Ab Esse ad Posse Non Valet Consequentia

Daniel Dohrn[1]

Abstract
While knowledge of mere possibilities is difficult to understand, knowledge of possibilities that are actual seems unproblematic (as far as we know the actual world). The principle that what is actual is possible has been near-universally accepted. After summarizing some sporadic dissent, I present a proposal for how the validity of the principle might be restricted. While the principle certainly holds for sufficiently inclusive objective and epistemic possibilities, it may not hold when the accessibility of possibilities is contextually restricted.

1 A Commonly Accepted Platitude

It is a venerable principle of modal reasoning that what is actual is possible:

$$(AB - ESSE) \; P \to \Diamond P$$

If P, it is possible that P.

$\Diamond P$ is usually defined as *not necessarily not P*: $\sim\Box\sim P$.[1] Then the principle follows from axiom (M) (or (T)) of standard modal logics[2]:

$$(M) \; \Box P \to P$$

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[1] P is a proposition as expressed by a declarative e sentence, $\to$ signifies the material implication, $\Diamond$ *possibly*, $\Box$ *necessarily*.

[2] For the labeling see Garson [8]. Inserting $\sim P$ into (M): $\Box\sim P \to \sim P, P$; *conclusion: $\sim\Box\sim P$.*

✉ Daniel Dohrn
Daniel_Dohrn@yahoo.com

[1] Dipartimento Di Filosofia, Università Degli Studi Di Milano, Via Festa del Perdono 7, 20122 Milano, Italy

AB-ESSE is usually assumed to hold in particular for *objective* possibilities. A commitment to objective possibilities can be illustrated by the following statement[3]:

(CHESS) The chess program could win against Carlsen (if he were not to play at his best), but it won't win (as he plays at his best).

The chess program winning here is clearly not an epistemic possibility as such a possibility is ruled out after the colon. It is not a *deontic* possibility either. In the following, unless I explicitly specify the modality at stake, I am talking of objective as distinguished in particular from deontic modality.

The canonical form of AB-ESSE can be found in eighteenth century school metaphysics:

'Whatever exists, is possible. …In this vein, the following is commonly stated *From being possibility is validly inferred*, or, what is the same: *the consequence from existence to possibility is valid*.' [38], § 170, my translation, m.e. see [14], 41).[4]

Łukasiewicz made AB-ESSE the first axiom of his 24 modal logics[5]:

$$(A1) \vdash CpMp$$

While AB-ESSE seems to be a matter of course for objective possibilities [16], 70, [17], 84), one may still wonder whether there is anything that could be said for it over and above acknowledging it as self-evident. I mention two exemplary metaphysical motivations.

In Aristotelian metaphysics, the connection between actuality and potentiality can be supported as follows (e.g. *Met. IX.8*): typically, *x* actually being *F* is due to the manifestation of a disposition or potentiality of *x* to be *F*. We therefore can reason from *x* actually being *F* to *x* having the potential of being *F*.

A very different line of motivation can be derived from a possible-worlds analysis of modal expressions [22]. $\Diamond P$ just if P is true at some world. (AB-ESSE) $P \rightarrow \Diamond P$ is true at any world. Either that world is a P-world and P is therefore possible, or it is not, making AB-ESSE vacuously true.

I content myself with these short considerations. While they illustrate the resources for supporting AB-ESSE, the support they lend to AB-ESSE seems limited. The principle itself has considerable immediate appeal. It may itself be thought to provide evidence logics and metaphysics of modality ought to respect rather than vice versa.

My aim is not to add further motivation to AB-ESSE. I shall try to give a general frame for the considerations that support AB-ESSE for more inclusive epistemic and objective possibilities in Section (3.1.), the consequence being that AB-ESSE

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[3] Sometimes also called 'alethic' or 'ontic' possibility.
[4] 'Quod existit, id est possibile… Item vulgo ita effertur Ab esse ad posse valet consequentia, seu, quod perinde est, Ab existentia ad possibilitatem valet consequentia.'.
[5] Where *Cpq* is the same as $P \rightarrow Q$ and *Mp* the same as $\Diamond P$.

indeed is valid for such more inclusive possibilities. I intend this frame to be compatible with the exemplary arguments mentioned so far.

Given its status as a near-universally accepted platitude, I find it more interesting to *question* AB-ESSE. I am not trying to argue that the principle is not valid, but rather that it may not be valid in *any* context for objective and epistemic modalities. My suggestion can be given a descriptive and a normative reading. In the descriptive reading, the argument becomes that we indeed reason in ways that do not validate AB-ESSE, in the normative reading, that it would be useful to do so.

2 Resources in the Literature for Questioning AB-ESSE

In this section, I shall consider exemplary positions that *explicitly* discuss AB-ESSE, either rejecting it or pointing out some of its potentially unsettling consequences.

2.1 The Actuality of Miracles

Explicit denials of AB-ESSE can be found in philosophical theology (e.g. [12, 26]). Without going into the detailed discussions, I present my own reconstruction of the general punchline.

Let us assume a strong notion of miracles: genuine miracles are not only events that are highly unusual or improbable.[6] They are impossible. By AB-ESSE, if miracles actually occur, it is possible that they occur. Miracles actually occur. Contradiction. AB-ESSE has to go.

Instead of the premise that miracles *do* occur, one may prefer a weaker one: it should not be excluded by our very understanding of miracles together with logical principles like AB-ESSE that miracles *might* occur. Yet adopting the strong notion of miracles and AB-ESSE, we can even rule out that miracles might actually occur. If we are to grant that miracles might occur and uphold the strong understanding of miracles, AB-ESSE has to go.

I shall not discuss the argument. I just note that it depends on strong theological premises. One may deny that there might be miracles in the strong understanding. One may adopt a weaker understanding of miracles as highly unlikely or *amazing* (see Section 3.2.1.2.). Or one may question that we have a sufficient grip on the notion of a miracle to be sure what it entails, whether it is consistent, or to assess the actual occurrence of a miracle as a genuine epistemic possibility.

Taking stock, while the argument from miracles sets an interesting precedent for questioning AB-ESSE, it is too esoteric to warrant principled doubts about AB-ESSE unless one is willing to incur strong theological commitments regarding miracles.

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[6] I note that the strong notion may make do with something weaker than metaphysical impossibility, e.g. nomic impossibility. The argument against AB-ESSE still works provided the actual world is assumed to be possible in the relevant sense.

2.2 Irrelevant Possibilities

Another source for questioning AB-ESSE is Fritz Mauthner's empiricist critique of language 25. According to Mauthner, AB-ESSE is

'A trivialism, which is not even true exactly speaking… Until recent years, an airship has been possible, that is thinkable, but improbable bordering to impossibility; now it is real. The principal mistake of the sentence ab esse etc. lies in the word consequentia. It is not a logical inference. There is no logical bridge between being or reality and the psychology of expectancy of probability.' [25], 2, my translation)

I shall try to make my own sense of Mauthner's argument, which might not perfectly capture his intention: he may be called an anti-realist about modality [2]: it is objectively possible that *P* in the most inclusive sense precisely if it is (ideally) conceivable (thinkable) that *P*. However, for a possibility to be *relevant*, it should clear a certain threshold of minimum subjective probability. This is where AB-ESSE fails. We cannot reason from *P* to *there is a relevant possibility that P*.

Nowadays we make more fine-grained distinctions between epistemic or subjective and objective meanings of possibility and probability. Mauthner's argument could be ignored if his distinction between most inclusive possibility (or conceivability) and contextually relevant possibilities did not lend itself to a more precise explication in a contemporary framework: AB-ESSE is valid for most inclusive possibilities, which at least some philosophers assume to covary with ideal conceivability. Yet it is not always valid when possibilities are restricted to the contextually *relevant* ones.

2.3 Iterated Modalities

Perhaps the most compelling motive for limiting the validity AB-ESSE to be found in the literature lies in the way it vindicates non-platitudinous principles of modal logics. As von Wright observed:

'It is a "received truth" of modal logic that if a proposition is true, then it is also possibly true. (Ab esse ad posse valet consequentia.) By an application of this principle to the case when the proposition concerned is to the effect that a further proposition is possibly true or not possibly true, we conclude: If (it is true that) a proposition is possibly true, then the proposition in question is also possibly possibly true, and if (it is true that) a proposition is not possibly true, then the proposition in question is also possibly not possibly true.' [39], 165)

Van Wright points out that we can obtain principles for iterated possibilities by inserting possibility statements into AB-ESSE. For instance, inserting $\Diamond P$ for *P* into $P \rightarrow \Diamond P$ gives us

$$\Diamond P \rightarrow \Diamond \Diamond P$$

This principle is not immediately intuitive. In the case of a normal non-modal prejacent P, we immediately are disposed to accept the transition $\Diamond P$ without having to first resort to the general AB-ESSE. The certainty of such instances makes AB-ESSE seem a matter of course.[7] In the case of $\Diamond P \rightarrow \Diamond\Diamond P$, we need additional support e.g. via AB-ESSE. In turn, uncertainties about the non-obvious $\Diamond P \rightarrow \Diamond\Diamond P$ may spill over to the principle which entails it.[8] This gives us a *prima facie*-reason for asking whether AB-ESSE is universally valid beyond any reasonable doubt. I shall not further discuss iterated modalities, though.

3 A Modest Proposal for Restricting AB-ESSE

The peculiar logical consequences of AB-ESSE for iterated modalities set a precedent for considering potential restrictions. I am especially interested in the traditional applications of AB-ESSE. They do not concern iterated modalities but the transition from a not-yet-modalized prejacent P to the modalized $\Diamond P$. These are the applications where AB-ESSE seems unshakeable, and where a good argument for denying the validity of AB-ESSE would break new ground. They are also most interesting in the sense of moving us from homely reality to the spooky realm of possibility.

I shall develop a modest proposal for why and how AB-ESSE might be restricted. I begin with clarifying the question I am interested in. In order to do so, I take a look at the more recent debate especially on objective (non-deontic, non-epistemic) modalities. In the standard post-Kripkean picture of objective modality, there is a metaphysically privileged 'absolute' sense of modality, which is supposed to delimit the way reality could and could not be (e.g. Kripke [18]; van Inwagen [33], 72; [37], 460). This sense of modality is often called 'metaphysical'. A succinct illustration is [22, 23] modal realism. There is a plethora of spatiotemporal universes. These universes are real just as ours is, and nothing beyond them is real. P is metaphysically possible if and only if P is verified by one of these universes. Of course, the endorsement of absolute metaphysical possibility does not depend on modal realism, but the latter gives us the most immediate idea of how reality might privilege certain possibilities.

There are more comprehensive objective possibilities like conceptual and logical ones, but they do not seem to correspond to an outstanding boundary in reality as it is independently of our reasoning (van Inwagen [33], 71). Metaphysical modality lends itself to defining a plethora of more limited possibilities. The outstanding example are nomological possibilities, which can be defined by metaphysical

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[7] Such a structure of being evident in any instance may be a hallmark of a self-evident general principle. In support of this, one may cite Russell's claim that even the law of non-contradiction is less immediately plausible than that a particular rose cannot be both red and not red all over [28], 112–113).

[8] Such uncertainties may also arise from looking at more problematic but at least superficially similar iterations like.

$(S4)$ $\Box P$
$\rightarrow \Box$ $\Box P$ [29].

possibility given the actual fundamental laws of nature. Depending on whether the fundamental laws are contingent, nomological possibilities may or may not be more restricted than metaphysical ones.

While the picture just drawn tends to dominate the current philosophical debate on modality, there are doubts about it. In particular, it has been argued that there is no naturally privileged boundary of objective possibility [5, 6]. Rather there are many equally eligible ways of delimiting objective possibility. Some of them are more inclusive than metaphysical possibility is supposed to be. It has even been claimed that, in a perfectly objective sense, anything is possible [27]. If these doubts are justified, there is no 'absolute' objective possibility. Correspondingly, there is no 'one true logic' [7].

In light of these arguments, it may seem as if the question whether AB-ESSE is valid for objective possibilities had a trivial answer[9]: there are many perfectly eligible ways of delimiting objective possibilities, and there are many corresponding variants of modal logics. For some of them, AB-ESSE is valid, for others, it is not. After all, there is a prominent system of modal logic which does not include axiom (M), namely Kripke's system K (e.g. [3], 2.2.), and there are several systems which do include (M), such as Łukasiewicz's [24].

I want to use the debate on absolute objective modality to bring out a question which is not yet settled by the discussion on objective modalities. Irrespectively of whether there is a privileged 'metaphysical' sense of possibility, surely there is a lot of leeway for philosophers and logicians to carve modal operators and modal logics so as to still qualify as perfectly objective as contrasted to epistemic or deontic. Some of the options validate AB-ESSE, others do not. Yet things are different when we are interested in how people as a matter of fact talk and reason in terms of objective modalities, as witnessed by my example:

(CHESS) The chess program could win against Carlsen (if he were not to play at his best), but it won't win (as he plays at his best).

CHESS seems a perfectly normal thing to say. The relevant understanding of objective modality is a highly restricted one. It is restricted by the rules of the game, the natural laws, and even technical restrictions on the chess program. The possibilities that are relevant to such an 'everyday' use of modals are usually focused on possibilities relevantly like the actual circumstances.[10] This centeredness on the actual circumstances makes AB-ESSE a highly plausible principle for reasoning with modals. This status seems to be captured by the traditional acceptance of AB-ESSE.

Given that the actual world undoubtedly plays a prominent role among the possibilities that we normally take into account when using a modal, one legitimate

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[9] I am grateful to an anonymous reviewer for raising this issue.

[10] A distinction that parallels the one I have in mind is made by van Inwagen. Van Inwagen is sceptical about specifically philosophical modal claims, but he accepts that '…we often do know modal propositions, ones that are of use to us in everyday life and in science…' (van Inwagen [33], 69) I am also interested in the modal discourse on modal propositions 'of use to us in everyday life', but rather with regard to the underlying logic than epistemology.

question about AB-ESSE is whether it is validated by the way we normally reason in terms of objective possibilities.[11] By 'normally' I mean outside of academic debates on metaphysics and logics. This question is not yet settled by observing that we can decide among several systems of modal logics and several perfectly objective candidates for drawing the boundary between possibility and impossibility. I shall put contexts of metaphysics and logics aside. I surmise that, *if* there is a privileged metaphysical sense of possibility, it will be the sense that is relevant for most discussions of metaphysics. Presumably this sense validates AB-ESSE. Yet assuming that there are everyday contexts in which AB-ESSE is not valid, the same presumably goes for certain metaphysical discussions.

3.1 AB-ESSE is Valid for Unrestricted Possibilities

I grant that AB-ESSE is valid for more inclusive possibilities, be they epistemic or objective.[12] As for the former, let epistemic possibilities be candidates for the way things actually are that are compatible with some contextual body of information. The information being factual, it must be compatible with the way the actual world is. The same goes for the resulting epistemic possibilities. Most inclusive epistemic possibilities are not delimited by additional respects like relevance or probability. Hence there is no way of ruling out the actual world as an epistemic possibility.

In a similar vein, consider candidates for 'absolute' metaphysical possibility (putting doubts aside for the sake of argument)[13]: metaphysical possibility concerns alternative ways for the world to be that meet certain logical, conceptual, and metaphysical constraints. Whatever the constraints are, the actual world is supposed to meet them. Again such inclusive objective possibilities are not restricted by additional respects like relevance, probability, compatibility with metaphysically contingent natural laws, and so on. Hence there is no way of ruling out the actual world as a metaphysical possibility.

3.2 AB-ESSE is Not Valid for Contextually Restricted Possibilities

While accepting AB-ESSE for more inclusive possibilities, I shall explore reasons why it may not hold for contextually more restricted possibilities. The key idea is that the actual world may display features that demote it from the contextually relevant possibilities picked up by a possibility modal.

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[11] One may doubt that there is a non-technical notion of validity that applies to non-formal ways of reasoning in everyday contexts. In this case, I propose to rephrase my question as follows: are there good reasons to formally reconstruct our normal ways of reasoning in a way that does not validate AB-ESSE?

[12] My more precise requirement for 'more inclusive' possibilities is that the actual world is not excluded from the possible worlds accessible in a context (see Section 3.2.2.).

[13] Obviously the same goes for any more inclusive alternative candidate for delimiting objective possibilities.

3.2.1 Precedents

In the following, I shall explore certain further precedents in the literature that may be invoked against the validity of AB-ESSE in any context. Unlike the views considered in Section. (2), they do not yet come with an *explicit* discussion of AB-ESSE, but they are more specifically related to my limitation of AB-ESSE. The precedents concern (3.2.1.1.) a false common ground and (3.2.1.2.) the role of low-likelihood properties in counterfactuals. In both cases, the actual world may be demoted from the set of contextually relevant possibilities. As a consequence, AB-ESSE would fail for this set. The proposal to come does not depend on either of these precedents, though.

A False Common Ground Perhaps the most interesting precedent for denying the validity of AB-ESSE concerns the common ground of purported truths accepted for the purposes of a conversation. Usually, the function of the common ground is to fix a set of epistemic possibilities that are left open by the commonly accepted truths. The participants in the conversation aim at reducing this set by communicating further truths.

Stalnaker considers a deviation from this standard situation: the common ground accepted by the participants in a conversation may contain some false albeit commonly accepted claim and thus be incompatible with the way the actual world is 32, 717). Assume Alice says to Bob on the person next to them: 'the man with the Martini is a philosopher'. Bob may accept her statement for the purposes of conversation (without correcting her) although he knows that the presupposition is false: the man is drinking Perrier from a cocktail glass.

Stalnaker calls the result a 'defective context', suggesting that normal contexts are different. Yet if we take into consideration shared background assumptions like folk physics (which is strictly speaking false, [36], 146) or common prejudices that have pervaded and still pervade much of our discourse, many or even most conversations may take place in a somewhat defective context. Of course, many false presuppositions are irrelevant. In Stalnaker's own example, Bob refrains from correcting Alice as it does not matter what precisely the man referred to is drinking.

A defective common ground containing false presuppositions rules out the actual world as an epistemic possibility that is compatible with the common ground. AB-ESSE is not valid for the set of possibilities that are compatible with the defective common ground. In Stalnaker's example, taking for granted that the man is drinking a Martini is incompatible with the actual way things are. The man is not actually drinking a Martini. Yet we cannot infer that not drinking a Martini is an epistemic possibility compatible with the common ground.

AB-ESSE may still be valid for the non-defective part of the common ground that comprises just the *genuine* information shared by the participants in a conversation, ignoring the *false* presuppositions they also take for granted.

An Analogy to Conditionals I shall also draw a tentative parallel to certain non-standard accounts of conditionals. To this parallel, the caveats already expressed for epistemic modals apply. There is a huge debate on conditionals both in the indicative and subjunctive or counterfactual mode. In this case, though, I hope I can stay clear of the debate as far as I am only drawing an analogy that may be dropped without damaging my overall argument.

In the Stalnaker [31]-Lewis [20] standard analysis, a conditional is true if the consequent is true in all closest antecedent worlds.[14] Closeness is determined by an ordering of contextually accessible possible worlds relative to a world of assessment. One core assumption is *centering*: the world of assessment figures among the closest worlds (weak centering), or it is the closest world (strong centering). Usually the world of assessment is the actual one.

There is a connection between the centering condition for conditionals and AB-ESSE. Both reflect the unique relevance of the actual world for accepting certain possibilities as relevant. Doubts about centering may therefore set a precedent for questioning AB-ESSE. I shall consider some exemplary positions that involve doubts about centering. Gundersen [9] professes the following intuitions:

> Scenario:
> It is irreverent to think that the venerable Zen master ever misses the mark, but this time a sudden gust of wind has diverted the arrow so as to actually miss. Still,
> (ZENI) If the zen master shoots an arrow, she hits the mark.
> (ZENC) If the zen master had shot an arrow, she would have hit the mark.

Focusing on the counterfactual ZENC, Gundersen goes on to develop a non-standard analysis for counterfactuals that vindicates ZENC. I do not share Gundersen's intuition. ZENC strikes me as false in the situation considered, whereas the indicative may have a true (habitual) reading. Still I appreciate Gundersen's example as a valiant attempt at questioning centering. The general strategy is to demote the actual way things turned out to be as irrelevant from the set of relevant possibilities considered in assessing a modal.

A more systematic reason for questioning centering has been developed by Williams [34]. One problem about the standard analysis of counterfactuals reminds of the discussion of the actuality of miracles. Certain *amazing* developments, though tremendously improbable, figure among the candidates for the closest antecedent worlds. This leads to the unwelcome consequence that most everyday counterfactuals are false [10]. Consider a delicate china plate. Normally, we would accept

(PLATE) If the plate had been dropped, it would have shattered.

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[14] I accept Stalnaker's limit assumption and drop his uniqueness assumption for convenience. Moreover, I disregard Lewis's restriction of the analysis to counterfactuals.

Now the following seems plausible: there is a closest dropping-world for any particular set of lawful trajectories for the invidual molecules forming the plate.[15] The plate shatters in the overwhelming majority of closest worlds where it is dropped. Yet in some closest worlds, there is an amazing coincidence in the lawful trajectories of the individual molecules. The plate flies off instead of shattering.

There are several proposals in the literature for how to deal with this problem. Lewis [23] himself famously suggested that 'counterentropic funny-business' demotes a world in closeness. Williams makes this suggestion precise by defining 'funny-business' as instantiating *low-likelihood* properties. A first idea may suffice: a sequence of one million heads among one million tosses of a fair coin is as likely as any particular random-looking sequence that has nearly 50% heads, but it displays low-likelihood properties like *all heads*. It is astronomically less likely for the sequence to display *all heads* than *approximately 50% heads*.

In a similar vein, the scenario in which the plate flies off displays the low-likelihood property that the trajectories of its molecules all point in the same direction, as contrasted to scenarios where the plate shatters. Williams proposes to mend Lewis's classical criterion of closeness in terms of match in particular matters of fact and laws up to a 'small miracle' by letting the display of low-likelihood properties detract from closeness.

I am interested in the consequence of the view for the hypothetical case that the *actual* world displays low-likelihood properties in a way that demotes it from being closest according to Williams. In this case, centering does not hold. Of course, it may still be added as an external constraint, but this seems somewhat ad hoc [34], 396).

Williams's account of counterfactuals is supplemented by his 35 approach to indicative conditionals, which is also relevant for my purposes. Diverging from Stalnaker and Lewis, he construes indicative conditionals as strict conditionals. For an indicative conditional to be true, all epistemic antecedent possibilities that are salient in the context of assessment must be consequent possibilities. Williams draws a distinction between salient and non-salient (albeit open) epistemic possibilities that parallels the distinction between contextually accessible and non-accessible worlds in the Stalnaker-Lewis approach. The distinction opens up the principled possibility that the way the actual world is unbeknownst to us, though an open epistemic possibility in a more inclusive sense, may not be a salient one, for instance because salience goes with instantiating high-likelihood properties and the actual way things are happens to display low-likelihood properties.

I summarize my parallel to conditionals: just as it is natural to assume that the actual world figures among the possible ones, it is tempting to assume that the truth of a conditional is determined by whether the consequent is actually true provided the actual world satisfies the antecedent condition. However, if the way the actual worlds satisfies the antecedent also happens to be highly unusual, giving up the centering condition seems a salient option. This option sets a further precedent for

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[15] Assuming counterentropic developments to be lawful but tremendously improbable.

AB-ESSE: sometimes the way the actual world is, though undoubtedly possible in a more inclusive sense, may not count towards the contextually relevant possibilities.

3.2.2 Contextually Restricted Possibilities

I shall now come to my own proposal, which does not depend on the precedents considered so far: AB-ESSE may not be valid for any contextually restricted set of epistemic or objective possibilities. I shall say a bit more on the relationship between classical validity and contextual validity.[16] The basic idea is that an inference is logically valid if it is not possible that the premises are true and the conclusion is false. In this vein, validity in modal logics is standardly characterized as introduced by [16, 17], see [3]. Begin with a modal *frame* (W, R), where W is the set of possible worlds and R a binary accessibility relation among worlds.[17] A Kripke *model* $(W, R, \Vdash)$ is obtained by adding a *satisfaction* relation $\Vdash$ between any $w \in W$ and any formula A. A formula A is valid in a *model* $(W, R, \Vdash)$ if and only if for all $w \in W$, $w \Vdash A$. A is valid in a *frame* (W, R) if and only if it is valid in $(W, R, \Vdash)$ for all possible choices of $\Vdash$. A is valid in a *class of frames* C if and only if it is valid in any member of C. Classes of frames can be distinguished among other things by the general characteristics of the accessibility relationship R. Now take (M) $\Box P \rightarrow P$. $w \Vdash \Box A$ iff for all $w*$ such that $wRw*$, $w* \Vdash A$. (M) is valid in the class of frames in which the accessibility relationship is *reflexive*: for any $w \in W$, wRw. The same for (AB-ESSE) $P \rightarrow \Diamond P$ as entailed by (M).

Coming to contextual validity, Stalnaker [31] and [20, 21] take the accessibility relationship R to be determined by the conversational context. The context determines which possible worlds are accessible so as to count towards the evaluation of a modal. As far as validity depends on the accessibility relationship R, it becomes context-dependent. The resulting notion of validity is the one that determines which modal inferences are permitted and which are not in a specific conversational situation.

In this vein, I take the role of a conversational context C to consist in determining the accessibility relation R_C and the satisfaction relation $\Vdash_C$ so as to obtain a specific Kripke model. Contextual validity is then determined as validity in the resulting model $(W, R_C, \Vdash_C)$.[18] My specific question becomes whether AB-ESSE is valid for any 'normal' conversational context (outside of debates on logics and metaphysics), i.e. whether for any such context, $(W, R_C, \Vdash_C)$ is such that, for any P and any $w \in W$, $w \Vdash P \rightarrow \Diamond P$. To bring out the relevance of this question, I note that Kripke himself took it for granted that the accessibility relationship R is reflexive, validating AB-ESSE:

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[16] Thanks to an anonymous reviewer for inviting me to clarify the relationship.

[17] If one is sceptical about metaphysical modality, one may use any sufficiently comprehensive set of objectively possible worlds instead.

[18] One may also think about defining a more general notion of contextual validity with regard to frames rather than models, but in order to do so one would have to abstract away from the full contribution of context not only to determining an accessibility but also a satisfaction relation.

'It is clear that every world H is possible relative to itself; for this simply says that every proposition true in H is also possible in H.' [16], 70, see [17], 84)[19]

I shall now try to devise counterexamples to Kripke's claim.

Everyday Contexts In a normal context, we do not consider possibilities most inclusively, but limited to the circumstantially accessible ones. This can be illustrated by an example of Lewis's:

'Suppose I am talking with some elected official about the ways he might deal with an embarrassment. So far, we have been ignoring those possibilities that would be political suicide for him. He says: "You see, I must either destroy the evidence or else claim that I did it to stop Communism. What else can I do?" I rudely reply: "There is one other possibility - you can put the public interest first for once!" That would be false if the boundary between relevant and ignored possibilities remained stationary. But it is not false in its context, for hitherto ignored possibilities come into consideration and make it true.' [21], 354-355)

According to Lewis, the official speaks truly as the context of the communication provides only two possibilities: destroying the evidence or pretending to stop Communism. The possibility to put the public interest first is not accessible in that context. It becomes accessible when the interlocutor (David) enforces accommodating it in a new context. Only in this context David's possibility statement is true.

I shall discuss examples like Lewis's within the 'customary analysis of modals in terms of accessibility relations' [15], 641). $\Diamond P$ existentially quantifies and $\Box P$ universally quantifies over a set of worlds accessible from the world at which the modal is evaluated. Some/any accessible world is a P-world. The main lesson from Lewis's example is that the accessibility relationship relevant to assessing a modal is determined by the conversational context. My question is the following: take any normal context for using a modal, i.e. a context outside of specific debates on metaphysics and logics. Does the set of worlds accessible in such a context include the actual world? If it does not, some P may be true in the actual world but impossible, i.e. not true in any of the worlds accessible from the actual world. AB-ESSE then is not valid for contextually restricted possibilities. I shall try to devise examples of a normal context in which the actual world is not part of those worlds that are contextually accessible from the actual world.

Examples abound for *deontic* modalities. For instance, 'one must tell the truth' can be analysed as universally quantifying, 'one may sometimes lie' as existentially quantifying over morally ideal worlds. Only such ideal worlds are accessible. The actual world is not ideal in this respect. There is no doubt that people actually lie, but this does not matter for whether one may sometimes lie. It is commonly accepted that AB-ESSE is not valid for *deontic* modalities. It is much less obvious that it fails to hold for *objective* and *epistemic* possibilities.

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[19] Kripke here seems to talk about objective modality in general, not only metaphysical modality.

I shall use Lewis's example to illustrate a situation in which the accessible objective possibilities do not include the actual world.

Assume the politician says: 'In a situation like mine one can ever only do two things: destroy the evidence or blame communism.'
David responds: 'Well, Nixon in a situation like yours actually ended up with putting the public interest first. Hence there is a third thing one can do.'
The politician may react (i) by insisting: 'One can only do two things! Everything else would be political suicide.'
He may (ii) be more conciliatory: 'Yes, but that would be political suicide.'

Stalnaker's Martini example may be used in the same way:

Alice: 'One can only get Martini in cocktail glasses.'
Bob: 'The man over there has Perrier in his cocktail glass. Thus, one can get Perrier in cocktail glasses.'
Again Alice may (i) dismiss Bob's interference: 'One can only get Martini. The drunk waiter confused the bottles.'
Alternatively, she (ii) may be more conciliatory: 'Yes, but just because the drunk waiter confused the bottles.'

I suggest the following analysis of the politician case: The politician takes the contextually accessible possibilities to be only the career-saving ones. He may be right in doing so. David may express disagreement on the set of accessible possibilities, or he may propose to accommodate a new possibility: putting the public interest first. In the broader but not the narrower context the reasoning via AB-ESSE is permitted. The politician may (i) insist on the set of possibilities he originally had in mind, (ii) correct himself or accommodate the new set.[20]

The Martini example can be interpreted in the same way: Alice takes the accessible possibilities to exclude the actual way the man got his Martini. Bob takes them to include that possibility, or he proposes to accommodate them. Alice may (i) insist, (ii) correct herself or accommodate.

The possibilities in these examples are objective. An epistemic version of the cases is available, featuring contextually relevant epistemic possibilities for what happens in the situations under consideration.

The possibilities considered in the examples may also be construed as deontic (ideal for one's career, abiding by drinking conventions), but they do not have to be construed in that way. The politician may objectively consider what could be done without terminating one's career. Alice may consider what drinks could be obtained correctly.

There are alternatives for reading the cases as described. The politician and Alice may speak imprecisely, as when one says 'The guests came at three' although one of them came at 15.10 h. Yet again, the examples do not have to be read in this way. Moreover, option (i) of simply standing one's ground is not as readily available in cases where the interlocutor corrects an imprecise statement (though see Section. 3.2.3.).

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[20] i.e. accept either that he was wrong from the very beginning, or that he would be wrong in the new context created by accommodation.

When someone replies: 'one guest came at 15.10', one cannot simply repeat: 'the guests came at three'.

In sum, the politician and the Martini example provide evidence that the objective and epistemic possibilities that are accessible in certain contexts do not include the actual way things are. In such a context, AB-ESSE is not valid.

Further evidence may be obtained from the precedents considered.

(2.1.) Theologians may welcome the opportunity of construing miracles as genuinely impossible in a limited context that does not validate AB-ESSE and thus permits that miracles might occur. In such a context, the accessible possibilities that exclude miracles would not include the actual world.

(2.2.) Mauthner's intuition that AB-ESSE is not valid for unlikely possibilities can be given a more thorough reconstruction.

(2.3.) Von Wright's argument from AB-ESSE to the non-trivial $\Diamond P \rightarrow \Diamond\Diamond P$ can be supplemented by further evidence that AB-ESSE sometimes leads to controversial consequences.

(3.2.1.1.) Stalnaker's defective contexts can be accepted as subcases of the principled restrictions of AB-ESSE.

(3.2.1.2.) Demoting amazing actual circumstances from the antecedent worlds relevant to assessing a conditional can be related to the general practice to sometimes demote the actual circumstances from counting as accessible possibilities.

Scientific Contexts I have chosen everyday examples of contextually restricted possibilities for which AB-ESSE might not be valid. Another source of examples may be scientific reasoning. While philosophers in the Quinean tradition have been sceptical as to whether modal reasoning has a place in science, it has more recently been argued that core pieces of science like quantum theory are best construed in terms of objective possibilities [1, 37].

One has to tread very carefully here, as any appeal to objective quantum possibilities faces the problem of *quantum contextuality*. One cannot simply assume that observables have definite values irrespectively of whether they are actually measured. The result may be lack of *counterfactual definiteness* (see [11][21]: according to the Copenhagen interpretation of quantum theory, it does not make sense to speak of measurements one would have obtained if one had measured a conjugate variable instead of one that one actually has measured. Assuming that counterfactuals are statements about objective possibilities, this raises doubts also about the definiteness of these very objective possibilities.

It is not my ambition to discuss the impact of the problem on our conception of physical possibilities. I acknowledge that any appeal to objective possibilities

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[21] Thanks to an anonymous reviewer for alerting me of the problem of quantum contextuality.

in science is subject to the resulting uncertainties. Still the very existence of the debate on counterfactual definiteness supports the claim that objective physical modality does play a role in scientific reasoning. Giving up counterfactual definiteness is only one option of several theoretical moves. An exemplary alternative is to give up locality (see [30]. To assess these options, one already has to reason in terms of objective possibilities, even if the result may be to eventually dismiss them as indefinite. One may reflect on our ways of doing so without already taking stance on quantum contextuality. I shall use this license, pointing out some very general motives for abandoning AB-ESSE. They will have to be reassessed in light of the ongoing debate on quantum contextuality.

It seems a platitude that science aims at cognizing the actual world. Yet often scientists detach from the latter. As it has been noted by Kuhn [19] and others, a well-established theory is not simply given up as falsified when faced with recalcitrant evidence, even when there is strong evidence that substantial statements of the theory are not actually true. There is a huge debate on how scientific theories relate to the actual world, and a correspondingly large variety of options for how to deal with a lack of fit with the actual world. I shall not try to engage with these options. Instead, I want to outline prospects arising from abandoning AB-ESSE in some scientific contexts.

One way of generalizing a commitment to objective possibilities in certain scientific discussions would be to claim that, just as everyday reasoning, scientific reasoning proceeds in communicative contexts which determine sets of relevant possibilities. Then one way of dealing with recalcitrant evidence indicating that the actual world does not conform to a theory is to dismiss the actual world from the contextually relevant worlds to which the theory is intended to apply.

A hint at such a measure is already given by my discussion of counterfactual scepticism. We may treat our folk reasoning that predicts the china plate to break if dropped as a protoscientific theory. We know folk physics to be false and still reason according to it [36], 145–146). The 'laws' of folk physics may be interpreted as necessary with regard to a limited set of relevant possibilities. Actual exceptions to them are discarded as irrelevant.

A further hint in the same direction is given by the phenomenon of idealization. Scientific theories are usually taken to idealize away from some features of the actual world. Idealization has a distinctive normative ring. An ideal world is understood as a world that is best in some respect. AB-ESSE is not valid for deontic modals like 'one must not tell lies'. In a similar vein, one may interpret idealization in scientific reasoning as reasoning within a context of contextually ideal possibilities, which do not include the actual world. One may regard these possibilities as deontic, but our aims being theoretical, there surely is the option to interpret them as objective possibilities. There are different motives for idealization. Again an example is a law that is necessary with regard to the contextually accessible possibilities. We may get simpler and more elegant laws at the price of their not strictly being laws of the actual but only of some nearby worlds.

In sum, abandoning AB-ESSE for contextually accessible possibilities is an option that should be taken seriously in the case of everyday reasoning, but also in the case of scientific reasoning.

3.2.3 Why AB-ESSE Seems Universally Valid

Assuming AB-ESSE is not valid for objective and epistemic possibilities independently of a conversational context,[22] we lack an explanation for why it *prima facie* seems independently valid. Authors like [16], 70, [17], 84) take us to be entitled to reason from P to $\Diamond P$ for epistemic and objective readings of the diamond operator irrespectively of the conversational context. In trying to provide an explanation for this tendency, I draw on an observation which seems to support the context-independent validity of AB-ESSE. Consider the Martini example. I feel a tension in the following sequence uttered in one breath:

> PERRIER: The man obtained Perrier in his cocktail glass. MARTINI: ?One cannot obtain Perrier in cocktail glasses.[23]

One explanation for the appearance of a tension is that PERRIER via AB-ESSE entails the falsity of MARTINI.

I shall highlight a different line of explanation, which is compatible with the invalidity of AB-ESSE for certain contexts. By way of a parallel, consider a non-modal universal quantification:

> PERRIER: The man obtained Perrier in his cocktail glass. EVERY: ?Everyone has Martini in their cocktail glasses.

I feel the same tension as for the modal sequence. The explanation is straightforward. Even if we implicitly restrict the domain of people, the man drinking Perrier cannot be left out once he is made salient.

I observe that the reversal sounds slightly better:

> EVERY: Everyone has Martini in their cocktail glasses. PERRIER: The man obtained Perrier in his cocktail glass.

The same goes for the reverse modalized sequence:

> MARTINI: One cannot obtain Perrier in cocktail glasses. PERRIER: The man obtained Perrier in his cocktail glass.

I suggest that the findings on the modalized and the universally quantified sequence should be explained in the same way. In the case of the universally quantified sequence, there is an implicit domain restriction. At the beginning, the domain is restricted to people at the party who drink Martini in cocktail glasses. However, once the man with Perrier is made salient, he has to be included in the domain of quantification. In the reverse sequence EVERY-PERRIER, the man with Perrier is made salient only after EVERY has been asserted without an effect on the preceding statement.

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[22] i.e. not valid for any normal context.

[23] Perhaps we can get an acceptable reading by interpreting the modal deontologically. If things go as they should, one can only get Martini in cocktail glasses.

In a similar vein, modal statements like MARTINI are implicitly restricted to the contextually accessible possibilities (getting Martini in a cocktail glass). In asserting PERRIER, the way the actual world is with regard to the prejacent of the modal is made explicit: someone obtained Perrier in his cocktail glass. AB-ESSE being valid unless the accessibility of possibilities is restricted, it follows from PERRIER that there is a further possibility in a less restricted domain of possibilities: getting Perrier in one's cocktail glass. This possibility is made salient by PERRIER. Once it is salient, it cannot any longer be excluded from the accessible possibilities. Yet this does not mean that it figured among the contextually accessible possibilities from the very beginning. In the reverse sequence MARTINI-PERRIER, the possibility of getting Perrier is made salient only after MARTINI has been asserted without an effect on the preceding statement.

One may doubt that PERRIER raises to salience the *possibility* of getting Perrier in a cocktail glass over and above the fact that the man *actually* got it as explicitly stated. After all, the possibility follows not trivially but only by AB-ESSE, which I assumed not to be valid in the context at stake. In response, the actual way things are is not just *any* far-fetched possibility. It is a prime candidate for a contextually accessible possibility. Even if AB-ESSE does not hold for any objective and epistemic modal in its context, still something closely related may hold universally. Once the actual way things are is raised to salience, it counts as a contextually accessible possibility. If it has not been contextually accessible up to now, it is made accessible by accommodating a new context. It therefore seems natural that PERRIER alerts us to the possibility of getting Perrier by accident as a candidate for an accessible possibility. An option that remains is to pointedly exclude it as in Alice's response (i) (Section 3.2.2.1.): 'One can't get Perrier in a cocktail glass. The waiter confused the bottles.'.[24]

My discussion of the PERRIER-MARTINI sequence explains why AB-ESSE seems valid context-independently. We normally reason from AB-ESSE by accepting a sequence according to the scheme: it is the case that P; hence it is possible that P. We may accept it because the possibility that P is accessible from the outset, or because it is accommodated while processing the sequence. In such a sequence, the actual truth of P and hence the possibility of P in a less restricted sense is raised to salience. If a modal follows, the possibility of P is a natural candidate for figuring among the possibilities accessible in assessing this modal, even if there are further contextual clues for some implicit restriction of the modal domain.

What follows for the validity of AB-ESSE? Although reasoning by AB-ESSE is valid *whenever* the actual world figures among the contextually accessible possibilities or is accommodated among them, it is not valid *unless* this condition is satisfied. In the case of accommodation, AB-ESSE was not valid in the initial context.

Summarizing, I have outlined exemplary ways for accommodation to explain why we are usually willing to make the transition from P to $\Diamond P$ although AB-ESSE is not always valid for contextually restricted objective or epistemic possibilities. My

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[24] For a comparable requirement of explicitness and its dynamics see Ippolito's [13]account of reverse Sobel sequences.

modest aim was just to rebut the objection that AB-ESSE must be valid regardless of the context as we seem disposed to reason according to AB-ESSE without any reservations.

4 Conclusion

While AB-ESSE is near-universally accepted as a core principle that guides our modal reasoning, I have made a modest suggestion under which circumstances it might fail even for objective and epistemic possibilities, and even outside of specific debates on metaphysics and logics. Given how deeply entrenched the principle is, even such a modest suggestion already courts controversy. Yet we should be prepared to once in a while question even the platitudes that seem most deeply entrenched in our reasoning in order to put them into their proper place.

Declarations

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