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Overcoming the Justificationist Addiction*

Abstract

It is a simple, though ancient, mistake in the theory of knowledge to think
that justification, in any degree, is central to rationality, or even important
to it. We must cut forever the intellectual apron strings that continue to
offer us spurious and unneeded security, and replace the insoluble problem
of what our theories are based on by the soluble problem of how to expose
their shortcomings. The paper will outline (not for the first time) the critical
rationalism of Karl Popper, taking account of some recent criticism. A brief
discussion of the status of the laws of logic provides an illustration of the
power of the critical approach.

Fools give you reasons, wise men never try.
Oscar Hammerstein, *South Pacific*, 1949

Introduction

Critical rationalism is the generalization, from empirical science to the whole
of our knowledge, of the methodological falsificationism (or deductivism) proposed
by Karl Popper in *Logik der Forschung*[1] as an alternative to the then prevalent
positivism and inductivism. After a brief account in §1 of the emergence of crit-
ical rationalism, I shall say something about three interlocked issues that remain
unsettled: the futility of justification (§2), methodological objectivism (§3), and
the status of logical rules (§4).

1. The Emergence of Critical Rationalism

At least in the late 1920s and early 1930s, the Vienna Circle and its confederates
held that there exist only two varieties of knowledge: analytic knowledge, which is

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[1] K.R. Popper, *Logik der Forschung* (Wien 1934).

justified by formal proof, and scientific knowledge, which is justified by empirical verification; and only those statements that are in principle justifiable by one or other of these processes are, they maintained, amenable to rational discussion. While dissenting forcefully,[2] from their identification of the empirical with the verifiable, and from their repudiation of the whole of traditional metaphysics as meaningless, Popper did initially accept the doctrine that all serious investigations that are not purely formal must make some 'appeal', though not an uncritically obsequious appeal, 'to the authority of experience'.[3] According to falsificationism, our exclusive concern, outside the formal sciences, should be with those statements and systems of statements that can conflict with the reports of experience; that is, those statements that are empirically falsifiable. This is Popper's criterion of demarcation of empirical science from what is not science.

There is a humdrum explanation for this insistence on falsifiability.[4] The universal hypotheses that are characteristic of science are not, as an artless inductivism might suppose, certified in the act of being formulated; they have to be entertained before they can be empirically investigated, arraigned before they can be judged. Hypotheses are literally *prejudices.* How we handle them depends on how opinionated, or how inquisitive, we are. We may want to confirm our prejudices, or we may want to correct them. But confirmation teaches us nothing, and provides no more than psychological comfort. If empirical investigation has an objective purpose, therefore, it can only be to determine, as far as we are able to, how badly our hypotheses are in error. If observations or experiments are to succeed in identifying mistakes, the hypotheses under examination must be empirically falsifiable.

Sense experience is doubly demoted in this version of empiricism. Falsificationism regards observation neither as the origin of knowledge nor as its basis. The empirical method rests its decisions on observation reports, not because these reports are firm, which they are not, but because they are easily checked, and easily replaced if they are found to be untenable. Observation remains a primary scientific resource, but it is not a primordial source;[5] it remains fundamental, but it is not foundational.[6] The bankrupt enterprise of empirical justification, in which experience and induction were long-standing partners, is unceremoniously dissolved. Experience is reemployed in the new business of empirical falsification and criticism, but induction is permanently retired on an invalidity pension.

There being nothing immaculate about experience, the deductivist alternative to verificationism may be readily extended to any area in which viable objective criticism is possible. This is the philosophy of *critical rationalism.* Central to it is the realization that the process of reasoning can never provide justification, but

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[2] K.R. Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* (London 1963), Chapter 11.

[3] K.R. Popper, *Logik der Forschung*, §10.

[4] D.W. Miller, *Out of Error. Further Essays on Critical Rationalism* (Aldershot–Burlington 2006), chapter 4, §1; D.W. Miller, *The Objectives of Science*, *Philosophia Scientiae*, 11 [1] (2007), pp. 21–43; §1.

[5] K.R. Popper, *Conjectures and Refutations…, Introduction.*

[6] K.R. Popper, *Logik der Forschung*, §30.

it may provide criticism; and indeed, that the rational attitude consists wholly of openness to criticism, and of appropriate responses to criticism. Justification, conclusive or inconclusive, is revealed as neither possible, nor useful, nor necessary.[7]

2. The Futility of Justification

Critical rationalism **CR** was first sketched in Popper,[8] where it was contrasted not only with Plato's mystical rationalism but also with *comprehensive* or *uncritical rationalism* **UR**, the traditional doctrine that we should believe or adopt only those propositions or policies that are justified by means of argument and experience. Popper argued that **UR** is an untenable position: 'a rationalist attitude must first be adopted if any argument or experience is to be [rationally] effective, and it cannot therefore be based upon argument or experience'. **UR** tells us not to accept **UR**.

If rationalism, in its traditional form, incorporates also the converse to **UR**, 'All justified propositions must be accepted' (as suggested by Cíntora),[9] then the proposition '**UR** is unacceptable' may have to be accepted. But it is one of the merits of Popper's formulation of **UR** that although the acceptance of a proposition may be permitted, and even recommended, it is not demanded. (Properly understood, a conditional like 'if *A* is accepted then [its logical consequence] *C* has to be accepted' is not a conditional demand but an absolute prohibition.) This desirable feature of **UR** is inherited by **CR**. We cannot rationally demand reason, Popper admitted; no argument has force against a person who has renounced reason. Nor should we demand acceptance. But if we adopt the rationalist attitude, we may be able to exclude some instances of unreason. Too much weight has been placed on the unfortunate term, 'an irrational *faith in reason*', that Popper used here for a frame of mind that, in the same sentence, he described as tentative. No faith, no commitment, is involved in the adoption of the way of reason; it is a free act, open to criticism, and to cancellation, at any time.

According to **CR**, the initial adoption of a proposition or policy (**CR** included) is neither dictated by reason nor contrary to it; what is contrary to reason is only the retention of a proposition or policy that does not withstand serious criticism. Only a lingering attachment to the rational hegemony of justification explains Popper's use here of the term 'irrational'.[10] The important question is not *Why should we be rational?*, which calls for justification of the rational attitude, but *What is objectionable (counter-productive, imprudent) about adopting a rational attitude?* The first question appears unanswerable if acceptance is subservient to justification (as it is in **UR**). The second question may be answered (perhaps only with the answer 'nothing') if rationality depends on criticism (as it does in **CR**). As we shall see in §4 below, reason may legitimately be used to attack the

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[7] D.W. Miller, *Critical Rationalism. A Restatement and Defence* (Chicago–La Salle 1994), Chapter 3.

[8] K.R. Popper, *The Open Society and Its Enemies* (London 1945), Chapter 24, §ii.

[9] A. Cíntora Gómez, 'Miller's Defence of Bartley's Pancritical Rationalism', *Sorites*, 15 December 2004, p. 50. http://www.sorites.org/Issue_15/cintora.htm/

[10] W.W. Bartley III, *The Retreat to Commitment* (London 1962).

use of reason, and rationalists ought not assume complacently that it will not be successful (though they may hope that it will not be). A continued failure to find fault with critical rationalism does nothing to secure it.

Where **CR** has a decided advantage over **UR** is in the irrefragable distinction between a circular or question-begging argument (a *petitio principii*), in which what is concluded is first assumed, and a critical argument (a *reductio ad absurdum*), in which what is concluded contradicts what is assumed. An argument advanced to justify, conclusively or inconclusively, the truth, or the acceptability, of a proposition is almost inevitably circular;[11] in any case, it must fail to achieve its purpose. A critical argument, in contrast, can succeed even if it assumes what it seeks to refute. I have no intention of defending the integrity of most forms of relativism, or of idealism, but it is no criticism of them if, in their arguments against realism, they presuppose the realist doctrines that they finish by rejecting. For one example of such a criticism, see the backboard of Harris.[12] In 'What Use is Empirical Confirmation?'[13] (§1), I quoted several other passages in which what look like decent critical arguments are unjustly called into question in this way, and in §4 below I shall discuss another one. For all that they are persistently mistaken for each other, there is a world of difference between a *petitio* and a *reductio*.

The chimera of reasonable belief and of justification may entice those, such as Musgrave,[14] who want to be instructed in what they should believe. Others will prefer to use their own judgement, and to appeal to reason only where it is effective; that is, as a check on palpable error. Musgrave admits that the 'rational adoption' of his approach (also called 'critical rationalism', I am sorry to say) 'involves circularity'.[15] Disregarding the fact that it was to escape a similar predicament that **UR** was discarded, and replaced by **CR**, he pleads in extenuation that 'any general theory of reasonable belief will be subject to the same objection'.[16] We can avoid such obscurantism, however, by more thoroughly purging justification from our system; not only with regard to propositions, where Musgrave too repudiates it, but with regard to policies, where he embraces it.[17] There is no need to indulge Musgrave's oppressive conclusion that 'if Miller's interpretation is correct, then so-called "critical rationalism" is another name for irrationalism'.[18] '[S]cience may

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[11] D.W. Miller *Critical Rationalism...*, Chapter 3, §3.

[12] J.F. Harris, *Against Relativism* (Chicago–La Salle 1992).

[13] D.W. Miller, 'What Use is Empirical Confirmation?', *Economics and Philosophy*, 12 [2] (1996), pp. 197–206.

[14] A.E. Musgrave, *Essays on Realism and Rationalism* (Amsterdam–Atlanta 1999), p. 335.

[15] *Ibidem*, p. 331.

[16] *Ibidem*; see also A.E. Musgrave, *Saving Science from Scepticism*, [in:] F. D'Agostino, I.C. Jarvie (eds.), *Freedom and Rationality: Essays in Honor of John Watkins* (Dordrecht–Boston–London 1989), p. 318.

[17] D.W. Miller, *Out of Error...*, Chapter 5, §4; for criticisms of Musgrave's position, from other justificationist perspectives, see D.G. Mayo, *Critical Rationalism and Its Failure to Withstand Critical Scrutiny*, [in:] C. Cheyne, J. Worrall (eds.), *Rationality and Reality: Conversations with Alan Musgrave* (Dordrecht 2006), pp. 63–96, and A. Schramm, *Methodological Objectivism and Critical Rationalist "Induction"*, [in:] I.C. Jarvie, K.M. Milford, D.W. Miller (eds.), *Karl Popper: A Centenary Assessment*, Vol. II (Aldershot–Burlington 2006), §4.

[18] A.E. Musgrave, *Saving Science from Scepticism*, p. 310.

[. . .] be a rational enterprise [. . .] in the sense associated with deontological rationality: science is rational because or the extent to which the disputes which arise within the scientific community are addressed within a framework of discursive rules which are themselves implicit in the so-called circumstances of method'.[19]

The craving for justification and intellectual security resembles an addiction, even an infantile addiction. The more enthusiastically we try to satisfy it, the more insistent and unsatisfiable it becomes.[20] We must learn to grow out of it.

3. Methodological Objectivism

Critical rationalism sees a continuity between animal knowledge and human knowledge. Much of our knowledge is inherited, some of it is discarded, more is acquired. With luck, darwinism says, a species can become well adapted to a stable (or regularly varying) environment. Its organs (its stomach, its eyes, its immune system, and so on) can come to serve well some task or tasks. They incorporate an endosomatic *knowledge how* concerning which it makes little sense to speak of truth, let alone justification or reasonableness. Some organs may seem to be better suited to the present environment than are others, or may strike us as simple and elegant, but adaptation is not truth and simplicity is not justification. If there is any endosomatic *knowledge that* as well as this endosomatic *knowledge how*, it too is not justified (for, as we have seen, justification is not an option), and it is rarely better than a fair approximation to the truth.

Epistemologically we are highly developed animals, not more. We may know more than brutes do, but we do not know it better. Our biologically encoded *knowledge that*, should there be any, is like all animal knowledge: unjustified and usually untrue.

If linguistically formulated knowledge, which resembles an exosomatic organ, is different, it is because we are different methodologically. What is distinctive about humans is not *instrumental rationality*, where we are often inferior to other creatures, but our *deliberative rationality*; and what is fundamental to all deliberation is the critical approach. Where we differ from brutes is in our ability consciously to evaluate our organs, to improve (and also to amplify) our knowledge. But critical scrutiny, however rigorous, provides only delusory justification. The aim is truth, but criticism would hardly be needed if truth were easily obtained. Exosomatic knowledge is not a species of belief. Human knowledge, for the most part, is *unjustified untrue unbelief*.

This is to state succinctly an important component of critical rationalism, its *methodological objectivism*, its concern with logical relations among items known, rather than with psychological relations among those who are in the know, or between knowers and what they know. Our most important knowledge, according to Popper[21] is shared knowledge, or even detached knowledge; at least it must

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[19] F. D'Agostino, *The "Optimum" Aim for Science*, [in:] F. D'Agostino, I.C. Jarvie (eds.), *Freedom and Rationality: Essays in Honor of John Watkins*, p. 256.

[20] D.W. Miller *Critical Rationalism...*, Chapter 2, §3.

[21] K.R. Popper, *Objective Knowledge. An Evolutionary Approach* (Oxford 1972), especially Chapters 3 and 4.

be detachable on demand, since the evaluation and criticism of a hypothesis, or a suggestion, normally requires that it be outside the knowing mind; in short, that it be formulated in an intersubjective and public language. Echoing Musgrave,[22] Schramm[23] has recently revived the objection that this kind of objectivism is an epistemologically unrewarding position: the problem of induction, in particular, is said to become quite trite when it is formulated objectively, and is interesting only when it is formulated in subjectivistic (and justificationist) terms. Referring to Popper's statement[24] of the problem of induction 'in an objective or logical mode of speech',

> Can the claim that an explanatory theory is true or that it is false be justified by 'empirical reasons'; that is, can the assumption of the truth of test statements justify either the claim that a universal theory is true or the claim that it is false?

Schramm[25] complains that, depending on the status of the terms 'assumption' and 'claim',

> we have either (a) an objective logical problem *but not the problem of induction*, or we have (b) a (subject-related, or 'subjective', as Popper calls it) version of the problem of induction *but not a logical problem.*
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> As [in case (a)] the 'justifying' relation takes propositions as arguments and, thus, must be an objective semantic relation, it would be better not to speak (misleadingly) of justification, but, rather, of logical consequence, logical implication, or some other suitable and semantically explicable relation [. . .]. And indeed, even though it may sound somewhat exaggerated to call it a logical *problem*, this is, after all, a purely logical question to which there is a trivial answer [. . .]. Thus, if the 'solution' of the problem of induction consists in nothing more than in the mere recognition of the asymmetry of falsifiability and verifiability, then this would constitute neither an original nor a particularly specific achievement of Karl Popper, but, rather, a commonplace hardly deserving any further discussion.

Popper's logical formulation of the problem of induction is thus dismissed. But there is more to the problem than what is recounted here, as Popper himself went on to emphasize,[26] in places resorting to needlessly justificationist language: there is the problem of explaining how experience, or better, experiential reports, have a bearing on our knowledge; if you like, how we 'learn from experience'. There is not only a problem of psychology here, but also the objective problem of specifying the methods we should employ to bring our (objective) knowledge into contact

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[22] A.E. Musgrave, *Saving Science from Scepticism*, p. 322; A.E. Musgrave, *Essays on Realism and Rationalism*, p. 317; and many minor variations on the same theme.

[23] A. Schramm, *Methodological Objectivism...*, §1.

[24] K.R. Popper, *Objective Knowledge...*, Chapter 1, §5.

[25] A. Schramm, *Methodological Objectivism...*, §1.

[26] *Ibidem*, Chapter 1, §§7–9.

with (objective) reports of experience. True, this is not a problem solely about propositions. But methods can be objective too, and can be discussed and evaluated without thought for the thought processes of those who operate them. The main purpose of *Logik der Forschung* was, I take it, to state an objectivist (even behaviourist) methodology appropriate to the trite negative solution of the purely logical problem of induction there propounded. It should perhaps be mentioned that this logical problem, and its solution, when cast in the language of preference, are not as uncomplicated as Schramm suggests. In Chapter 5, §4, of my *Out of Error*, it was claimed that what we may deduce from an experiential report that contradicts the theory A, but not the theory C, is that, with respect to truth, *A should not be preferred to C*; and that this is enough to enable some modest but unjustified learning from experience. (The first part of this claim, but hardly the second part, should have been credited to Howson.[27]) This logical point is not vitiated by the objection[28] that the truth of the experiential report is itself unjustified.

Our objective methods not only lack justification; they sometimes let us down. This is the obvious response to the misgivings of Haack,[29] that fallibilism is a doctrine with little bite if it is restricted to the domain of propositions. Haack herself ventures exactly this response,[30] but expresses concern that the existence of fallible methods is not enough to explain the full extent of fallibility in science. Although perhaps true, that is hyperbolic worry, since no one wants to suggest that all our wrong turns are open to objective rationalization. It does not at all detract from the objectivity of much of our knowledge that it was created by knowing subjects; that our evaluations and criticisms of what is known are *our* evaluations and *our* criticisms,[31] and that they are on occasion misguided and even foolish. Our objective shoes are not the less objective for being created by shoemaking subjects and repaired by cobbling subjects.

It is an objective matter how to play a game such as chess, or croquet and, as Schramm[32] rightly notes, a different matter how to play it well. Most chess players, and all croquet players, are thinking subjects, and the tactics a player employs are of course the outcomes of his thought processes. But his tactics do not relate to his state of mind (though his preparation for the game may do so); in the main they are concerned with the objective state of play, and perhaps with the objective state of mind of his opponent (whom he may wish to unsettle). Those of us who hold that human knowledge calls for objective analysis and explanation of this kind need not deny the existence also of subjective factors, for example

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[27] C. Howson, 'Popper's Solution to the Problem of Induction', *The Philosophical Quarterly*, 34 [135] (1984), p. 144.

[28] A. Schramm, *Methodological Objectivism...*, §3.

[29] S.W. Haack, 'The Wheel and Beyond', *The British Journal for the Philosophy of Science*, 29 [2] (1978), p. 187; S.W. Haack, 'Epistemology *with* a Knowing Subject', *The Review of Metaphysics*, 33 [2] (1979), pp. 326f.

[30] *Ibidem*, p. 328.

[31] *Ibidem.* A.E. Musgrave, *Saving Science from Scepticism*, p. 322; A. Schramm, *Methodological Objectivism...*, §1.

[32] A. Schramm, *Methodological Objectivism...*, §2.

what Polanyi[33] calls the tacit dimension of knowing. There is some knowledge, especially *knowledge how*, that its possessors seem unable to pass on to others.[34] But the ubiquity of *how-to-do-it* books makes it evident that, with thought, most of what we think of as subjective knowledge can be objectified. One internet site recently consulted identifies 33 articles offering advice on how to breastfeed, 35 articles on how to walk backwards, and 193 articles on how to shake hands.

4. The Status of Logical Rules

The fecundity of *reductio ad absurdum* arguments was contrasted in §2 above with the sterility of those arguments that commit the traditional fallacy of *petitio principii.* From a *reductio* we can learn that we were wrong. From a *petitio* we learn nothing.

An understanding of the distinction is never more valuable than when we confront the problem of how the rules of logic (which, for simplicity, are here taken to be the natural deduction rules of classical logic) are themselves to be evaluated. In his autobiography, having characterized a deductively valid argument as one that admits no counterexample, Popper wrote:[35]

> The view is still widely held that in logic we have to appeal to intuition because without circularity there cannot be arguments for or against the rules of deductive logic: all arguments must presuppose logic. Admittedly, all arguments make use of logic and, if you like 'presuppose' it, though much may be said against this way of putting things. Yet it is a fact that we can establish the validity of some rules of inference without making use of them.

He gives as an example the rule of identity $A \vdash A$, but offers no glimpse of how we can establish, without using identity, that this rule admits no counterexample. Nor does he make it obvious that this rule can be consistently avoided in attempts to establish the validity of other rules, such as the rule of indirect proof, which might themselves have been used in some form in the course of establishing the validity of the rule of identity.

A more promising approach, more congenial to critical rationalism, is to volunteer the rules of deduction as conjectures, and to invite all comers to identify counterexamples to them. Critical rationalists will not be flustered by the platitude that, here as elsewhere, a failure to falsify a conjecture provides no shred of justification for it; a rule is not justified because no counterexample has been found. More worrying is the suggestion (attributed by Nilsson to Apel, Habermas, Thomas Nagel, and Bartley[36]) that there is some small set of logical laws that are immune to criticism because, it is claimed, they constitute an 'absolute presup-

[33] M. Polanyi, *The Tacit Dimension* (London 1967).

[34] J.S. Mill, *A System of Logic, Ratiocinative and Inductive* (London–New York–Bombay 1843), Book II, Chapter III, §3.

[35] K.R. Popper, *Unended Quest* (London–Glasgow 1974), §32.

[36] J. Nilsson, *On the Idea of Logical Presuppositions of Rational Criticism*, [in:] I.C. Jarvie, K.M. Milford, D.W. Miller (eds.), *Karl Popper. A Centenary Assessment*, vol. II, pp. 109–117.

position of argument', and can thus be conclusively and irrevocably justified by showing that any attempt to deny them leads to 'performative contradictions'.[37] This transcendental mode of argument leads easily to a rejection of the view that 'someone who is trying to inquire and reason *rationally* can and should treat logic as criticizable and revisable'.[38]

It is evident that this predicament is similar to that encountered in §2 above. I hope to show how elegantly critical rationalism can once more weather the storm,[39] and in particular, to give a more satisfying response than that given by Nilsson, who also writes from the perspective of critical rationalism. He poses the problem like this:[40]

> The idea [...] seems to be applicable [when an attempt is made to establish the invalidity of some rule]. If the criticism is aimed at showing that an inference rule is invalid, then it is of course problematic if in the critical argument one presupposes the validity of the same rule. Similarly, if the argument is intended to show that an inference rule is unjustifiable and hence that reasoning in accordance with it is not rationally permitted, it is problematic if the critical argument is based on the presuppositions that the rule is valid and that reasoning in accordance with it is rational.

This is plainly incorrect, unless 'presuppose' means something decidedly odd. If a rule R of inference is supposed (or presupposed) to be valid, and a counterexample is derived with its assistance, then either the rule R itself, or one of the other rules used in the derivation, or one of its premises, is not valid. If R is the only rule used in the derivation, then if R is valid it is invalid. It follows that R is invalid. It does not follow that the counterexample to R was not validly derived, since most invalid rules have valid instances (as Nilsson recognizes). It is much the same even if R is a version of the rule of indirect proof, such as

$$(0)\ \Gamma, A \vdash \neg A \text{ therefore } \Gamma \vdash \neg A.$$

Let B be the assumption that R unfailingly transmits validity. If $\neg B$ can be derived from B and true premises Γ by use only of rules that are assumed valid, and the rule R, then R does not unvaryingly transmit validity. Note that although $\neg B$ is a true conclusion, it is validly derived from the premises Γ only if the derivation $\Gamma, B \vdash \neg B$ is valid. This may not be the case, since R may have been used in that derivation.

Nilsson's reaction is to seek to eliminate the use of the rule R:[41]

> Let us assume, again, that we have found what we think is a counterexample to an inference rule R and that we use it in order to argue that R is invalid.

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[37] *Ibidem*, p. 110.
[38] *Ibidem*, p. 112.
[39] D.W. Miller *Critical Rationalism...*, Chapter 4, §3c.
[40] J. Nilsson, *On the Idea...*.
[41] *Ibidem*, p. 113.

>   It might well be the case that we *actually* [...] make use of the rule
>   R in question [...]. But when criticizing a rule like R does one really
>   *have to* use the very same rule that has been targeted for criticism?

>   No, I do not think that one has to [...].

>   First of all, there will be other inference rules than R. It is reasonable
>   to think that an argument presupposes a certain inference rule only if
>   that rule is actually used in it. It may be possible to reconstruct one's
>   critical argument in such a way that R is not used in any step.

He indicates other strategies too: we might 'propose a *more strict* version of
R, a version that contains a *restriction* that rules out all cases with the special
characteristic of the counterexample'.[42]

Dispensing with, or abridging, the rule R seems quite the wrong approach.
The force of the counterexample to R would be massively enhanced if we were
to eliminate from its deduction not R but *all the other rules of inference*, for we
should then sidestep the Duhemian problem of which rule to blame. But it is no
easy matter to reduce so drastically the set of rules employed in the production
of a counterexample to a logical rule R. It depends on how the necessary seman-
tic information is presented in the truth tables, but some rules for $\to$ and $\wedge$, for
example, may be required in order to infer this information; and the rules of $\wedge$
introduction and $\exists$ introduction seem required to license the move from a coun-
terexample to R to the statement that there is a counterexample to R (that is, to
the statement that R is invalid). There follow three brief illustrations of what can
be achieved. (*TA* means that *A* is true and *FA* means that *A* is false.)

Let R be the rule $A \vdash C$, and let *B* be a true sentence. Using R we may derive
FB from *TB.* What we assumed, and what we have just derived from it using R,
namely *FB*, show that the instance $B \vdash B$ of R has a true premise and a false
conclusion; that is, is a counterexample to R. By the definition of invalidity, R is
invalid.

For a more complex example, let R be the rule of affirming the consequent or
modus morons (**MM**): $A \to C, C \vdash A$. Suppose that we understand the standard
truth tables for $\neg$ and $\to$ to provide us with the following two conditionals:

1) $T(\neg A \to A) \to TA$,
2) $F\neg A \to TA$.

To construct a counterexample to **MM**, we adopt the premises *B* and $\neg B \to B$,
where *B* is some true sentence. Then by **MM** we may deduce $\neg B$. From our
assumption *TB*, we may deduce $T(\neg B \to B)$, by (1) and **MM**. We may also
deduce $F\neg B$, by (2) and **MM**. This means that using **MM**, and the two semantical
statements (1) and (2), which are not in contention, we have derived the false
conclusion $\neg B$ from the true premises *B* and $\neg B \to B$. The rule **MM** admits
a counterexample.

There is also the possibility of using a more direct semantics in order to bypass
the problem of how the appropriate semantic constraints are extracted from the

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[42] *Ibidem.*

truth tables. The final example, which provides a counterexample to **MM** without a single use of **MM** (or any other rule), does just this. Someone who thinks that the Amazon is in all respects the greatest river in the world may assent unexcitedly to the truth of the sentence *If the Amazon is not the longest river in the world, then it is (anyway) the most voluminous*, and also to the truth of its consequent, while denying its antecedent.

These examples are far from perfect, since what has been demonstrated in each case is only that if the rule R is valid then it is not valid. There remains the problem of discharging the assumption of the validity of R; that is, of inferring unconditionally (by (0)) the invalidity of R. I plan to return to this problem elsewhere. But it must be recognized that these improvements are more decorative than structural. Whatever other rules may be required for its production, a counterexample is not vitiated because it assumes the validity of that rule of inference whose validity is under threat.