

THE ROUTLEDGE  
COMPANION TO  
PHILOSOPHY OF SOCIAL  
SCIENCE

*Edited by*  
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 **Routledge**  
Taylor & Francis Group  
LONDON AND NEW YORK

First published 2017  
by Routledge  
711 Third Avenue, New York, NY 10017

and by Routledge  
2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

*Routledge is an imprint of the Taylor & Francis Group, an informa business*

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*Library of Congress Cataloging in Publication Data*  
A catalog record for this book has been requested

ISBN: 978-1-138-82575-8 (hbk)  
ISBN: 978-1-315-41009-8 (ebk)

Typeset in Goudy  
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## SITUATIONAL ANALYSIS

Kevin D. Hoover

### 1 Origins and Nature of Situational Analysis

*Situational analysis* is a term popularized by Karl Popper. It is sometimes also referred to as *situational logic*, *logic of situations*, or the *logic of the situation*. Situational analysis and its synonyms have been used for over a century in a variety of fields from military strategy, to psychology, to sociology—sometimes in senses closely related to Popper's usage (see e.g. Mannheim 1936 [1997], 95), sometimes in quite different senses. Our concern here is principally with situational analysis as it has derived from Popper.

Popper first deployed the idea of situational analysis in an early draft of the *Poverty of Historicism*, which was ultimately published in 1957 (see Popper 1982). There, Popper attacked the idea that history could be understood as the working out of universal laws (such as Marx's laws of historical materialism) analogous to the laws of physics or as expressions of transindividual "spirits of the age." Historical laws cannot serve as the focus of a theoretical science, as the only plausible candidates are "trivial and used unconsciously" (Popper 1957, 150). The goal of historical explanation, in contrast to theoretical explanation, is to account for singular outcomes; and singular outcomes depend on a complex of partial causes and initial conditions that run into the remote past, most of which are of little interest. Historical interpretation for Popper is a matter of adopting a "point of view" (Popper 1957, 151). Situational analysis might provide the basis for such an interpretation, tracing the interaction of a dominant motivation with principal constraints. The constraints, in fact, provide most of the explanatory force. Because of the limited point of view and the focus on singular outcomes, such accounts, which are sometimes wrongly mistaken for theories, rarely result in testable hypotheses and, therefore, while valuable nonetheless, cannot be regarded as scientific.

Popper subsequently came to view situational analysis as more than a strategy of historical interpretation, but rather as the basis for a theoretical and scientific social science. The method of situational analysis "was an attempt to generalize the method of economic theory (*marginal utility theory*) so as to become applicable to the other theoretical social sciences" (Popper 1982, 117–18; see also 1976, 102–3). Here Popper echoes the now dominant definition of economics, due to Lionel Robbins (1932, 15): "Economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses." The vision can be stated quite generally as the idea that economics is the science of optimization under constraints.

A typical explanation based on "marginal utility theory," supposes that consumers gain utility from goods at decreasing rates. Then, a consumer with a fixed budget would allocate consumption in such a way that an additional (i.e. marginal or infinitesimal) unit of any good would add to utility at the same rate per dollar.<sup>1</sup> A situational analysis using this apparatus supposes a simplified or idealized consumer motivation: consume in such a way that one can reach the highest feasible utility given the situation (i.e. for the available budget).

Even without knowing the exact way in which consumption of different goods translates into utility, the assumption that every good faces diminishing marginal utility is enough to demonstrate that, *ceteris paribus* real income, the demand curve for a good slopes downward with respect to its own price. Stronger assumptions—i.e. more detailed descriptions of the situation—result in stronger conclusions. Thus, for example, if a consumer could be assigned a concretely parameterized utility function, then the demand curve itself, rather than just its generic character, could be derived.

David Hume famously denied that *is* implies *ought*. No descriptive fact about the world logically implies a normative claim. The most characteristic methodological move in economics constructs the explanations of economic behavior by imputing a dominant goal or motive to individuals and then figuring what their optimal choices would be in the circumstances in which they find themselves. For the economist, Hume's dictum is thus turned on its head: *what ought to be* implies *what is*. This is the mode of explanation that Popper advocates generalizing throughout the social sciences.

Popper describes situational analysis as

*a purely objective method in the social sciences ... [that] consists in analysing the social situation of acting men sufficiently to explain the action with the help of the situation, without any further help from psychology. Objective understanding consists in realizing that the action was objectively appropriate to the situation .... [T]he situation is analyzed far enough for the elements which initially appeared to be psychological (such as wishes, motives, memories, and associations) to be transformed into elements of the situation.*

(Popper 1976, 102)

The assumption that people in fact act appropriately to the situation as they see it—that is, the inversion of Hume's dictum, so characteristic of economics—is what Popper calls the *rationality principle*.

Noretta Koertge has reconstructed Popper's argument as follows:

1. *Description of the Situation*: Agent A was in a situation of type C.
2. *Analysis of the Situation*: In a situation of type C, the appropriate thing to do is x.
3. *Rationality Principle*: Agents always act appropriately to their situations.
4. *Explanandum*: (Therefore) A did x.

(Koertge 1979, 87)

Koertge's reconstruction captures nicely two key features of situational analysis: first, it is meant to be an application of methodological individualism—ultimately, it is to individual behavior that social science must look for its explanations; and, second, that, while eschewing psychological explanations, it analyzes human behavior as goal-directed or intentional. There is, however, a third feature of Popper's analysis that Koertge's reconstruction

overlooks: Popper sees situational analysis as typically deployed in support of type-level explanations and not as an account of singular explanations. Koertge's quantifier "always" in the rationality principle must be softened to *generally* or *typically*. It is the shift from singular to type-level explanations that most likely accounts for the shift in Popper's early presentation of situational analysis as an interpretive methodology of history to his later claim that it constitutes an objective, scientific methodology of social explanation. We consider these features in turn.

## 2 The Methodology of Situational Analysis

In rejecting a law-based account of history, Popper explicitly and fully appealed to the individual as the motive force behind not only history but social interactions more generally. He embraced methodological individualism. Yet, Popper did not conceive of social interaction as always accountable through the *direct* interaction of intentional agents. Methodological individualism would have to explain the way that ideas spread, traditions are created, and institutions are formed and break down, and these may be the unintended consequences of individual social interaction (Popper 1957, 149; 1950, 288–89). The institutions may then, in turn, form some of the constraints that define the situation in which intentional agents act. The complexity and particularity of such institutional settings, on the one hand, militates against lawlike historical explanation and, on the other, suggests situational analysis as an effective alternative. Situations transcend individuals; nevertheless, the situations are traceable to individuals, and the motivations of individuals are the ultimate engine of social behavior.

An important justification for the rejection of internal psychology as the basis for explanation is that, once we have even a very broad-brush notion of a goal, the relevant human behavior is often more driven by the constraints than by the fine details of the psychology. Herbert Simon (1959) draws an analogy with pouring molasses into a bowl: if all one wants to know is the equilibrium depth of the molasses, the physical properties, beyond the fact that it is a fluid, do not matter to our accurately predicting the outcome. Simon (1996, 51–54) similarly suggests that, despite our ignorance of the physiology of an ant's nervous system or the various confounding perceptions an ant may receive along the way, a good explanation of the ant's path on a beach could be cashed out in terms of a simple ascription of motivations (e.g. that the ant aims to carry food back to the anthill) and the constraints (e.g. the location of the anthill and the landscape of the beach).

Spiro Latsis (1976, esp. 19–23) argues, against the broad applicability of situational analysis as dominated by constraints, that it applies only to single-exit situations. Single-exit situations are ones in which, given the motivation and the constraints, only one outcome is possible. In economics, optimization problems with a unique solution would be single-exit situations; while, in contrast, those with multiple solutions or multiple equilibria would be multi-exit situations. Multi-exit situations may be regarded as "situationally open" (19). Latsis argues that "[i]n multiple-exit situations the agent's internal environment, i.e. his psychological characteristics, etc. become central components in the explanation" (16).

To the degree that multiple-exit situations are common and Latsis's criticism of situational analysis is correct, situational analysis would not be the unique method of explanation in the social sciences but would apply to a limited domain. In some sense, Popper anticipates the objection with the suggestion that the domain of explanation is limited in social science in any case. For Popper, social science is mainly interested in type-explanation rather than singular

explanation. Explanations of tendencies, demand curves, can be adequate to the extent that the science might apply.

History aims to be a basis for historical explanation; it explains more, lights, not sciences, does not generate interpretive value. It aims at type-explanations (Popper 1967 [1959], "explanations in history" (Popper 1982, 1983).

Typical situations are the natural sciences. Who wants to explain a lamp to represent a can easily demonstrate our explanation but what we must of the moon reification of what representation level of prediction.

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Popper's criticizing Simon's animating prior appropriately, the necessary concrete concreteness a. For that reason empty principle theoretical effect (ibid.).

explanation. Explanations in the social sciences are rarely about individuals but about groups or tendencies. Demand curves in economics are generally not individual, but rather market, demand curves. A good deal of the plausibility of Popper's claim that the situational constraints can be adequately specified and that personal psychology can be ignored results from the assumption that the social scientist targets typical or group behavior to which, for example, statistics might apply.

History aims at singular explanation. Popper does not reject a psychological point of view as a basis for historical interpretation *tout court*; yet he generally supposes that situational analysis explains more, and more convincingly, even when it is not falsifiable—and, therefore, by his lights, not scientific (1957, 151). This is not to say that situational analysis of history necessarily does not generate testable hypotheses, but only that it may not do so and may nonetheless have interpretive value (see also Popper 1982, 118). In contrast to the historian, the social scientist aims at type-explanations—in particular, with the construction of models of typical situations (Popper 1967 [1983], 357). Such explanations are, then, “explanations in principle” rather than “explanations in detail” (358). Situational analysis provides the basis for testable hypotheses (Popper 1982, 118).

Typical situations are often captured in models; and, in this regard, the social sciences and the natural sciences rely on similar strategies. Popper gives the example of the natural scientist who wants to explain recurring eclipses (1967 [1983, 358]). A very rough model, consisting of a lamp to represent the sun and a larger and a smaller ball to represent the earth and the moon, can easily demonstrate that a full moon is a necessary but not sufficient condition of eclipses. If our explanation is left as generic, we need very little more detail about the parts of the model, but what we must have is some idea of the typical movement of the earth relative to the sun and of the moon relative to the earth. That is, we require an additional element—namely, a specification of what it is that “*animates*” the model. How much detail we need in terms of accurate representation of sizes, relative initial positions, and laws of motion depends on exactly what level of predictive or explanatory precision we seek.

Popper suggests that the same strategy of modeling the principal parts and their relationship (the constraints) can be applied to social sciences. The animating principle—analogue in the eclipse model to Newton's laws of motion plus the law of gravity—is the rationality principle. The rationality principle, as stated, for example, in Koertge's reconstruction, is broad—more similar to “lower mass bodies orbit higher mass bodies in elliptical orbits” than to the complete Newtonian account of planetary motion. But for certain kinds of explanation, the very crude model of the lamp and balls is perfectly adequate, and for certain kinds—indeed, Popper would argue, for most kinds of social explanation—the broad animating principle expressed in the rationality principle will be adequate.

Popper's central idea here is that the key to explanation in social science, like the key to predicting Simon's ant's path, is to understanding the constraints in such detail that a very coarse animating principle—namely, that the “various person's or agents involved act *adequately, or appropriately*, that is to say, in accordance with the situation” (Popper 1967 [1983], 359). The necessary concreteness and detail of the animating principle is inversely proportional to the concreteness and detail included in the model, for a given required precision of explanation. For that reason, “the principle of acting appropriately to the situation ... [is] clearly an *almost empty principle*” (359). The methodological strategy is that “we should pack or cram our whole theoretical effort, our whole explanatory theory, into an analysis of the situation: into the *model*” (ibid.).

Whether derived from Popper or not, the economists Gary Becker and George Stigler in a famous paper, "De Gustibus Non Est Disputandum" (1977), embrace Popper's methodological strategy. The animating principle in microeconomic explanations is to *maximize utility*. Becker and Stigler suggest giving all agents in a model the same utility function, which amounts to relying on only the broadest characteristics of preference maximization, and distinguishing one agent from another through the detailed descriptions of the constraints that they face (Popper's "situation"). As for Popper, the animating principle is nearly empty: *agents consistently choose what they prefer from the feasible options*. And, as with Popper, the degree to which their account supports precise explanation is made to depend on the concreteness and detail of the specification of the constraints. Such an approach may well flounder in the attempt to predict any individual's detailed behavior, but it is really aimed at successfully predicting either the coarse behavior of individuals (as with Simon's ant) or the more precise *statistical* behavior of collections of individuals.

### 3 Situational Analysis and the Methodology of the Natural Sciences

In emphasizing the parallel between model-based explanation in the physical and the social sciences, Popper underlines his commitment to the unity of science, as well as to his famous *demarcation criterion*—namely, that propositions are scientific only if they are falsifiable and that the method of science is to seek out such falsifications in the process that he characterizes as "conjectures and refutations." There is, however, a line of criticism that suggests that Popper sees natural and social sciences as having fundamentally different methodologies, to the point that D. Wade Hands argues that we should label Popper's methodology of the natural sciences  $P_N$  and his methodology of the social sciences  $P_S$  (see also Koertge 1979, esp. 83–84, 92–95; Caldwell 1991, 17–22). Popper encourages this interpretation through his choice of examples drawn from the social sciences as his prime illustrations of unfalsifiable pseudo-science: Marx's theory of history, Freud's psychoanalysis, and Adler's individual psychology (1972, 33–65, esp. 34–39). The gravamen of this line of criticism is that Popper takes the rationality principle (in the context of situational analysis) to be the method of the social sciences and, at the same time, to be unfalsifiable, which would either undercut the unity of science or require him to re-evaluate the scientific status of the theories of Marx, Freud, and Adler, having judged them by the wrong criterion.<sup>2</sup>

It would be implausible to explain away the putative dilemma as Popper having changed his mind about the nature of science; for, once he had articulated the notion that situational analysis is the method of social science, he frequently reasserts both the criterion of falsification and the unity of science in close conjunction with restatements of the role of situational analysis. He writes, for instance:

The method of the social sciences, like that of the natural sciences, consists in trying out tentative solutions to certain problems: the problems from which our investigations start and those which turn up during the investigation.

Solutions are proposed and criticized. If a proposed solution is not open to pertinent criticism, then it is excluded as unscientific ....

If the attempted solution is open to pertinent criticism, then we attempt to refute it; for all criticism consists of attempts at refutation.

(Popper 1976, 89)



Despite these assertions of the unity of science, the charge of inconsistency gains traction and plausibility from Popper's own words. Commenting on his own statement of the rationality principle, "Agents always act in a manner appropriate to the situation in which they find themselves," Popper notes that individual agents, driven by other motives, may sometimes act inappropriately (1982, 361). He continues:

But a principle that is not universally true is false. Thus the rationality principle is false. I think there is no way out of this. Consequently, we must deny that it is *a priori* valid.

Now if the rationality principle is false, then an explanation which consists of the conjunction of this principle and a model must also be false, even if the particular model in question is true.

But can the model be true? Can any model be true? I do not think so. Any model, whether in physics or in the social sciences, must be an oversimplification. It must omit much, and it must overemphasize much.

(Popper 1982, 361)

Yet, Popper does not retract the rationality principle or situational analysis.

A principle of charitable interpretation—even of one's own beliefs and works—is to prefer the account that maximizes their consistency. Neither Popper's critics nor Popper himself have interpreted situational analysis sufficiently charitably. Models are not propositions; in themselves, they cannot be true or false. They may, of course, be used to make claims that can be true or false despite simplifications and omissions. Popper falls into a common trap, not only of regarding models as themselves bearers of truth values, but of assuming that the only model that could bear the value *true* is one that was a one-to-one recapitulation of the world. But such a model is not a model; it is the world. A genuine model can be used to make falsifiable claims about the world—true when accurately asserted—within specific domains and up to explicitly or implicitly specified degrees of precision (cf. Popper 1976, 101, 103).

When seen in the context of models, the rationality principle—despite the grammar of its statement—should not be regarded as a declarative proposition. The "always" is not a universal quantifier in a factual proposition but a universal injunction in an imperative statement, namely, an instruction on how to construct models—a methodological rule. Popper embraces the economists' inversion of Hume's dictum: build your models such that what is optimal within the model (i.e. *what ought to be* in the model's delimited world) implies what the model asserts is the case (i.e. *what is* in the model's world). Even on this construal, the model is not itself a truth bearer with respect to the actual world, though it can be used to construct falsifiable propositions when the actual world is asserted to be like the model world in particular respects and to particular degrees.

One advantage of treating the rationality principle as a methodological injunction is that it is consistent with the unity of science, as it makes claims about modeling generally and not about the social sciences in particular. Situational analysis for Popper arises naturally in the social sciences but also in other cases in which the appropriate account must be highly localized and non-universal. As we saw earlier, Popper first presents situational analysis as a non-scientific method of historical explanation. It was non-scientific because in the complex and unique circumstances that generate particular historical events, he believed that falsification of an explanation would not typically be possible. Nevertheless, it was possible that different points of view could be



illuminating, even if not falsifiable. Rejecting the logical positivists' contrary view, Popper neither treats *meaningful* and *scientific* as synonyms, nor does he equate metaphysics with nonsense. When applied to the social sciences, Popper sees the hypotheses generated through the application of situational analysis as sometimes falsifiable and, hence, scientific in the same sense that the hypotheses of physics are scientific (1967 [1983], 360).

Natural history poses much the same problem for Popper as human history—it is highly complex and local. The circumstances that generate a particular species with very specific characteristics are probably unique, and an evolutionary explanation, down to the last detail, is unlikely to be falsifiable (Popper 1982, ch. 37). Popper sees Darwinian evolution as not “a testable scientific theory, but a *metaphysical research programme*—a possible framework for testable scientific theories” (1982, 168; see also 1979, 67–72). Darwin's account of evolution can be seen as species themselves pursuing a program of conjectures (mutations) and refutations (failures to survive). And the characteristic mode of explanation follows the same situational logic (Popper 1982, 168; see also 1979, 167). Some applications of situational analysis to history may be testable, while others are only interpretive. Situational analysis amounts to a conjecture based on “an idealized reconstruction of the *problem situation*”—what Popper elsewhere called a “model”: “the explanatory theory of action will, in the main, consist of a conjectural reconstruction of the problem and its background. A theory of this kind may well be testable” (1979, 179).

The appeal of situational analysis for Popper is that he sees it as the most effective way of generating testable hypotheses. Far from standing in conflict with falsifiability as the criterion demarcating the scientific from the nonscientific, Popper sees situational analysis as the way in which social sciences, history, and natural history can meet the demarcation criterion and become scientific. The unfalsifiability of the rationality principle is a red herring. Even in his original account of science in *The Logic of Scientific Discovery* (1959), Popper does not require that every statement that is useful in science be falsifiable, but only that every truly scientific theory deliver hypotheses that could be falsified in principle.<sup>1</sup> As an opponent of foundationalism, Popper goes out of his way to reject the idea that each and every element of theories be empirically grounded. To try to ground each element would result in an infinite regress or a vicious circularity (Popper 1959, 87, n. \*1, 93–94, 104–5). Rather he holds that some important elements are maintained conventionally, and some can be best described as metaphysics (not a pejorative term for Popper), and these elements are not themselves testable (sections 11, 29).

When situational analysis and the rationality principle are properly understood, the supposed tension between them and Popper's falsification criterion vanishes. Situational analysis stands in a difficult relationship to another of Popper's well-known views. Drawing on Reichenbach's (1938, 382) distinction between the “logic of justification” and the “logic of discovery,” Popper denies that discovery has any logic:

The initial stage of conceiving or inventing a theory, seems to me to call for neither logical analysis nor to be susceptible of it. The question of how a new idea occurs to a man—whether it is a musical theme, a dramatic conflict, or a scientific theory—may be of great interest to empirical psychology; but it is irrelevant to the logical analysis of scientific knowledge.

(Popper 1959, 31)

Science proceeds by a process of conjectures and refutations, though the provenance of the conjectures stands outside the methodology of science. Yet, situational analysis amounts to

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a preferred methodology for generating conjectures. Situational analysis revolves around the normative claim that the formulation of conjectures should be based on an application of the rationality principle to a rational reconstruction or idealized model of the situation. Is not the implied methodology a logic of conjecture formulation—a logic of scientific discovery? That must hinge on exactly what is meant by “a logic.”

If “logic” meant only a demonstratively valid pattern of inference, then the same type of argument that Popper makes against the existence of an inductive logic, could be brought to bear on any logic of discovery (1959, section 1). This is the way that Popper is most frequently read. But logic can have other meanings. For example, Popper indicates that *situational logic* refers to the assumption that the actors in a model “act within the terms of the model, or that they ‘work out’ what was implicit in the situation” (1967 [1983], 359). Similarly, situational analysis supplies a normative model of the practice of social science: apply the rationality principle to suitably idealized models. Acting within the terms of that model, working out the implications of the rationality principle in the cognitive situation amounts to a “methodological logic” in the same sense that situational analysis itself is an object level logic. Inasmuch as the role of situational analysis is to provide a mechanism for generating falsifiable hypotheses, it would appear to provide a logic of scientific discovery. And inasmuch as Popper advocates situational analysis as the premier methodology of the social sciences, he can hardly consistently deny that the context of discovery is part of the social sciences—and, indeed, part of any science for which it proves fruitful—or that it constitutes a logic.

### Notes

- 1 Popper invokes the notion of marginal utility, which is the original way that these ideas were developed in the 19th century. Modern microeconomics, however, does not assume that consumers have measurable utility, but only that they have well-ordered preferences that allow them to rank bundles of goods with respect to each other. Then the optimal position can be stated as, consume in such a way that the marginal rate of substitution between any pair of goods is equal to the relative price of the two goods.
- 2 Even in its own terms, this argument is not watertight, as it attacks only the uniqueness of Popper's falsificationist demarcation criterion. It assumes that situational analysis sets up a second, social-scientific demarcation criterion: consistency with situational analysis. The theories may fail to fulfill the natural-science criterion and still not fulfill the social-science criterion.
- 3 Popper 1959 is the English translation with revisions of his German original, *Logik der Forschung* (1935).

### References

- Caldwell, Bruce J. (1991) “Clarifying Popper,” *Journal of Economic Literature* 29(1), 1–33.
- Hands, D. Wade. (1985) “Karl Popper and Economic Methodology,” *Economics and Philosophy* 1(1), 83–99.
- Koertge, Noretta. (1979) “The Methodological Status of Popper's Rationality Principle,” *Theory and Decision* 10(1), 83–95.
- Latsis, Spiro. (1976) “A Research Programme in Economics,” in Spiro Latsis, ed. *Method and Appraisal in Economics*. Cambridge: Cambridge University Press, 1–42.
- Mannheim, Karl. (1936 [1997]) *Ideology and Utopia*, repr. in *Ideology and Utopia: Collected Works*, vol. 1. London: Routledge, 1997.
- Popper, Karl R. (1935) *Logik der Forschung*. Berlin: Springer.
- Popper, Karl R. (1950) *The Open Society and Its Enemies*. Princeton, NJ: Princeton University Press.
- Popper, Karl R. (1957) *The Poverty of Historicism*. Boston: Beacon Press.
- Popper, Karl R. (1959) *The Logic of Scientific Discovery*. London: Hutchinson.

- Popper, Karl R. (1967 [1983]) "The Rationality Principle," in David Miller, ed. *A Pocket Popper*. London: Fontana, 1983, 357-65.
- Popper, Karl R. (1972) *Conjectures and Refutations: The Growth of Scientific Knowledge*, 4th edn. London: Routledge and Kegan Paul.
- Popper, Karl R. (1976) "The Logic of the Social Sciences," in Theodor Adorno et al., *The Positivist Dispute in German Sociology*, trans. Glyn Adey and David Frisby. New York: Harper and Row, 87-104.
- Popper, Karl R. (1979) *Objective Knowledge*, rev. edn. Oxford: Oxford University Press.
- Popper, Karl R. (1982) *Unended Quest*. LaSalle, IL: Open Court.
- Reichenbach, Hans. (1938) *Experience and Prediction: An Analysis of the Foundations and Structure of Knowledge*. Chicago: Chicago University Press.
- Robbins, Lionel. (1932) *The Nature and Significance of Economic Science*. London: Macmillan.
- Simon, Herbert A. (1959) "Theories of Decision-Making in Economics and Behavioral Science," *American Economic Review* 49(3), 253-83.
- Simon, Herbert A. (1996) *Sciences of the Artificial*, 3rd edn. Cambridge, MA: MIT Press.
- Stigler, George A. and Gary S. Becker. (1977) "De Gustibus Non Est Disputandum," *American Economic Review* 67(2), 76-90.

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