Review of: "Sustainable futures: a quality-focused model for inclusive knowledge co-production"

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Thank you for the opportunity to comment on the article titledSustainable futures: a quality-focused model for inclusive knowledge co-production.

Two previous reviews have already stated some key points, so I will briefly remark on the article's general purpose and frame of reference.

The first line of the abstract states that “The paper uses a quality assurance-focused conceptual framework based on the distributed cognition theory….” As the other reviewers have suggested, the article obtains a limited degree of success in its aims as far as it goes. It does not, however, go very far, as it focuses on microscopically working through a narrowly focused implementation of Hutchins' notions of distributed cognition, Shabani's sense of quality assurance methods, and Eaton's conceptual framework for social, behavioral, and environmental change.

The article then suffers from the same myopic shortcomings as those Latour (1995) points out in his review of Hutchins' 1995 book, *Cognition in the Wild*. By not taking the history of science into account, the article in review repeats the same error as Hutchins, failing “to make more precise what exactly is propagated from one representational medium to the next” (Latour, 1995, p. 62) in the coproduced networks of distributed cognition. Just as was the case in Hutchins' book, this article uses a vocabulary “very reminiscent of the one used in the sociology of scientific instruments, metrology, collections and centres of calculation in general” (Latour, 1995, p. 62), and the article similarly lays out how people act to coordinate and coproduce shared, communicable sociocognitive outcomes. But in not making the connection to the fundamental ways in which linguistic standards serve as the model for, and are extended into, universally distributed metrological standards useful hundreds of times every day in the lives of billions of people, the article does not articulate or envision its own proper ontological frame of reference, and so cannot possibly follow through to a significant advancement of its own stated purposes.

For further background, in addition to Latour's 1995 review of Hutchins' book, see:

- Latour (1987, pp. 247-257) on “metrologies” and Latour (1990, 1993, 1998; Fisher & Stenner, 2018; Morrison & Fisher, 2019, 2021, 2023) on distinctions between modernizing and amodern (or nonmodern or unmodern) ecologizing models and methods;
- Weitzel (2004, p. 11) on the implications of the fact that "written language is a perfect standardization process" that provides the root model for metrological standards;

- Scott (1998, pp. 355-357) on the reasons for taking language as a model for all efforts aimed at improving the human condition;
- Ricoeur (1981, p. 219) on the way that "social reality is fundamentally symbolic;"
- Brier (2013), Danesi (2017), Derrida (1976, p. 50), Dewey (1954, p. 210), Gadamer (1989, pp. 367, 378, 383, 388), Heelan (1983), Ihde (1991), Latour and Lepinay (2010), Noth (2018), Peirce (1955, p. 230; 1992, p. 30), Platt (1961), Sebeok (2001), Thrift (2008), Weeks and Galunic (2003), Wheatley, et al. (2019), Whitehead (1911, p. 61; 1925, p. 107), Wittgenstein (1958, p. 107), etc., etc. on the consequences of the facts that we think only in signs, and that language is the vehicle of thought;
- Banks, (2004) and Franck (2002, 2019) on how language serves as a labor-saving device creating efficient knowledge markets in an economy of thought and attention;
- Galison (1997, p. 49; 1999), Star and Griesemer (1989, p. 392), Star and Ruhleder (1996, pp. 118, 128, 132), Scott (1998, pp. 355-357) and many others (Bowker, 2015) on how language enables us to leverage simultaneously enacted, integrated, hierarchically discontinuous levels of complexity (Commons, 2008; Commons & Goodheart, 2008; Dawson-Tunik, et al., 2005; Pattee, 1973, 1985; Pattee & Raczaszek-Leonardi, 2012) to share virally communicable meaning;
- Pendrill (2019) on the development of quality-assured metrological standards across the natural and social sciences,
- a wide range of works on mathematical models of measurement capable of supporting the development of complex, multilevel metrological standards across the natural and social sciences (Andrich, 1988; Andrich & Marais, 2019; Cano, et al., 2019; Fisher & Wright, 1994; Fisher, et al., 2021; Linacre, 2003; Luce, 1959; Luce & Tukey, 1964; Mari & Wilson, 2014; Mari, et al., 2023; Massof, 2014; Pendrill & Fisher, 2015); and
- a number of relevant works synthesizing these developments (among many others, Fisher, 2004, 2009, 2012, 2020, 2021, 2022, 2023a/b/c; Fisher, et al., 2019; Fisher & Stenner, 2018; Fisher & Wilson, 2015).

Pragmatically speaking, as the article in review makes an initial effort at doing, it makes clear sense to focus straightforwardly on how things come into language and meet our needs for shared symbol systems instead of allowing ourselves to be distracted unproductively by metaphysical beliefs in an objective reality that exists independent of human interests and that automatically inserts itself as an indisputable fact (for free!) into discourse. It will be challenging, but not impossible, to coproduce across domains the new systems of integrated semiotic idea-word-thing and theory-instrument-data assemblages we need. These systems are inherently complex, as each level exhibits properties discontinuous with those of the adjacent levels. But there seems no other way to model practical approaches to creating shared abstract signs and symbols connecting, with acknowledged uncertainty and limits, unrealistic, formal conceptual ideals with infinite varieties of local, unique concrete circumstances.

No one can do this work alone, so we have to be able to imagine it together, and to communicate it. Whitehead (1925, p. 107), writing just after the advent of quantum mechanics, points out that the sudden change in physics did not come about because all the scientists suddenly all become more imaginative; rather, he points out, they had better instruments. He (Whitehead, 1911, p. 61) had previously made much the same point in noting that civilization does not advance by means of individuals learning to think more clearly for themselves, but via the distribution of technologies that enable everyone to successfully execute operations they do not understand and could not create (on this general theme, see Hankins &

Silverman, 1999; Jasanoff & Kim, 2015; Marcus, 1995; Fisher, 2020, 2021, 2023c).

This point has become a matter of central concern in developmental psychology's realization that “cultural progress is the result of developmental level of support” (Commons & Goodheart, 2008; also see Commons & Bresette, 2006; Commons, et al., 2011; Petracca & Gallagher, 2020; Sutton, et al., 2010). Hayek (1948, p. 88; Fisher, 2014) quotes the passage from Whitehead (1911) in his effort to raise and answer the question as to the

“...central question of all social sciences: How can the combination of fragments of knowledge existing in different minds bring about results which, if they were to be brought about deliberately, would require a knowledge on the part of the directing mind which no single person can possess?”

I hypothesize that this question cannot be productively answered in the absence of applications using probabilistic models of measurement in (a) the development of complex multilevel metrological standards and knowledge infrastructures that must be (b) distributed across scientific, legal, financial, and communications domains; that must furthermore (c) be validated by publicly reproducible predictions and explanatory theories; and (d) must also support individually adapted, meaningful, coherent, and interpretable feedback into learning, development, and healing processes. (See Figures 12.2 and 12.3 on pp. 370-372 in Fisher, 2023c.)

Tests of that hypothesis require humanity to start imagining new ways of thinking and being, together, ways that literally think outside of the box of existing languages and concepts. That is, humanity is engaged in processes moving into a more complex context that does not take language for granted in an unexamined sphere of background assumptions, but which instead focuses directly on language as an object of operations capitalizing on its role as the medium of thought and of the stewardship of meaningful, trusting, healing, and caring social relations. Echoing Rasch (1960, p. xx), we can also say that, though the challenge is truly intimidating, having formulated it, human ingenuity will likely find a way to meet it.

References

1. Andrich, D. (1988). Sage University Paper Series on Quantitative Applications in the Social Sciences. Vol. series no. 07-068: Rasch models for measurement. Sage Publications.
2. Andrich, D., & Marais, I. (2019). A course in Rasch measurement theory: Measuring in the educational, social, and health sciences. Springer.
3. Banks, E. (2004). The philosophical roots of Ernst Mach's economy of thought. Synthese, 139(1), 23-53.
4. Bowker, G. C. (2015). Susan Leigh Star Special Issue. Mind, Culture, and Activity, 22(2), 89-91.
5. Brier, S. (2013, June). Cybersemiotics: A new foundation for transdisciplinary theory of information, cognition, meaningful communication and the interaction between nature and culture. Integral Review, 9(2), 220-263.
6. Cano, S., Pendrill, L., Melin, J., & Fisher, W. P., Jr. (2019). Towards consensus measurement standards for patient-centered outcomes. Measurement, 141, 62-69. https://doi.org/10.1016/j.measurement.2019.03.056
7. Commons, M. L. (2008). Introduction to the model of hierarchical complexity and its relation to postformal structures. World Futures: The Journal of New Paradigm Research, 64, 305-320.
8. Commons, M. L., & Bresette, L. M. (2006). Illuminating major creative scientific innovators with postformal stages. In C.

Hoare (Ed.), Handbook of adult development and learning (pp. 255-280). Oxford University Press.

9. Commons, M. L., & Goodheart, E. A. (2008). Cultural progress is the result of developmental level of support. World Futures: The Journal of New Paradigm Research, 64(5-7), 406-415. https://doi.org/10.1080/02604020802301360
10. Commons, M. L., Ross, S. N., & Bresette, L. M. (2011). The connection between postformal thought, stage transition, persistence, and ambition and major scientific innovations. In D. Artistico, J. Berry, J. Black, D. Cervone, C. Lee & H. Orom (Eds.), The Oxford handbook of reciprocal adult development and learning (pp. 287-301). Oxford University Press.
11. Danesi, M. (2017). Semiotics as a metalanguage for the sciences. In K. Bankov & P. Cobley (Eds.), Semiotics and its masters (pp. 61-81). DeGruyter.
12. Dawson-Tunik, T. L., Commons, M., Wilson, M., & Fischer, K. (2005). The shape of development. The European Journal of Developmental Psychology, 2, 163-196.
13. Derrida, J. (1976). Of grammatology (G. C. Spivak, Trans.). Johns Hopkins University Press.
14. Dewey, J. (1954). The public and its problems. Swallow Press, Ohio University Press.
15. Fisher, W. P., Jr. (2004, October). Meaning and method in the social sciences. Human Studies: A Journal for Philosophy and the Social Sciences, 27(4), 429-454.
16. Fisher, W. P., Jr. (2009, November). Invariance and traceability for measures of human, social, and natural capital: Theory and application. Measurement, 42(9), 1278-1287.
17. Fisher, W. P., Jr. (2012, June 1). What the world needs now: A bold plan for new standards [Third place, 2011 NIST/SES World Standards Day paper competition]. Standards Engineering, 64(3), 1 & 3-5 [http://ssrn.com/abstract=2083975].
18. Fisher, W. P., Jr. (2014). The central theoretical problem of the social sciences. Rasch Measurement Transactions, 28(2), 1464-1466. http://www.rasch.org/rmt/rmt282.pdf
19. Fisher, W. P., Jr. (2020). Contextualizing sustainable development metric standards: Imagining new entrepreneurial possibilities. Sustainability, 12(9661), 1-22. https://doi.org/10.3390/su12229661
20. Fisher, W. P., Jr. (2021). Bateson and Wright on number and quantity: How to not separate thinking from its relational context. Symmetry, 13(1415). https://doi.org/10.3390/sym13081415
21. Fisher, W. P., Jr. (2022). Contrasting roles of measurement knowledge systems in confounding or creating sustainable change. Acta IMEKO, 11(4), 1-7. https://acta.imeko.org/index.php/acta-imeko/article/view/1330
22. Fisher, W. P., Jr. (2023a). Separation theorems in econometrics and psychometrics: Rasch, Frisch, two Fishers, and implications for measurement. Journal of Interdisciplinary Economics, 35(1), 29-60. https://journals.sagepub.com/doi/10.1177/02601079211033475
23. Fisher, W. P., Jr. (2023b). Foreword: Koans, semiotics, and metrology in Stenner's approach to measurement-informed science and commerce. In W. P. Fisher, Jr. & P. J. Massengill (Eds.), Explanatory models, unit standards, and personalized learning in educational measurement: Selected papers by A. Jackson Stenner (pp. ix-lxx). Springer.
24. Fisher, W. P., Jr. (2023c). Measurement systems, brilliant results, and brilliant processes in healthcare: Untapped potentials of person-centered outcome metrology for cultivating trust. In W. P. Fisher, Jr. & S. Cano (Eds.), Person-centered outcome metrology: Principles and applications for high stakes decision making (pp. 357-396). Springer.

https://link.springer.com/book/10.1007/978-3-031-07465-3

25. Fisher, W. P., Jr., Oon, E. P.-T., & Benson, S. (2021). Rethinking the role of educational assessment in classroom communities: How can design thinking address the problems of coherence and complexity? Educational Design Research, 5(1), 1-33
26. Fisher, W. P., Jr., Pendrill, L., Lips da Cruz, A., & Felin, A. (2019). Why metrology? Fair dealing and efficient markets for the United Nations' Sustainable Development Goals. Journal of Physics: Conference Series, 1379(012023 [http://iopscience.iop.org/article/10.1088/1742-6596/1379/1/012023]). doi:10.1088/1742-6596/1379/1/012023
27. Fisher, W. P., Jr., & Stenner, A. J. (2018). Ecologizing vs modernizing in measurement and metrology. Journal of Physics Conference Series, 1044(012025), [http://iopscience.iop.org/article/10.1088/1742-6596/1044/1/012025].
28. Fisher, W. P., Jr., & Wilson, M. (2015). Building a productive trading zone in educational assessment research and practice. Pensamiento Educativo: Revista de Investigacion Educacional Latinoamericana, 52(2), 55-78. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2688260
29. Fisher, W. P., Jr., & Wright, B. D. (Eds.). (1994). Applications of probabilistic conjoint measurement. International Journal of Educational Research, 21(6), 557-664.
30. Franck, G. (2002). The scientific economy of attention: A novel approach to the collective rationality of science. Scientometrics, 55(1), 3-26.
31. Franck, G. (2019). The economy of attention. Journal of Sociology, 55(1), 8-19.
32. Gadamer, H.-G. (1989). Truth and method (J. Weinsheimer & D. G. Marshall, Trans.; (Rev. ed.). Crossroad (Original work published 1960).
33. Galison, P. (1997). Image and logic: A material culture of microphysics. University of Chicago Press.
34. Galison, P. (1999). Trading zone: Coordinating action and belief. In M. Biagioli (Ed.), The science studies reader (pp. 137-160). Routledge.
35. Hankins, T. L., & Silverman, R. J. (1999). Instruments and the imagination. Princeton University Press.
36. Hayek, F. A. (1948). Individualism and economic order. University of Chicago Press.
37. Heelan, P. A. (1983, June). Natural science as a hermeneutic of instrumentation. Philosophy of Science, 50, 181-204.
38. Ihde, D. (1991). Instrumental realism: The interface between philosophy of science and philosophy of technology. The Indiana Series in the Philosophy of Technology). Indiana University Press.
39. Jasanoff, S., & Kim, S. H. (Eds.). (2015). Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power. University of Chicago Press.
40. Latour, B. (1987). Science in action: How to follow scientists and engineers through society. Harvard University Press.
41. Latour, B. (1990). Postmodern? No, simply amodern: Steps towards an anthropology of science. Studies in History and Philosophy of Science, 21(1), 145-171.
42. Latour, B. (1993). We have never been modern. Harvard University Press.
43. Latour, B. (1995). Cogito ergo sumus! Or psychology swept inside out by the fresh air of the upper deck: Review of Hutchins' Cognition in the Wild, MIT Press, 1995. Mind, Culture, and Activity: An International Journal, 3(192), 54-63.
44. Latour, B. (1998). To modernise or ecologise? That is the question. In B. Braun & N. Castree (Eds.), Remaking reality: Nature at the millennium (pp. 221-242). Routledge.

45. Latour, B., & Lépinay, V. A. (2010). The science of passionate interests: An introduction to Gabriel Tarde's economic anthropology. Prickly Paradigm Press.
46. Linacre, J. M. (2003). Constructing scientific measurement models. Rasch Measurement Transactions, 17(1), 907 [http://www.rasch.org/rmt/rmt171f.htm].
47. Luce, R. D. (1959). On the possible psychophysical laws. Psychological Review, 66(2), 81-95.
48. Luce, R. D., & Tukey, J. W. (1964). Simultaneous conjoint measurement: A new kind of fundamental measurement. Journal of Mathematical Psychology, 1(1), 1-27.
49. Marcus, G. E. (Ed.). (1995). Late editions: Cultural studies for the end of the century. Vol. 2: Technoscientific imaginaries: Conversations, profiles, and memories. University of Chicago Press.
50. Mari, L., & Wilson, M. (2014, May). An introduction to the Rasch measurement approach for metrologists. Measurement, 51, 315-327. http://www.sciencedirect.com/science/article/pii/S0263224114000645
51. Mari, L., Wilson, M., & Maul, A. (2023). Measurement across the sciences: Developing a shared concept system for measurement, 2nd ed. (Springer Series in Measurement Science and Technology). Springer.
52. Massof, R. W. (2014). A general theoretical framework for interpreting patient-reported outcomes estimated from ordinally scaled item responses. Statistical Methods in Medical Research, 23(5), 409-429.
53. Morrison, J., & Fisher, W. P., Jr. (2019). Measuring for management in Science, Technology, Engineering, and Mathematics learning ecosystems. Journal of Physics: Conference Series, 1379(012042). doi:10.1088/1742-6596/1379/1/012042
54. Morrison, J., & Fisher, W. P., Jr. (2021). Caliper: Measuring success in STEM learning ecosystems. Measurement: Sensors, 18, 100327. https://doi.org/10.1016/j.measen.2021.100327
55. Morrison, J., & Fisher, W. P., Jr. (2023). Caliper: Steps to an ecologized knowledge infrastructure for STEM learning ecosystems in Israel. Acta IMEKO, in press.
56. Narens, L., & Luce, R. D. (1986). Measurement: The theory of numerical assignments. Psychological Bulletin, 99(2), 166-180.
57. Nöth, W. (2018). The semiotics of models. Sign Systems Studies, 46(1), 7-43.
58. Pattee, H. H. (Ed.). (1973). Hierarchy theory: The challenge of complex systems. George Braziller.
59. Pattee, H. H. (1985). Universal principles of measurement and language functions in evolving systems. In J. L. Casti & A. Karlqvist (Eds.), Complexity, language, and life: Mathematical approaches (pp. 268-281). Springer Verlag. https://core.ac.uk/download/pdf/33894060.pdf#page=282
60. Pattee, H. H., & Raczaszek-Leonardi, J. (2012). Biosemiotics. Vol. 7: Laws, language and life: Howard Pattee's classic papers on the physics of symbols with contemporary commentary (M. Barbieri & J. Hoffmeyer, Eds.). Springer.
61. Peirce, C. S. (1955/1940). Philosophical writings of Peirce (J. Buchler, Ed.). Dover.
62. Peirce, C. S. (1992). The essential Peirce: Selected philosophical writings, volume I (1867-1893) (N. Houser & C. Kloesel, Eds.). Indiana University Press.
63. Pendrill, L. R. (2019). Quality assured measurement: Unification across social and physical sciences. Springer Series in Measurement Science and Technology). Springer.
64. Pendrill, L., & Fisher, W. P., Jr. (2015). Counting and quantification: Comparing psychometric and metrological

perspectives on visual perceptions of number. Measurement, 71, 46-55. doi: http://dx.doi.org/10.1016/j.measurement.2015.04.010

65. Perline, R., Wright, B. D., & Wainer, H. (1979, Spring). The Rasch model as additive conjoint measurement. Applied Psychological Measurement, 3(2), 237-255.
66. Petracca, E., & Gallagher, S. (2020). Economic cognitive institutions. Journal of Institutional Economics, 16(6), 747-765.
67. Platt, J. R. (1961, September 1). Social chain reactions. Bulletin of the Atomic Scientists: Man and His Habitat, Part II, 17, 365-386. (Rpt. in The step to man (pp. 39-52). John Wiley & Sons (Original work published 1966). http://dx.doi.org/10.1080/00963402.1961.11454270
68. Rasch, G. (1960). Probabilistic models for some intelligence and attainment tests ((Reprint, with Foreword and Afterword by B. D. Wright, Chicago: University of Chicago Press, 1980). Danmarks Paedogogiske Institut.
69. Ricoeur, P. (1981). The model of the text: Meaningful action considered as a text. In J. B. Thompson (Ed.), Hermeneutics and the human sciences: Essays on language, action and interpretation (pp. 197-221). Cambridge University Press.
70. Scott, J. C. (1998). Seeing like a state: How certain schemes to improve the human condition have failed. Yale University Press.
71. Sebeok, T. A. (2001). Signs: An introduction to semiotics. University of Toronto Press.
Thrift, N. (2008, December). Pass it on: Toward a political economy of propensity. Emotion, Space, and Society, 1(2), 83-96.
72. Star, S. L., & Griesemer, J. R. (1989, August). Institutional ecology, 'translations,' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. Social Studies of Science, 19(3), 387-420.
73. Star, S. L., & Ruhleder, K. (1996, March). Steps toward an ecology of infrastructure: Design and access for large information spaces. Information Systems Research, 7(1), 111-134.
74. Sutton, J., Harris, C. B., Keil, P. G., & Barnier, A. J. (2010). The psychology of memory, extended cognition, and socially distributed remembering. Phenomenology and the Cognitive Sciences, 9(4), 521-560.
75. Weeks, J., & Galunic, C. (2003). A theory of the cultural evolution of the firm: The intra-organizational ecology of memes. Organization Studies, 24(8), 1309-1352.
76. Weitzel, T. (2004). Economics of standards in information networks. Physica-Verlag.
77. Wheatley, T., Boncz, A., Toni, I., & Stolk, A. (2019). Beyond the isolated brain: The promise and challenge of interacting minds. Neuron, 103(2), 186-188.
78. Whitehead, A. N. (1911). An introduction to mathematics. Henry Holt and Co.
79. Whitehead, A. N. (1925). Science and the modern world. Macmillan.
80. Wilson, M. R. (2013a, April). Seeking a balance between the statistical and scientific elements in psychometrics. Psychometrika, 78(2), 211-236.
81. Wilson, M. R. (2013b). Using the concept of a measurement system to characterize measurement models used in psychometrics. Measurement, 46, 3766-3774. http://www.sciencedirect.com/science/article/pii/S0263224113001061
82. Wittgenstein, L. (1958). Philosophical investigations (G. E. M. Anscombe, Trans.; 3d Ed.). Macmillan.

83. Wright, B. D. (1997). A history of social science measurement. Educational Measurement: Issues and Practice, 16(4), 33-45, 52 [http://www.rasch.org/memo62.htm]. https://doi.org/10.1111/j.1745-3992.1997.tb00606.x
84. Wright, B. D. (1999). Fundamental measurement for psychology. In S. E. Embretson & S. L. Hershberger (Eds.), The new rules of measurement: What every educator and psychologist should know (pp. 65-104 [http://www.rasch.org/memo64.htm]). Lawrence Erlbaum Associates.