- Thomasson, A. L. 1999. *Fiction and Metaphysics*. New York: Cambridge University Press.
- Thomasson, A. L. 2020. If Models Were Fictions, Then What Would They Be? In A. Levy, and P. Godfrey-Smith (eds.), *The Scientific Imagination. Philosophical and Psychological Perspectives*. New York: Oxford University Press, pp. 51-74.
- Thompson, E., R. Frigg, and C. Helgeson 2016. Expert Judgment for Climate Change Adaptation. *Philosophy of Science* 83: 1110-1121.
- Thompson, P. 1983. The Structure of Evolutionary Theory: A Semantic Approach. *Studies in History and Philosophy of Science* 14: 215-229.
- Thompson, P. 1987. A Defence of the Semantic Conception of Evolutionary Theory. *Biology and Philosophy* 2: 26-32.
- Thompson, P. 1988. Explanation in the Semantic Conception of Theory Structure. *Philosophy of Science (Proceedings)* Vol. 2: 286-296.
- Thompson, P. 1989. *The Structure of Biological Theories*. Albany: State University of New York Press.
- Thomson-Jones, M. 2006. Models and the Semantic View. *Philosophy of Science* 73: 524-535.
- Thomson-Jones, M. 2010. Missing Systems and Face Value Practise. *Synthese* 172: 283-299.
- Thomson-Jones, M. 2012. Modeling without Mathematics. *Philosophy of Science* 79: 761-772.
- Thomson-Jones, M. 2020. Realism About Missing Systems. In A. Levy, and P. Godfrey-Smith (eds.), *The Scientific Imagination. Philosophical and Psychological Perspectives*. New York: Oxford University Press, pp. 75-101.
- Thorn, C. B. 2012. Classical Mechanics. <http://www.phys.ufl.edu/~thorn/homepage/cmlectures.pdf>.
- Toon, A. 2010a. Models as Make-Believe. In R. Frigg, and M. Hunter (eds.), *Beyond Mimesis and Convention: Representation in Art and Science*. Berlin Springer, pp. 71-96.
- Toon, A. 2010b. The Ontology of Theoretical Modelling: Models as Make-Believe. *Synthese* 172: 301-315.
- Toon, A. 2011. Playing with Molecules. *Studies in History and Philosophy of Science* 42: 580-589.
- Toon, A. 2012a. *Models as Make-Believe. Imagination, Fiction and Scientific Representation*. Basingstoke: Palgrave Macmillan.
- Toon, A. 2012b. Similarity and Scientific Representation. *International Studies in the Philosophy of Science* 26: 241-257.

- Toon, A. 2017. Imagination in Scientific Modeling. In A. Kind (ed.), *The Routledge Handbook of Philosophy of Imagination*. London and New York: Routledge, pp. 451-462.
- Torretti, R. 1990. *Creative Understanding: Philosophical Reflections on Physics*. Chicago: The University of Chicago Press.
- Truesdell, C. 1984. Suppesian Stews. In C. Truesdell (ed.), *An Idiot's Fugitive Essays on Science. Methods, Criticism, Training, Circumstances*. New York and Berlin: Springer, pp. 503-579.
- Tuomela, R. 1973. *Theoretical Concepts*. Wien and New York: Springer.
- Turner, J. 1955. Maxwell on the Method of Physical Analogy. *The British Journal for the Philosophy of Science* 6: 226-238.
- Tversky, A. 1977. Features of Similarity. *Psychological Review* 84: 327-352.
- Ubbink, J. B. 1960. Model, Description and Knowledge. *Synthese* 12: 302-319.
- Uebel, T. 2007. *Empiricism at the Crossroads. The Vienna Circle's Protocol-Sentence Debate*. Chicago: Open Court.
- Uebel, T. 2011. Carnap's Ramseyfication Defended. *European Journal for Philosophy of Science* 1: 71-87.
- Uebel, T. 2019. Verificationism and (Some of) Its Discontents. *Journal for the History of Analytical Philosophy* 7: 1-32.
- Uffink, J. 2001. Bluff Your Way in the Second Law of Thermodynamics. *Studies in History and Philosophy of Modern Physics* 32: 305-394.
- Uffink, J. 2007. Compendium of the Foundations of Classical Statistical Physics. In J. Butterfield, and J. Earman (eds.), *Philosophy of Physics*. Amsterdam: North Holland, pp. 923-1047.
- Unruh, W. G. 2018. Map and Territory in Physics: The Role of an Analogy in Black Hole Physics. In S. Wuppuluri, and F. A. Doria (eds.), *The Map and the Territory. Exploring the Foundations of Science, Thought and Reality*. Cham: Springer, pp. 233-243.
- Väänänen, J. 2020. Second-Order and Higher-Order Logic. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/fall2020/entries/logic-higher-order/>.
- van Fraassen, B. C. 1970. On the Extension of Beth's Semantics of Physical Theories. *Philosophy of Science* 37: 325-339.
- van Fraassen, B. C. 1972. A Formal Approach to the Philosophy of Science. In R. G. Colodny (ed.), *Paradigms and Paradoxes*. Pittsburgh: University of Pittsburgh Press, pp. 303-366.
- van Fraassen, B. C. 1980. *The Scientific Image*. Oxford: Oxford University Press.
- van Fraassen, B. C. 1981. Theory Construction and Experiment: An Empiricist View. *Philosophy of Science (Proceedings)* Vol. 2: 663-677.
- van Fraassen, B. C. 1985. Empiricism in the Philosophy of Science. In P. M. Churchland, and C. A. Hooker (eds.), *Images of Science*. Chicago: Chicago University Press, pp. 245-308.
- van Fraassen, B. C. 1987. The Semantic Approach to Scientific Theories. In N. Nersessian (ed.), *The Process of Science. Contemporary Philosophical Approaches to Understanding Scientific Practice*. Dordrecht: Martinus Nijhoff, pp. 105-124.
- van Fraassen, B. C. 1989. *Laws and Symmetry*. Oxford: Clarendon Press.
- van Fraassen, B. C. 1991. *Quantum Mechanics*. Oxford: Clarendon Press.
- van Fraassen, B. C. 1994. Gideon Rosen on Constructive Empiricism. *Philosophical Studies* 74: 179-192.

- van Fraassen, B. C. 1995. A Philosophical Approach to Foundations of Science. *Foundations of Science* 1: 5-9.
- van Fraassen, B. C. 1997. Structure and Perspective: Philosophical Perplexity and Paradox. In M. L. Dalla Chiara (ed.), *Logic and Scientific Methods*. Dordrecht: Kluwer, pp. 511-530.
- van Fraassen, B. C. 2001. Constructive Empiricism Now. *Philosophical Studies* 106: 151-171.
- van Fraassen, B. C. 2002. *The Empirical Stance*. New Haven and London: Yale University Press.
- van Fraassen, B. C. 2008. *Scientific Representation: Paradoxes of Perspective*: Oxford University Press.
- van Fraassen, B. C. 2010. Reply to Contessa, Ghins, and Healey. *Analysis Reviews* 70: 547-556.
- van Fraassen, B. C. 2014. One or Two Gentle Remarks About Hans Halvorson's Critique of the Semantic View. *Philosophy of Science* 81: 276-283.
- van Fraassen, B. C. 2019. *The Semantic Approach, after 50 Years*. Manuscript.
- Veit, W. 2020. Model Pluralism. *Philosophy of the Social Sciences* 50: 91-114, <https://doi.org/10.1080/1350178X.2021.1898660>.
- Veit, W. 2021. Model Diversity and the Embarrassment of Riches. *Journal of Economic Methodology* Online first, <https://doi.org/10.1080/1350178X.2021.1898660>.
- Vezér, M. A. 2016. Computer Models and the Evidence of Anthropogenic Climate Change: An Epistemology of Variety-of-Evidence Inferences and Robustness Analysis. *Studies in History and Philosophy of Science* 56: 95-102.
- Vickers, P. 2009. Can Partial Structures Accomodate Inconsistent Science. *Principia* 13: 233-250.
- Vickers, P. 2014. Scientific Theory Eliminativism. *Erkenntnis* 79: 111-126.
- Volterra, V. 1926. Fluctuations in the Abundance of a Species Considered Mathematically. *Nature* 118: 558-560.
- von Neumann, J. 1932/1955. *Mathematical Foundations of Quantum Mechanics*. Princeton: Princeton University Press.
- Vorms, M. 2011. Representing with Imaginary Models: Formats Matter. *Studies in History and Philosophy of Science* 42: 287–295.
- Vorms, M. 2012. Formats of Representation in Scientific Theorising. In P. Humphreys, and C. Imbert (eds.), *Models, Simulations, and Representations*. New York: Routledge pp. 250-273.
- Vorms, M. 2018. Theories and Models. In A. Barberousse, D. Bonnay, and M. Cozic (eds.), *The Philosophy of Science*. Oxford: Oxford University Press, pp. 171-224.
- Votsis, I. 2010. Making Contact with Observations. In M. Suárez, M. Dorato, and M. Rédei (eds.), *Epsa Philosophical Issues in the Sciences. Vol. 2*. Berlin: Springer, pp. 267-277.
- Votsis, I. 2015. Perception and Observation Unladen. *Philosophical Studies* 172: 563-585.
- Votsis, I. 2018. Putting Theory-Ladenness to the Test. *Cognitive Science Society Proceedings*: 2630-2635.
- Votsis, I. 2020. Theory-Ladenness: Testing the 'Untestable'. *Synthese* 197: 1447–1465.
- Wade, N. and S. Finger 2001. The Eye as an Optical Instrument: From Camera Obscura to Helmholtz'sperspective. *Perception* 30: 1157-1177.
- Walsh, S., E. Knox, and A. Caulton 2014. Critical Review of Mathematics and Scientific Representation. *Philosophy of Science* 81: 460-469.
- Walton, K. L. 1990. *Mimesis as Make-Believe: On the Foundations of the Representational Arts*. Cambridge/MA: Harvard University Press.

- Wartofsky, M. W. 1979. *Models: Representation and the Scientific Understanding*. Dordrecht: Reidel.
- Wasserman, L. 2004. *All of Statistics. A Concise Course in Statistical Inference*. New York: Springer.
- Watson, J. D. 1998. *The Double Helix. Personal Account of the Discovery of the Structure of DNA*. New York: Scribner.
- Weatherall, J. O. 2016a. Are Newtonian Gravitation and Geometrized Newtonian Gravitation Theoretically Equivalent? . *Erkenntnis* 81: 1073-1091.
- Weatherall, J. O. 2016b. Categories and the Foundations of Classical Field Theories. <https://arxiv.org/abs/1505.07084>.
- Weatherall, J. O. 2016c. Understanding Gauge. *Philosophy of Science* 83: 1039-1049.
- Weatherall, J. O. 2019a. Part 1: Theoretical Equivalence in Physics. *Philosophy Compass* 14:e12592: 1-11.
- Weatherall, J. O. 2019b. Part 2: Theoretical Equivalence in Physics. *Philosophy Compass* 14:e12591: 1-12.
- Webb, B. 2001. Can Robots Make Good Models of Biological Behaviour? With Peer Commentary. *Behavioral and Brain Sciences* 24: 1033-1050.
- Webb, B. 2009. Animals Versus Animats: Or Why Not Model the Real Iguana? *Adaptive Behavior* 17: 269-286.
- Weber, M. 2014. Experimental Modeling in Biology: In Vivo Representation and Stand-Ins as Modeling Strategies. *Philosophy of Science* 81: 756-769.
- Weinert, F. 1999. Theories, Models and Constraints. *Studies in History and Philosophy of Science* 30: 303-333.
- Weinert, F. 2016. *The Demons of Science. What They Can and Cannot Tell Us About Our World*. Cham: Springer.
- Weirich, P. 2011. The Explanatory Power of Models and Simulations: A Philosophical Exploration. 42: 155-176.
- Weisberg, M. 2004. Qualitative Theory and Chemical Explanation. *Philosophy of Science* 71: 1071-1081.
- Weisberg, M. 2006a. Forty Years of 'the Strategy': Levins on Model Building and Idealization. *Biology and Philosophy* 21: 623-645.
- Weisberg, M. 2006b. Robustness Analysis. *Philosophy of Science* 73: 730-742.
- Weisberg, M. 2007a. Three Kinds of Idealization. *The Journal of Philosophy* 104: 639-659.
- Weisberg, M. 2007b. Who Is a Modeler? *The British Journal for the Philosophy of Science* 58: 207-233.
- Weisberg, M. 2012. Getting Serious About Similarity. *Philosophy of Science* 79: 785-794.
- Weisberg, M. 2013. *Simulation and Similarity: Using Models to Understand the World*. Oxford: Oxford University Press.
- Weisberg, M. 2015. Biology and Philosophy Symposium on Simulation and Similarity: Using Models to Understand the World: Response to Critics. *Biology and Philosophy* 30: 299-310.
- Weisberg, M. and K. Reisman 2008. The Robust Volterra Principle. *Philosophy of Science* 75: 106-131.
- Werndl, C. 2009. What Are the New Implications of Chaos for Unpredictability? *The British Journal for the Philosophy of Science* 60: 195-220.
- Wigner, E. 1960. The Unreasonable Effectiveness of Mathematics in the Natural Sciences. *Communications on Pure and Applied Mathematics* 13: 1-14.
- Wilde, M. and J. Williamson 2016. Models in Medicine. In M. Solomon, J. R. Simon, and H. Kincaid (eds.), *The Routledge Companion to Philosophy of Medicine*. Abingdon: Routledge, pp. 271-284.

- Williams, D. 2021. Imaginative Constraints and Generative Models. *Australasian Journal of Philosophy* 99: 68-82
- Williams, J. B., D. Popp, K. A. Kobak, and M. J. Detke 2012. The Power of Expectation Bias. *European Psychiatry* 27: 1.
- Williamson, J. 2017. Models in Systems Medicine. *Disputatio*, 9: 429-469.
- Williamson, T. 2005. Armchair Philosophy, Metaphysical Modality, and Counterfactual Thinking. *Proceedings of the Aristotelian Society* 105: 1-23.
- Wilson, F. 1964. Implicit Definitions Once Again. *The Journal of Philosophy* 62: 364-374.
- Wilson, J. 2017. Determinables and Determinates. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/archives/spr2017/entries/determinate-determinables/>.
- Wimsatt, W. C. 1981. Robustness, Reliability, and Overdetermination. In M. B. Brewer, and B. E. Collins (eds.), *Scientific Inquiry and the Social Sciences: A Volume in Honor of Donald T. Campbell*. San Francisco: Lexington Books, pp. 123-162.
- Wimsatt, W. C. 1987. False Models as Means to Truer Theories. In M. H. Nitecki, and A. Hoffman (eds.), *Neutral Models in Biology*. New York and Oxford: Oxford University Press, pp. 23-55.
- Wimsatt, W. C. 2007. *Re-Engineering Philosophy for Limited Beings: Piecewise Approximations of Reality*. Cambridge: Harvard University Press.
- Windt, J. M. and V. Noreika 2011. How to Integrate Dreaming into a General Theory of Consciousness—a Critical Review of Existing Positions and Suggestions for Future Research. *Consciousness and Cognition* 20: 1091-1107.
- Winnie, J. A. 1965. Theoretical Terms and Partial Definitions. *Philosophy of Science* 32: 324-328.
- Winnie, J. A. 1967. The Implicit Definition of Theoretical Terms. *The British Journal for the Philosophy of Science* 18: 223-229.
- Winsberg, E. 1999. The Hierarchy of Models in Simulation. In L. Magnani, N. Nersessian, and P. Thagard (eds.), *Model-Based Reasoning in Scientific Discovery*. New York: Kluwer Academic/Plenum Publishers, pp. 255-269.
- Winsberg, E. 2010. *Science in the Age of Computer Simulation*. Chicago: University of Chicago Press.
- Winther, R. G. 2006. On the Dangers of Making Scientific Models Ontologically Independent: Taking Richard Levins' Warnings Seriously. *Biology and Philosophy* 21: 703-724.
- Winther, R. G. 2016. The Structure of Scientific Theories. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* <https://plato.stanford.edu/archives/win2016/entries/structure-scientific-theories/>.
- Wit, E., E. van den Heuvel, and J.-W. Romeijn 2012. All Models Are Wrong...': An Introduction to Model Uncertainty. *Statistica Neerlandica* 66: 217-236.
- Wolfson, R. J. 1970. Points of View, Scientific Theories and Econometric Models. *Philosophy of Science* 37: 249-260.
- Wong, H.-Y. and J. Rosenhead 2000. A Rigorous Definition of Robustness Analysis. *The Journal of the Operational Research Society* 51: 176-182.
- Woods, J. and A. Rosales 2010. Virtuous Distortion. Abstraction and Idealization in Model-Based Science. In L. Magnani, W. Carnielli, and C. Pizzi (eds.), *Model-Based Reasoning in Science and Technology*. Berlin and Heidelberg: Springer, pp. 3-30.
- Woodward, J. 1989. Data and Phenomena. *Synthese* 79: 393-472.
- Woodward, J. 2000. Data, Phenomena, and Reliability. *Philosophy of Science (Proceedings)* 67: 163-179.

- Woodward, J. 2006. Some Varieties of Robustness. *Journal of Economic Methodology* 13: 219-240.
- Woodward, J. 2010. Data, Phenomena, Signal, and Noise. *Philosophy of Science* 182: 792-803.
- Woodward, J. 2011. Data and Phenomena: A Restatement and Defense. *Synthese* 182: 165-179.
- Woody, A. 2000. Putting Quantum Mechanics to Work in Chemistry: The Power of Diagrammatic Representation. *Philosophy of Science* 67: 612-627.
- Woody, A. (ed.) 2010. *Syposia Papers from the Psa 2008 Program*. Chicago: Chicago University Press.
- Worrall, J. 1984. An Unreal Image. *The British Journal for the Philosophy of Science* 34: 65-80.
- Worrall, J. 2007a. Miracles and Models: Why Reports of the Death of Structural Realism May Be Exaggerated. In A. O'Hare (ed.), *Philosophy of Science*. Cambridge: Cambridge University Press, pp. 125-154.
- Worrall, J. 2007b. Why There's No Cause to Randomize. *The British Journal for the Philosophy of Science* 58: 451-488.
- Worrall, J. 2011. Underdetermination, Realism and Empirical Equivalence. *Synthese* 180: 157-172.
- Wylie, A. 2017. Representational and Experimental Modeling in Archaeology. In L. Magnani, and T. Bertolotti (eds.), *Springer Handbook of Model-Based Science*. Dordrecht, Heidelberg, London and New York: Springer, pp. 989-1002.
- Yablo, S. 2014. *Aboutness*. Princeton: Princeton University Press.
- Yoshida, Y. 2020. Multiple-Models Juxtaposition and Trade-Offs among Modeling Desiderata. *Philosophy of Science* 88: 103-123.
- Young, H. D. and R. Freedman 2000. *University Physics with Modern Physics* (10th ed.). San Francisco and Reading (MA): Addison Wesley.