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RESEARCH

Truth Tables, True Distinctions. Paradoxes of the Source Code of Science

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Abstract
On the occasion of a growing popularity of paradox theory in management and organisation research, this article provides an introduction to the paradox of true distinctions, reports on its relevance to theory building, and presents a strategy to contain the paradox without resolving it. To this end, I draw on works by George Spencer Brown and Niklas Luhmann to contextualize theory within the paradox of observation in general and the paradox of scientific observation in particular. A special case of the paradox of scientific communication, paradox theory is then redefined as a scientific programme fascinated with the paradoxical nature of the basic operation of science. I conclude that further development work on the "source code" of science will provide "critical updates" on the opportunities and limits to metatheoretical extensions of theories of management, organisation, and society, including their digital transformation.

Keywords Paradox theory · management and organisation research · Niklas Luhmann · Spencer Brown · digital transformation

Feature

Just weeks before of the first wave of coronavirus lockdowns, a group of 30 researchers attended the *Formlabor 2020* in Berlin, co-organised by Dirk Baecker, Florian Grote, and Lars Clausen. In my talk entitled "True distinctions. Ein Werkstattbericht *(A workshop report)*", I spoke on the distinction between true and false distinctions and its key role in what I refer to as the "digital transformation of social theory" (Roth 2019). Due to the paradoxical nature of this distinction, the subsequent discussion soon hit a cliff, and the paradox was not resolved that day. The following article presents one strategy to contain the paradox of true distinctions without resolving it.

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Introduction

Scholars applying paradox theory to issues of management and organisation (Poole and van den Ven, 1989; Smith and Lewis, 2011; Tuckermann, 2019; Rasche and Seidl, 2020) tend to agree that it "truly offers a new way of viewing organizational phenomena, as well as solutions and ways of responding to ongoing problems that managers and organizations face" (Waldman et al. 2019, p. 1). Yet, paradox theory is considered useful for much more than just the production of more creative and surprising perspectives on management and organization. In observing the elusiveness of its lens, paradox, the theory has discovered its own versatility and self-identified as a "next generation of organizing and management theory" (Lewis and Smith 2014, p. 140) in terms of "a meta-theory to guide theorizing in multiple areas of organizational research" (Keller and Lewis 2016, p. 553).

This emphasis on the meta-theoretical potential of paradox has recently been matched by ambitions to develop paradox-based prototypes of *universal machines* or *platforms* for theories of management, organisation, or society (Roth 2019, 2022).

All such attempts at designing paradox-grounded meta theories or theory platforms, however, remain confronted with the issue that theories are based on paradoxes themselves (Clegg et al. 2022; Schad, Lewis, & Smith, 2019).

Against this backdrop, it is the purpose of the present paper to explore the paradoxical relationship of theory and paradox to propose a framework that contains this paradox without resolving it. To this end, I draw on works by George Spencer Brown (1979; 2021; Luhmann (1987, (1994, 1995a, b) to contextualize theory within, first, the general paradox of observation and, second, the paradox of scientific observation. A special case of the paradox of scientific communication, paradox theory is then "re-entered" as a scientific programme fascinated with the paradoxical nature of the basic operation of science, that is, the drawing distinctions between true and false distinctions. I conclude that my development work on the "source code" of science provides a "critical update" on the possibilities and limits to a metatheoretical extensions of theories of management and organisation, including their potential digital transformation.

The Paradox of True Distinctions

According to George Spencer Brown (1979, p. 1), "we cannot make an indication without drawing a distinction". Every indication therefore implies the distinction between distinction and indication (Kauffman 1987, p. 58). Niklas Luhmann (1999, p. 49) gives the example that "(a) sign is the difference between the sign and the signified (…) or likewise: a system is the difference between system and environment". Whenever we wish to observe or describe something, we simultaneously draw a distinction and indicate "one side of the distinction and not the other. The other side, the unmarked side, can be anything that is, for the time being, of no concern" (Luhmann 1995a, p. 172). The inevitable paradox of observation is hence that to observe we must unobserve one side of the distinction that makes our observation come about.

The paradox of scientific observation then reappears as a special case of this general paradox of observation. To observe, we must draw distinctions. To observe scientifically, we must draw the distinction between true or false distinctions (Luhmann 1994). True to Spen-

Table 1 A famous management tool emerging as a combination of two basic distinctions(source: Roth, 2021)

	Positive	Negative
Internal	Strength	Weakness
External	Opportunity	Threat

Table 2 Eigen-complexity unfolded by the self-application of a true distinction(source: Roth, 2019)

	System	Environment
System	Systems	Environments in systems
Environment	Systems in environments	Environments

cer Brown (1979, p. 1), "distinction is perfect continence". This means that true distinctions split the entire frame of reference into two mutually exclusive and jointly exhaustive sides.

The paradox of true distinctions is now in that, by definition, all distinctions are true distinctions as all distinctions are perfectly continent, for otherwise they would not be distinctions. Yet, to observe scientifically, we must draw distinctions between true and false distinctions. Hence, some true distinctions must be false ones.

This paradox is foundational to science in all its dimensions, including theory in general and paradox theory in particular. One way to manage or "unfold" it is illustrated in the subsequent section.

Navigating the Paradox of True Distinctions

My strategy to maintain both Spencer Brown's definition of distinction as "perfect continence" and the foundational paradox of scientific observation is to argue that distinctions are, by default, neither true nor false and can, therefore, be both true and false at the same time.

Consider the distinction between 0 and 1, for example. If we consider 0 and 1 to be two elements of the number range, then the distinction between these two numbers is false in that the two distinguished elements are obviously not jointly exhaustive, and therefore do not match the above requirement of perfect continence. Yet, if these two numbers represent two values of a binary code system, then their distinction is clearly a true one as it splits the entire frame of reference into two mutually exclusive and jointly exhaustive sides.

The crux of the matter is hence not whether or what distinctions are *essentially* true or false, but rather what follows if we take a distinction for a true or false one.

If we take a distinction to be true, we may unhesitatingly combine it with other true distinctions, including the distinction itself. Thus, combinations of true distinctions create informative windows to the world, as is illustrated in Table 1, which presents a famous management tool, SWOT, as the outcome of a cross-tabulation of two reasonably true distinctions:

Self-applications of true distinctions are highly informative, too, as they allow for zooms in on or out of our objects of observation (see the example in Table 2).

Combinations of false distinctions, however, provide only limited or distorted world views. Take the example of capitalism versus socialism. If we treat this distinction as if it were a true one, our window to the world displays one pure type each and two mixed types of capitalism and socialism (see Table 3).

Table 3 Capitalism/socialism. A true distinction? (Roth 2022)

	Capitalism	Socialism
Capitalism	Capitalism	Socialist capitalism
Socialism	Capitalist socialism	Socialism

Table 4 Capitalism/socialism. A false distinction. (Roth 2022)

	Capitalism	Non-Capitalism
Socialism	Capitalist socialism Socialist capitalism	Socialism
Non-Socialism	Capitalism	Despotism Feudalism Fascism Environmentalism etc.

Yet, if we have reasons to believe that capitalism/socialism is a false distinction, we might soon realise that our political world is not just black, white, and grey, but rather pretty colourful (see Table 4).

What we see in the case of Table 4 is the outcome of a translation of one false distinction, capitalism versus socialism, into two true distinctions, capitalism versus non-capitalism and socialism versus non-socialism. The gain in knowledge attained by this strategy is apparent.

What might be less apparent, however, is that this strategy is also instrumental in navigating the above paradox of true distinctions. In fact, we can now both confirm the definition that all distinctions are true and nonetheless allow for the observation of false distinctions *if* we accept that every false distinction is actually two true ones.

From a practical perspective, it follows that if we take distinctions for true ones, then we can combine or self-apply them without any difficulty; and if we identify distinctions as false, then we need to translate them into two true distinctions. The latter procedure corresponds to the translation of dilemmas into tetralemmas, a technique already well-established in ancient Indian logic (Roth et al. 2021a, b).

Theory Navigating its Own Paradox

Insofar as doing theory is a special form of doing science, every theory must "observe itself in terms of the schema of its own code, that is, 'true' and 'false'" (Luhmann 1994, p. 20). Paradox theory therefore needs to "think of thematizing the paradoxical nature of this code, that is, of asking whether the distinction of this code is itself a true or a false distinction." (ibid.) In this context, it is interesting to note that Luhmann himself is using the distinctions true/false and true/untrue as if they were interchangeably (see, e.g., id., p. 16).

Apparently, we may take true/untrue to be the truer of the two distinctions. If we perform a "re-entry" (Spencer Brown 1979) of this distinction, that is, if we apply the distinction to itself, then we find that we can now distinguish not only between the true and the untrue, but also between what is truly true and truly untrue as distinguished from what is untruly true and untruly untrue (see Table 5).

The emerging category of "untruly true" then refers to situations where, typically with hindsight, we find that certain truths, such as the geocentric world view, have been identified

Table 5 Truth, re-entered

	True	Untrue
True	Truly true	Truly untrue
Untrue	Untruly true	Untruly untrue

Table 6 Truth, the paradox unfolded

	Code			
	True	**Untrue**		
True	Truly true	Truly untrue	**Unfalse**	***Programme***
Untrue	Untruly true	Untruly untrue	**False**	

as true in an untrue manner, while the competing heliocentric world view has been declared as untrue in an untrue way. The issue that such wording exercises may appear cumbersome is then somewhat resolved in Table 6.

Most importantly, Table 6 reflects the issue that "a re-entry has remarkable consequences. The form of a re-entry is a paradoxical form, because the re-entering form is the same and is not the same." Luhmann 1995a, p. 173).

In our case, a true/untrue distinction applied to a true/untrue distinction remains a true/untrue distinction, and yet the former seems to be very different form the latter. This issue may be solved if we translate the former distinction into an unfalse/false distinction. In so doing, the other candidate for the basic distinction of science, true/false, appears as a conflation of true/untrue and unfalse/false, and therefore as false. Once this false distinction unfolded into an architecture of two true ones, however, we can more distinguishedly distinguish between, first, the basic operation of science, that is, the application of the binary code true/untrue, and, second, those scientific operations that apply this code to its own operations along the distinction of unfalse/false. In this sense, the latter second-order operations act as programmes as they "define the conditions for the factual rightness" (Luhmann 2019, p. 210) of the true/untrue distinctions at stake.

Regarding scientific programmes, Luhmann (1990) identified two basic forms, namely methods and theories. Whereas methods "have no goal other than producing decisions between true and untrue" (id., p. 415; own translation) and consist of "operative steps with the goal to indicate communications as true or untrue" (id., 418; own translation), a theory's "special feature is the facilitation of comparisons" (id., 408; own translation). Methods are digital (either/or) while theories are analogue (both/and), we might feel inclined to say. Yet, this programmatic separation is challenged in the case of super- or meta-theories as these "theories necessarily act as methodologies as soon as they apply their own distinctions or categories not only to their research objects but also to themselves" (Roth et al. 2021, p. 690). It is therefore consistent that paradox theory has emerged as both theory and method in terms of the above meta-theoretical method to "guide theorizing in multiple areas of organizational research" (Keller and Lewis 2016, p. 553). As much as every method, however, a theory-method like paradox theory must operate under the conditions of logic and exclude third values at the level of the code of science, true/untrue (Luhmann 1990, p. 415). As much as every theory-method, paradox theory must, therefore, once "decide on a lie, once it must take an untruth as truth, then things will work" (ibid., own translation) just as in the above case of the binary number system invented by Gottfried Leibniz, where a false dis-

tinction is redefined into a true one as two natural numbers are taken out of the number range to entirely recode it. Hence, the big question for paradox theorist is, what is our first lie?

Outlook: Paradox Meta Theory Platform

As has been outlined in this paper, one obvious way to adequately answer the question of the first lie and thus to execute paradox theory as a theory programme that is aware of its own foundational paradox/es is to strategically navigate the paradox of true distinctions. Starting from the general paradox of observation as the concurrent drawing of a distinction and indication of one of its sides, scientific observation has been introduced as a special case of this inherently paradoxical operation, which consists in drawing a distinction between true and untrue distinctions, that is, in an operation that is paradoxical in its own right. On the one hand, every observation draws a true distinction, that is, a distinction that splits the entire world into two mutually exclusive and jointly exhaustive parts. On the other hand, the very point of science is the distinction between true and untrue distinctions.

In this paper, I have maintained and managed this paradox by arguing and demonstrating that observations of false distinctions actually point at a tacit co-observation or fusion of two true distinctions. Once a false distinction is translated into two true ones, observed paradoxes are tetralemmatised and thus typically vanish as they are replaced by another, often "larger" one. Theories then appear as programmes that guide the transition from one paradox to another. Against this backdrop, the present work on the "source code" of science allows for a metatheoretical perspective on "the strategic operation of paradoxes, in the sense of their transformation and combination" (Roth et al. 2021a, b). This strategic operation might well resemble the cascading of logic gates or of their substitution by one another, respectively, and thus a form of intellectual circuit design that facilitates not only a digital transformation of theories of management, organisation, and society (Roth 2019, 2022), but also the detection of intellectual short circuits within the so recoded bodies of theory.

While uncompromising with regard to the basic operation (and paradox) of science, that is the paradoxical distinction of true/untrue distinctions, the present approach is neither dogmatic nor partisan if it comes to the observation of particular distinctions or observations of particular distinctions as being true or untrue, respectively. All we need to realise is that *if* we observe a distinction as false or untrue, then we must translate it into two true ones, while true distinctions may unreservedly be used for the construction of architectures of scientific knowledge. Thus, the approach outlined in this short paper works with the broadest possible range of distinctions—including male/female, culture/strategy, stakeholder/shareholder, or economy/society—and is hence compatible with all existing paradigms and theories of management and organisation and beyond.

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