Normality

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Abstract

The modality of normality distinguishes states of affairs which are normal from those which are abnormal. Existing work on the modality of normality assumes that it is a restriction of metaphysical modality. In this paper, we argue that this assumption is inappropriate and explore the consequences of abandoning it.

After preliminary discussion (§1), we introduce the dominant framework for reasoning about normality (§2) and argue that it ascribes implausibly strong structural properties to the modality. In its place, we propose a new framework, which avoids this commitment (§§3-5). This account has a number of interesting features, which we explore in both an informal and formal setting. If correct, it implies that the modality of normality occupies a distinctive place in the space of modalities. Before concluding, we consider some of the wider implications of our account (§6), focusing on the role normality has played in epistemic theorizing.

1 Introduction

Normality is commonplace. We routinely distinguish normal weather from hurricanes and droughts; normal prices from bargains and rip-offs; and normal behavior from eccentricity and oddity. Not only do we form judgments about normality with ease, but facts about what is normal serve as a reliable guide to navigating the world. Knowing the normal presentation of a disease can help a doctor to successfully diagnose a patient. Knowing the normal migration patterns of birds can help ornithologists to identify species. And knowing the normal level of rush hour traffic can help a commuter to arrive on time.

Our subject in this paper is the modality of normality. Items of a variety of types can be evaluated for normality. For example, we can readily compare the normality of individuals, kinds and properties. Gerald Ford was more normal, for a president, than Richard Nixon. Weasels are more normal, for mammals, than wombats. And being tall is more normal, for basketball players, than being short. The modality of normality, in contrast, has to do with properties of states of affairs.[1] There may be interesting connections between the properties of individuals, kinds and properties and the modality of normality. However, in what follows, our attention will be focused exclusively on facts about the latter.

English is not particularly well-equipped to report such facts. As observed by Loets (2022), in sentences of the form ⌜ Normally, x would be F⌝, 'normally' does not function as sentential operator, predicating normality of states of affairs, but rather as an adverbial quantifier with the power to bind variables in its scope (Lewis (1975)).[2] In common with other adverbial quantifiers, the quantificational force and domain of the quantifier are highly context sensitive. While we do not wish to rule out that sentences involving 'normally' may sometimes express facts of the kind we are interested in, the relationship between the two is opaque and we will avoid such constructions for present purposes.

Sentences of the form ⌜x being F would be normal⌝ and ⌜x being F would be abnormal⌝ appear better suited in this regard. The former expresses—roughly—that x being F is compatible with with things being normal. However, it does not entail that x not being F is incompatible with things being normal. For example, someone can coherently hold that it would be normal for a fair coin to land heads and, equally, that it would be normal for it to land tails. In this respect, it appears to denote an existential modality, akin to that denoted by adverbs such as 'possible' and 'permissible'. The latter expresses—again, roughly—that x being F is incompatible with things being normal. In this respect, it appears to denote a negative universal modality, akin to that denoted by adverbs such as 'impossible' and 'impermissible'. In what follows we will restrict ourselves to constructions like these, along with closely related sentences of the form ⌜It would be normal [/abnormal] for x to be F⌝ in providing informal glosses of our observations. Notably, English does not appear to have a dedicated sentential operator denoting the corresponding positive universal modality akin to that denoted by 'necessary' or 'obligatory'. It is nevertheless possible to express such a property, either as the dual of the property expressed by 'normal' or the internal negation of the property expressed by 'abnormal'. While this adds an additional layer of complexity, it

[1] We will use 'state of affairs' to refer to what others sometimes use 'proposition' to refer to. We don't intend anything to hang on the choice of terminology; we will simply use it to refer to 0-arity properties.

[2] As evidence of this, Loets (2022) notes the contrast between (†.a-b):

(†) a. Normally, I would be at work.

b. ?? Normally, I would be at work at on 6th April, 2023.

On the assumption that 'normally' is an adverbial quantifier, this contrast is attributable to the general infelicity of vacuous quantification.

provides the most faithful way of articulating claims about our target modality.[3]

Williamson (2016, 2017) distinguishes between objective modalities (including metaphysical, nomic and practical modalities) and non-objective modalities (including deontic, epistemic and teleological modalities). Where metaphysical modality is identified with the broadest objective modality, we can understand each of the objective modalities as restrictions of metaphysical modality by different (and potentially contingent) conditions (Hale & Leech (2017); Strohminger & Yli-Vakkuri (2019); Roberts (2020)).[4] Non-objective modalities are then distinguished from the objective modalities by their failure to fit this model.

A central concern of this paper is where the modality of normality belongs in this picture. By considering its structural properties, we will aim to situate it within the space of modalities. Our conclusion will be that normality occupies an interesting location outside the objective modalities. While not an objective modality itself, it is more closely related to them than other, familiar non-objective modalities are.

The modality of normality has been put to work in a variety of ways and in a variety of areas: in epistemology, giving theories of justification (Goldman (1986); Leplin (2009); Smith (2010, 2013, 2016); Goodman (2013)) and knowledge (Greco (2014); Goodman & Salow (2018, 2021)); in philosophy of language, giving theories natural representation (Stampe (1977); Dretske (1981, 1988); Millikan (1984, 1989); Stalnaker (1999)) and generics (Asher & Morreau (1995); Asher & Pelletier (1997, 2012); Eckardt (1999); Nickel (2008, 2016)); and in philosophy of science, giving theories of ceteris paribus laws (Pietroski & Rey (1995); Schurz (2001a,b, 2002); Spohn (2002); Smith (2007)) and biological function (Boorse (1977); Millikan (1984, 1989); Wachbroit (1994)). Getting clear on its place within the space of modalities is important if we are to evaluate the success of these applications. In order to know what a theory which makes appeal to normality entails, we need to know which inferences involving it are valid. Our proposal, below, takes the logic of normality to be significantly weaker than many of these theorists assume. This need not be bad news, however. In §6 we show that our proposal has promising implications for the prospect of giving a theory of justification in terms of normality. Implications for other theories will need to proceed on a case-by-case basis.

[3] Where the matrix clause occurs with indicative mood (e.g., 'My being at work is abnormal'), the sentence has a reading which implies that the prejacent state of affairs (e.g. my being at work) obtains. We think that this entailment can be attributed to the role of indicative mood in marking realis environments in English and that, as a result, it should be treated separately from the target modality. Importantly, no prejacent entailing reading is available in sentences which lack indicative mood. For this reason, we limit ourselves to examples with subjunctive matrix clauses (e.g., 'My being at work would be abnormal'). We are grateful to an anonymous referee at *The Journal of Philosophy* for highlighting the role of mood in claims about what is normal.

[4] More carefully, (where $\Box$ is the unique broadest objective modality) O_i is an objective modality iff there is some condition R_i such that: (i) $\Box\exists! q : R_i(q)$ and (ii) $\Box(O_i p \equiv \exists q : R_i(q) \wedge \Box(q \rightarrow p))$.

We start, in §2, by introducing the prevailing framework for theorizing about normality. This framework, we argue, generates implausibly strong commitments. Giving up these commitments requires denying that the modality of normality is an objective modality. In §3 we propose an alternative and show how it avoids the unwanted commitments. §4 supplements our informal proposal with a formal model for a first-order modal language, and investigates in more detail the predictions it makes. §5 considers objections to the proposal made in §§3-4. Finally, §6 consider the implications of our argument for the growing literature on normality and epistemology. §7 concludes.

2 The Standard Model

Where ϕ is a state of affairs, we'll let $\ulcorner \blacksquare\phi \urcorner$ express that $\neg\phi$ would be abnormal. That is, the operator denotes the property instantiated by a state of affairs iff it would not be normal for it to fail to obtain. Though details differ, there is substantial consensus over the basic properties of this operator.

According to the standard model of normality—which we will call the Standard Model—possible worlds can be ordered according to how normal they are (either absolutely, or relative to an index world). At all worlds, $\blacksquare\phi$ obtains iff ϕ obtains at all worlds for which no world is strictly more normal.[5]

The Standard Model is assumed throughout the majority of existing work on normality (Delgrande (1987); Boutilier (1994a,b); Asher & Morreau (1995); Asher & Pelletier (1997, 2012); Eckardt (1999); Smith (2007); Booth *et al.* (2012) ; see Loets (2022), in particular, for a comprehensive overview of the Standard Model). As a result, while such theories differ in the conditions they impose on the relation of comparative normality, they share a common commitment to many of the structural properties of the modality it determines.

Importantly, $\blacksquare$ is an objective modality according to the Standard Model. Specifically, it is the result of restricting metaphysical modality by the (presumably contingent) condition of being maximally normal. As shown by Roberts (2020), the objective modalities, understood as restrictions of metaphysical modality, are all and only those with a logic characterized by some accessibility relation in a Kripke semantics. For instance, in the case of the modality of normality (according to the

[5] This gloss assumes that domain of worlds ordered by comparative normality has one or more maximal members. This is assumption is helpful, at least as an idealization. Where it is abandoned, (as in, e.g., Boutilier (1994b,a)), the Standard Model must be amended so that $\blacksquare\phi$ obtains at a world iff at every world w_1 at least as normal, there is some world w_2 at least as normal as w_1, and ϕ obtains at all worlds at least as normal as w_2. For further discussion of how this bears on the question of whether normality is an objective modality, see footnote 6.

Standard Model), this would be the accessibility relation which maps each world to the set of worlds which are maximally normal by its lights.

A core property of objective modalities is that they are agglomerative (Williamson (2016)). If ϕ and ψ are necessary, in some objective modality, then so too is $\phi \wedge \psi$. Stated for normality:

Agglomeration $\blacksquare\phi, \blacksquare\psi \models \blacksquare(\phi \wedge \psi)$

In our preferred locution for talking about normality, **Agglomeration** says that if it would be abnormal for x to be F and it would be abnormal for y to be G, then it would be abnormal for x to be F or y to be G. Or, equivalently, if it would be normal for x to be F or y to be G, then it would either be normal for x to be F or it would be normal for y to be G.

Agglomeration follows directly from the fact that the Standard Model is committed to understanding the modality of normality as a restriction of metaphysical modality. If ϕ and ψ obtain at every maximally normal world, then $\phi \wedge \psi$ will obtain at every maximally normal world.[6] Where **Agglomeration** has received explicit discussion (in particular, Boutilier (1994a, 112-113), Thompson (2008, 69-70), Smith (2010, 15-16), Smith (2016, §4), Smith (2016), Smith (2017) Smith (2018, 3859-3862)), it has been treated as a desirable consequence of the Standard Model. And it is perhaps understandable why. From the fact that it would be abnormal for Ana to come to the party and that it would be abnormal for Bob to come to the party, it is certainly somewhat tempting to infer that it would be abnormal for either Ana or Bob to come to the party.

Nevertheless, we think that **Agglomeration** fails. In fact, we think that the kinds of counter-instances which demonstrate its failure are easy to find. Consider a collection of 100 biased coins, each of which has a $\frac{19}{20}$ chance of landing heads on any given flip. For each of the biased coins, it would be abnormal for that coin to land tails on a given flip.[7] Now suppose that all 100 coins are flipped simultaneously. It would not be abnormal for at least one of the coins to land tails.[8] Indeed, something stronger appears true. For no coin to land tails would be abnormal. Afterall, the chance of this occurring is approximately $\frac{59}{10{,}000}$.

[6] **Agglomeration** continues to hold in the absence of the assumption that the ordering of worlds for comparative normality has a maximal member. However, its infinitary variant will fail.

Infinitary Agglomeration $\bigwedge\{\blacksquare\phi | \phi \in \Gamma\} \models \blacksquare(\bigwedge\Gamma)$

The question of whether a modality which satisfied **Agglomeration** but not **Infinitary Agglomeration** should be classified as an objective is vexed and beyond the scope of our paper (but see Bacon & Zeng (forthcoming, 9)). Observe that, if some modalities which fail to satisfy **Infinitary Agglomeration** are categorized as objective, the gloss on what counts as a restriction in §1 will need to be revised.

[7] If you don't like this, lower the chance of the coin landing tails as much as you want.

[8] If you don't like this, increase the number of coins as much as you want.

These two observations, when combined, provide us with an immediate counter-example to **Agglomeration**. For some coins to land tails just is for the first coin to land tails or the second coin to land tails or the third coin... and so on. But **Agglomeration** says that if it would not be abnormal for this disjunctive state to obtain, then, for some coin or other, it would not be abnormal that coin to land tails.[9]

Some may be suspicious about cases of the kind above. One possible source of worry is that coin flips are chancy in some way that precludes attributions of normality.[10] We do not share this worry. Nevertheless, this sort of chanciness is inessential to the basic observation.

For a person born in the US this year, it would be abnormal for that person to die before reaching the age of 30. Yet, it would not be abnormal for someone born in the US this year to die before reaching the age of 30.[11] Indeed, something stronger appears true. For no-one born in the US this year to die in the next 30 years would be (highly) abnormal. Again, these observations, when combined, provide us with a counter-example to **Agglomeration**. For someone born in the US this year to die before the age of 30 is just for the youngest person born in the US this year to die before 30 or the second youngest or the third youngest... and so on.

The kinds of cases which motivate rejecting **Agglomeration** are widespread and easy to generate.[12] However, accommodating such cases requires us to make sub-

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[9]Here, we are tacitly assuming that if ϕ and ψ are logically equivalent, ϕ would be abnormal iff ψ would be abnormal. This assumption is strictly speaking eliminable; the same argument could be made by observing that: (i) it would be abnormal for the first coin not to land heads, abnormal for the second coin not to land heads, abnormal for the third coin not to land heads,..., but (ii) it would not be abnormal for it not to be the case that: the first coin lands heads and the second coin lands heads and the third coin lands heads, ... However, we find the principle that $\blacksquare$ is closed under logical equivalence highly plausible (and it is a valid meta-theorem of our system in §4 (Fact 3)).

[10]See Smith (2010, 15) and (2017) for an expression of this kind of worry.

[11]For reference, the SSA puts the chance of reaching the age of 30 at $\sim$ 97% for men, and $\sim$99% for women (https://www.ssa.gov/oact/STATS/table4c6.html)

[12]Some have claimed that there are two category of normality: a statistical notion and a qualitative notion (Wachbroit (1994); Schurz (2001b, 2002, 2004); Smith (2010, 2016); Loets (2022)). Irrespective of what one thinks of this proposal, it will not offer an explanation of the current cases which would allow one to preserve **Agglomeration** for one or either of the notions. There is just no sense of normality on which it would be normal for every healthy person born in the US this year to survive the next 30 years.

Some authors distinguish a functional notion of normality as a sub-category of the qualitative notion. We think this will plausibly admit counter-examples too. Imagine a firm produces orange crushers. To maximize profits the firm designs the orange crushers with built-in obsolescence—they are designed to have, on any given crush, a small but non-zero chance of catastrophic failure. Consider all the orange crushers produced by the firm. On any sensible characterization of the functional notion of normality, for each orange crusher, it would be abnormal for that crusher to fail to crush its next orange. However, it would not be abnormal for some crusher or other to fail stantial revisions to the way we think about normality. **Agglomeration** is a direct consequence of identifying normality with the property of obtaining across all maximal worlds, for some proposed ordering of comparative normality. Denying **Agglomeration** amounts to denying that $\blacksquare$ has a normal modal logic.[13] Since any modality which can be characterized by an accessibility relation in a Kripke semantics has a normal modal logic, it therefore also amounts to denying that $\blacksquare$ is an objective modality.

Vindicating judgments about the kinds of cases which motivate **Agglomeration** failure will require some departure from the Standard Model. Those who wish to retain the Standard Model could try to explain our judgments about these cases without giving up **Agglomeration**. The most obvious way to do this would be by appealing to the context sensitivity of the language we use to talk about normality (something along these lines is proposed in recent work by Goodman & Salow (2021)).

It is generally assumed by proponents of the Standard Model that the property picked out by predicates like 'normal' and 'abnormal' can vary according to the context in which they are used (Loets (2022, §4.2)). Whether someone dying at 30 can be correctly described using 'normal' will vary according to whether we are talking the 21st century or the 14th century. Whether its being 40°F in winter can be correctly described using 'abnormal' will vary according to whether we are talking LA or NYC.

For context sensitivity to explain why it appears to us that **Agglomeration** can fail, it is not sufficient to posit that different orderings over worlds are elicited in different contexts of utterance. We also need a mechanism which would explain why specific utterances are only ever evaluated relative to contexts with the kind of ordering which would yield the judgments we observe. The proponent of this strategy needs to provide some mechanism which would explain why, in any context in which someone utters ⌜It would be abnormal for the nth coin to land tails⌝, in no maximally normal worlds in the contextually relevant order does the nth coin land tails. Simultaneously, this mechanism needs to explain why, in any context in which someone utters 'It would be abnormal for every coin to land tails', all maximally normal worlds in the contextually relevant ordering contain at least one coin which lands tails.

As far as we can see, the only plausible way of doing this is to posit a connection between what ordering is contextually relevant and what objects are mentioned in an utterance. According to this kind of picture, by mentioning the nth coin, an

to crush its next orange.

[13] That is, a logic satisfying Necessitation, Modus Ponens and the K axiom.

ordering is made salient in which any worlds in which the nth coin lands tails is at least somewhat abnormal. Meanwhile, in quantifying over all the coins, an ordering must be made salient which counts as maximally normal at least some worlds in which some coin lands tails. This strategy quickly runs into difficulties however. Judgments about quantified sentences are sensitive to the scope of the quantifier. Although we are inclined to reject (1a), we are inclined to accept (1b), the variant in which the quantifier takes wide scope . Similarly, we are inclined to accept the conjunctive claim (2)—indeed, it appears to simply be a succinct way of describing the kind of case in which we have been claiming **Agglomeration** fails.

(1) a. It would be abnormal for any coin (whatsoever) to land tails.
b. For each coin, it would be abnormal for it to land tails.

(2) It would not be abnormal for some coin or other to land tails but for each coin, it would be abnormal for that coin to land tails.

It is far from clear that the approach has the resources to explain this kind of sensitivity to facts about scope. To account for our judgments about the conjunctive claim, the proponent of the standard model must posit that the left- and right-hand conjuncts are evaluated relative to different contexts.[14] However, even if we permit this kind of mid-sentence shift, it is unclear that the framework has the resources to explain why a change in quantifier scope would be associated with differences in ordering.

First, suppose we grant that which ordering is salient depends on which objects are mentioned. Suppose, additionally, we grant that in quantifying over a domain of individuals, a speaker mentions each object in that domain. The problem the proponent of the standard model faces is that the same objects are quantified over in the wide scope and narrow scope sentences.[15] Accordingly, it is hard to see how the difference in quantifier scope could lead to differences in ordering in the way required. Of course, it could simply be stipulated that the two sentences elicit

[14]Standard linguistic tests for such shifts raise some worries for the prospects of this approach. Embedding clauses under certain subordinating expression, such as 'although', (rather than a coordinating expression, like 'and') is canonically taken to prevent a mid-sentence shift in context (Kroch (1974); von Fintel & Gillies (2021)). However, the availability of a true reading of (¶) does not disappear.

(¶) Although it would not be abnormal for some coin to land tails, for each coin it would be abnormal for that coin to land tails.

[15]The argument is not that we should accept the Barcan formulas for ■. Rather it is the weaker claim that, in this specific case, the scope of the quantifier will not make a difference to the domain of quantification.

different orderings. However, it is unclear at this point to what extent they would count as offering an explanation of our judgments.

Second, in order to predict that (1b) is true, it must be possible to occupy a context in which the relevant ordering ranks only worlds in which every coin lands heads as maximally normal. But if it is sometimes possible to occupy a context in which this ordering is relevant, it would be surprising if it was impossible to ever get into such a context when evaluating (1a). That is, the there must be an extremely robust connection between which sentences are uttered and which orders are relevant, which makes the ordering unavailable whenever evaluating (1a), despite not being unavailable *tout court*. Even if the context can be influenced by uttering a sentence, this kind of extremely robust connection between the two strikes us as highly implausible. The problem is particularly acute if, as argued above, the proponent of the standard model lacks an explanation of why certain sentences are associated with certain orderings in the first place.

Finally, it is worth noting that the contextualist is offering an error theory, which aims to explain away our divergent judgments about (1a-b) by positing unnoticed shifts in context. Insofar as we would like a theory which vindicates our pre-theoretic judgments, we have reason to look for an alternative.

§§3-4 offer one such alternative proposal about what makes a state of affairs abnormal, one which vindicates the apparent failures of **Agglomeration**. In doing so, it departs from the Standard Model in a number of ways.

3 A Theory of Normality

Our theory combines two core ideas. First, that normality is determined relative to one or more subject matters—sets of mutually exclusive states of affairs. What is normal is what obtains across the most normal states in the relevant subject matters. Second, that the comparative normality of states of affairs is proportional to their probability. We'll introduce each of these ideas separately in §3.1 and §3.2.

States of affairs, as we will think about them, are the kinds of things which obtain (or fail to obtain) at worlds. Each state of affairs partially settles how things are at the worlds at which it obtains and the same state of affairs can obtain at multiple different worlds. Understood this way, states of affairs can be ordered for strength. Where one state of affairs obtains at every world at which a second obtains, we will say that the second necessitates first. For example, a die landing 2 necessitates the die landing prime, but not *vice versa*. Correspondingly, we'll say that one state of affairs is at least as strong as another iff the first necessitates everything necessitated by the second. We will assume that for each world there is some maximally strong non-absurd state of affairs which obtains at that world and at no other.

3.1 Subject Matters

Imagine 100 fair coins are tossed simultaneously. Some outcomes would be abnormal, such as all the coins landing tails. No outcome in which $\frac{1}{2}$ of the coins landed heads would be abnormal, however. But suppose, now, that exactly 50% of the coins are painted red on the heads side, with the other 50% being painted red on the tails side. It's hard to resist accepting that it would be abnormal for all 100 coins to land with their red face up. Yet for all 100 coins to land red face up is for some outcome in which $\frac{1}{2}$ of the coins to land heads to obtain.

Similar judgments can be elicited across a wide variety of cases. It would not be abnormal for any six of my friends to be ill (assuming I have sufficiently many friends). However, if I decide to invite six of my friends over for dinner, it would be abnormal for those six people to be ill. Or another: there is no card in a 52 card deck which it would be abnormal to draw. However, if you are first asked to name a card, it would be at least somewhat abnormal for someone to draw that card at random from the deck.[16]

Here is one conclusion that could be drawn from these cases: in determining whether ϕ is abnormal, it matters how the space of possibilities is divided.[17] Depending on what subject matter is being considered, different ways of dividing up possibilities will be made relevant. We can think of a subject matter as corresponding to a set of mutually exclusive and jointly exhaustive states of affairs (Lewis (1988a,b); Yablo (2014); Yalcin (2011); Plebani & Spolaore (2021)). Intuitively, each subject matter corresponds to a question about how things are in some particular respect ; a state of affairs is included in a subject matter iff it fully settles how things are in that respect and there is no strictly weaker state which also fully settles how things are in that respect . Characterized this way, a subject matter determines a partition on the space of possible worlds. Two worlds are cell-mates iff some state

[16]Here is another kind of case. Suppose a fair coin lands heads 99 times in a row. It would not be abnormal for the 100th flip to land heads. However, it would be abnormal for all 100 flips to land heads. Yet the former state of affairs will obtain iff the latter obtains. We think that insofar as this pattern can be explained by difference in subject matter associated with the two states, this provides some further (defeasible) evidence in favor of a subject matter sensitive approach. We are grateful to a a referee for raising this kind of case.

[17]We don't want to overstate our argument here—other explanations of these judgments could be offered. However, such explanations would need to hold that, e.g., by painting some of the coins red, we can change the way it would be normal for them to land. While we do think that it is contingent what is normal, we think this level of sensitivity to non-modal matters would make the modality of normality implausibly unstable. Ultimately, while we think that while the kinds of cases we discuss lend some initial support to the idea that normality-talk is subject matter sensitive, the role of subject matters in explaining **Agglomeration** failure in our framework is at least as important to us.

in the subject matter obtains at both. Since the states are mutually exclusive (i.e., necessarily fail to co-obtain), cells will be disjoint. Since they are jointly exhaustive (i.e., necessarily one of the states obtains), each world will be a member of some cell. Our guiding idea is that, in evaluating ϕ for normality, we consider what is the case across the most normal states in subject matters which ϕ is associated with.[18] Here is a first pass (to be supplemented below):

Normality $\blacksquare\phi$ iff ϕ is necessitated by each of the most normal states of affairs in each subject matter ϕ is associated with.

To understand what **Normality** says, we obviously need to supplement it with an account of what it is for a state of affairs to be associated with a subject matter.

Say that a state of affairs ϕ is about a subject matter iff there is some subset of the subject matter such that, necessarily, ϕ obtains iff some member of that set obtains. Equivalently, ϕ is about a subject matter iff the set of worlds at which it obtains is the union of some set of cells of the partition the subject matter induces. Informally, we can think of the states of affairs about a subject matter as partial answers to the question of how things are in the relevant respect.

In order to be associated with a subject matter, a state of affairs must be about it. However, not every subject matter which a state of affairs is about will be associated with it. We propose a distinction between subject matters which are relevant and those which are not. In order to be associated with a state of affairs, a subject matter must be relevant. Being relevant (as we intend it) is not an intrinsic property of subject matters; rather different subject matters will be relevant at different contexts. Our idea is that, in a given context, normality talk expresses the property of being (ab)normal relative to the relevant subject matters in that context.[19] As a result, across contexts the property picked out in normality ascriptions will co-vary with which subject matters are relevant.

[18] In recent work, Goodman & Salow (2021) also suggest relativizing normality to a contextually supplied partition. Crucially, the two proposals differ in whether the subject matters considered in determining facts about normality vary according to the state of affairs being evaluated. As a result, while **Agglomeration** fails in our proposal, it remains valid in Goodman and Salow's.

[19] What makes a subject matter relevant? One option is to take relevance to be connected to salient questions in a conversation. However, care is needed. We think there is a general expectation that, if possible, claims are evaluated relative to a context in which they are neither trivially true nor trivially false. Yet in many conversations, this condition will not be able to be met if only the (unique) QUD is relevant. Many normality ascriptions will fail to have prejacents associated with the QUD.

Many theorists posit not a single QUD but a 'stack' of questions, ordered by salience (Roberts (1996, 2012); Isaacs & Rawlins (2008); Farkas & Bruce (2010); Agha & Warstadt (2020)). This fits better with our picture. For example, we could take the set of relevant subject matters to comprise, for each claim embedded under $\blacksquare$ in an argument, the top-most question in the stack which that claim is about. (Other alternatives are possible—we offer this primarily for illustrative purposes).

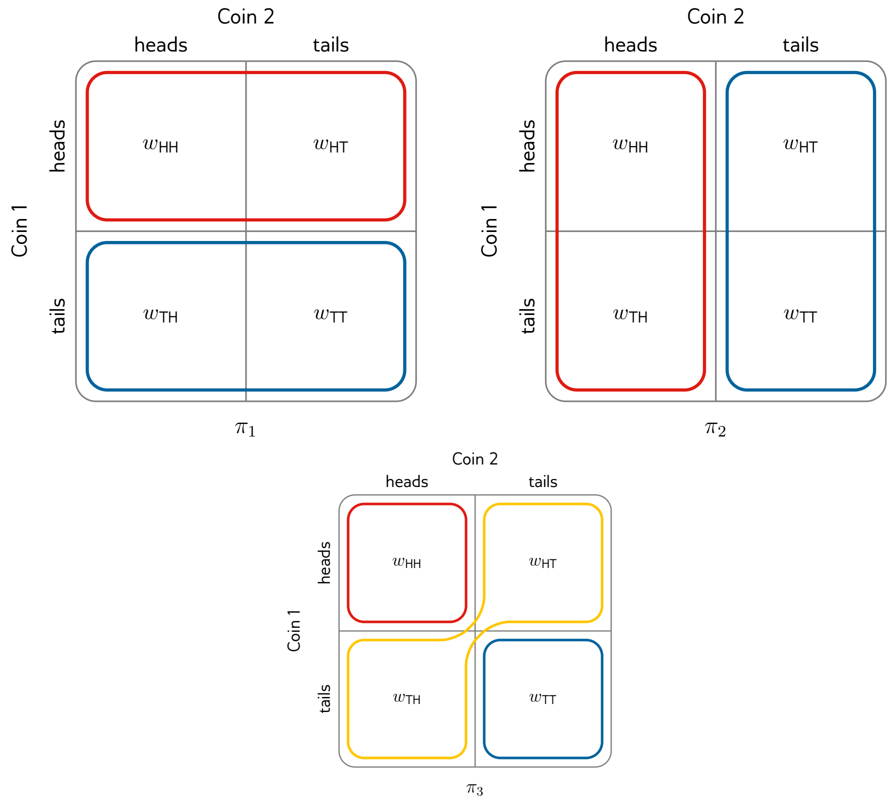

Figure 1: A four world model.

Association $\quad \pi$ is associated with ϕ iff $\begin{cases} \text{(i)} & \phi \text{ is about } \pi\text{; and} \\ \text{(ii)} & \pi \text{ is relevant.} \end{cases}$

To see how **Normality** and **Association** can allow for failures of **Agglomeration**, it suffices to observe that the subject matters associated with a conjunction need not overlap with any of the subject matters associated with its conjuncts.

For a simple example, consider the four possible ways two coins could land. Different subject matters will divide up these possibilities in different ways. For instance, take the following three subject matters:

π_1: `How did coin 1 land?`

π_2: `How did coin 2 land?`

π_3: `How many coins landed heads?`

Where each shaded region corresponds to a different state of affairs, each partition in

Figure 1 corresponds to a different subject matter. Thus, π_1 and π_2 are the subject matters which distinguish between possibilities based on how the first and second coins land, respectively; in contrast, π_3 is the subject matter which distinguishes between possibilities based on what proportion of the coins land heads (but not on how any particular coin lands).

Suppose that all and only these three subject matters are relevant.Then the states of affairs of the first and second coins landing heads will be uniquely associated with π_1 and π_2, respectively. By **Normality**, then, it would be abnormal for the first coin not to land heads (i.e., to land tails) iff the state of affairs corresponding to the red region in π_1 is more normal than the state of affairs corresponding to the blue region. The same goes, *mutatis mutandis*, for the second coin.

The state of affairs of both coins landing heads, in contrast, will be uniquely associated with π_3. Accordingly, by **Normality**, it would be abnormal for both coins not to land heads (i.e., for some coin to land tails) iff the state of affairs corresponding to the red region in π_1 is more normal than the states of affairs corresponding to the yellow region and the blue region. Yet, for all we have said so far, which states are most normal in π_1 and π_2 fails to impose any requirements on which states are most normal in π_3. Accordingly, absent further constraints on comparative, **Normality** and **Association** will be compatible with failures of **Agglomeration**.

These observations generalize to more complicated cases, such as our biased coins example. It is relatively natural to think that, within our setup, it will be relevant how each individual coins lands and also what proportion of coins land heads and land tails.

With this in mind, for $1 \leq n \leq 100$, let $\hat{\pi}_n$ be the subject matter comprising the state of affairs of the nth coin landing heads and the state of affairs of the nth coin landing tails. Intuitively, $\hat{\pi}_n$ is the subject matter `How did the nth coin land?`. Let $\hat{\pi}_{\%}$ be the subject matter comprising, for each $0 \leq k \leq 100$, the state of affairs of exactly $\frac{k}{100}$ coins landing heads. Intuitively, $\hat{\pi}_{\%}$ is the subject matter `How many coins landed heads (exactly)?`

Wherever $\hat{\pi}_1 - \hat{\pi}_{100}$ and $\hat{\pi}_{\%}$ exhaust the relevant subject matters, failures of agglomeration of the kind we discussed above will be possible. For $1 \leq n \leq 100$, the state of affairs of the nth coin landing heads will be associated with $\hat{\pi}_n$. In contrast, the state of affairs of all the coins landing heads will be associated with $\hat{\pi}_{\%}$. Yet nothing we have said so far requires that, if for any n, the nth coin landing heads would be more normal than the nth coin landing tails, then for any for $k \geq 1$, it would be more normal for all the coins to land heads than for exactly $\frac{k}{100}$ to land tails.

We do not want to claim that it is impossible to reach a context in which subject matters other than $\hat{\pi}_1, ..., \hat{\pi}_{100}$, and $\hat{\pi}_{\%}$ are relevant—only that in many easily accessible contexts, these will be natural subject matters to consider. Our aim is to vindicate the judgment that **Agglomeration** admits of counter-examples, rather than show that counter-examples arise in every context.

For example, let $\hat{\pi}_{max}$ be the subject matter comprising, for each possible combination of flip outcomes, the state of affairs of the coins landing in that combination. Intuitively $\hat{\pi}_{max}$ is the subject matter `How did each coin land?`. We think that it may well be possible to access a context in which $\hat{\pi}_{max}$ is relevant. That's because, correspondingly, we think that it is sometimes possible to access the judgment that, for each biased coin, it would be normal for that coin to land tails. This judgment will be accurate in any context where $\hat{\pi}_{max}$ is relevant and, for each coin, there is some member of $\hat{\pi}_{max}$ in which that coin lands tails which is among the most normal.[20] In such a context, the biased coin-flipping case would not be expected to generate failures of **Agglomeration**.

Note that we don't want to overstate the availability of this judgment. In general, we find it much easier to access the judgment that it would be abnormal for a very biased coin to land tails. On our account, this would reflect a difference in the availability of contexts in which the respective subject matters are relevant.

Predicting that **Agglomeration** can fail in the kinds of cases which motivated its rejection is not the same as predicting that it does fail in those cases. In order to do the latter, our proposal needs to be supplemented with a substantive account of what makes one state of affairs more normal than another. This is the focus of the next subsection.

3.2 Probability

Comparing the normality of entire worlds is complicated. Any order over worlds will inevitably need to settle trade-offs between different dimensions along which worlds can be abnormal. While such questions may not pose an insurmountable challenge for the proponent of the Standard Model, we would be happier not to have to adjudicate them.

Comparing the normality of states of affairs is, in many instances, comparatively simple. Two dice landing with a total of 12 is less normal than two dice landing with a total of 7; an American family having 2 children is more normal than their

[20] Crucially, this will arise given our account of comparative normality in §3.2 even given an *extremely* low threshold (i.e., $t > 0.00592$). In general, we think that it is extremely hard to access a context which permits the most normal states (take collectively) to have a probability very close to 0. Accordingly, it will be extremely hard to access a context in which the only state among the most normal in $\hat{\pi}_{max}$ is the state in which every coin lands heads.

having $2 + n$ children (for all $n \geq 1$); the closer a person's temperature to 37°C, the more normal; and so on.[21]

We propose the following principle as a simple gloss on what it is for a state to be among the most normal in a subject matter.[22]

Probability ϕ is among the most normal states in π iff the probability of being in a state more probable than ϕ is sufficiently low.

Probability says that for a state of affairs to be among the most normal in a subject matter, the sum of the probabilities of states which are (strictly) more probable can't exceed some relevant threshold. Put another way: for ϕ to be among the most normal states, it must be quite improbable that a more probable state of affairs would obtain. **Probability** is motivated by the thought that the comparative normality of states of affairs (relative to that subject matter) is determined by their comparative probability. It implies that, where the states of affairs in a subject matter are ordered by their probability, the most normal states will be some upward closed subset of this order. Or, put another way, for $\phi, \psi \in \pi$: if ϕ is no more probable than ψ, then ϕ is among the most normal states in π only if ϕ is.[23] [24]

It is vague what it takes for the probability of a set of states to be sufficiently low. So, by **Probability**, it is vague what it takes for a state of affairs to be more among the most normal. This is as we would expect. Since we are primarily interested in structural features of normality, vagueness regarding comparative normality will not present an obstacle to developing our account. We assume only that there will be some threshold $t \geq 1$ such ϕ is much less probable than ψ iff the probability of ψ divided by the probability of ϕ is (strictly) greater than t. We allow that the exact value of this threshold may be unknowable and dependent on the context in which we are situated. For any resolution of what it takes to be much less probable, however the structural properties of the resulting order over states of affairs will

[21] Crucially, where ϕ is more normal than ψ, it does not follow that, for any χ, $\phi \wedge \chi$ will be more normal than $\psi \wedge \chi$. Someone having septicemia and a temperature of 37°C may well be less normal than their having septicemia and a temperature of 42°C.

[22] See Goodman & Salow (2021) for a related proposal which also proposes to reduce comparative normality to comparative probability.

[23] As this way of stating it brings out, our characterization of the most normal states in a subject matter is closely related to the notion of cogent belief in Holguín (2022) and Dorst & Mandelkern (2023). This is not accidental. In particular, we think that this connection lends additional appeal to an account of justification in terms of normality, as offered in §6.

[24] This does not mean that, in general, comparative normality can be understood as a simple matter of comparative probability. On our view, even if ϕ and ψ are associated with precisely the same subject matters, it may be that $\blacksquare\phi$ and $\neg\blacksquare\psi$, despite ϕ being strictly less probable than ψ. Nevertheless, we do think that if our proposal is correct, this would give us reason to expect probability to have some role to play in the correct account of comparative normality.

remain the same.

What kind of probability measure does **Probability** appeal to? Here, we want to remain as neutral as possible. There is, we claim, a pre-theoretical but respectable objective probability measure which is invoked in claims about the likelihood of a pair of dice landing a certain way, a family having a given number of children or your having a certain temperature. Whatever that measure is, it is the measure which is relevant to the comparative normality of states of affairs. [25] (NB: The target measure would appear to be well-characterized by a propensity interpretation, according to which, e.g., the probability of a die landing a certain way is proportional to the degree to which it is disposed to be land that way (Popper (1957, 1959, 1990); Giere (1973); Fetzer (1982, 1983); Gillies (2000, 2016)). While we are sympathetic to the prospects of this kind of gloss on the relevant measure, **Probability** should not be taken to rest on the success of any particular version of propensity theory. Rather, it appeals directly to the judgments which such theories aim to capture.)[26]

We are now in a position to see what predictions **Normality** and **Probability** make about our original case of **Agglomeration** failure when combined. In our case, the probability of any particular biased coin landing heads is 19 times the probability of its landing tails. Accordingly, assuming that the relevant threshold for being much less probable is lower than 19, the former will be more normal than the latter. In contrast, there is some $k > 0$ such that the probability of all 100 coins landing heads is lower than the probability of exactly k coins landing tails.Accordingly, on any way of fixing the relevant threshold, the latter will be at least as normal as the former. It follows that if the relevant subject matters are as

[25]To clarify the target notion, it may be helpful to consider a case in which it comes apart from some familiar probability measures. Imagine a world comprising 1000 balls. 999 of the balls are eternally red while the 1 remaining ball is eternally black. Suppose, further, that while it is nomologically necessary that the ratio of red to black balls is 999:1, for each ball it is nomologically contingent whether that ball is red or black. Assuming that the balls are inert and occupy their locations necessarily, there will be 1,000 nomologically possible ways that the world could be, varying only in which ball is red. There is a clear sense in which, for each ball, the probability of that ball being black is .001. This is not the ball's subjective likelihood of being black—it does not vary according to what information any agent hypothetically acquires about the ball. And, for the same reason, it also is not the evidential likelihood of it being black. Nor is it the chance of its being black—for any ball, the chance of it being black is either 1 or 0.

[26]Given our setup, failures of the 4 axiom will require that a probability distribution can assign itself a non-zero likelihood of failing to obtain. In fact, we think that it is possible to find examples like this within the propensity interpretation of objective probability. Imagine a setup in which balls are drawn from one of two urns (with replacement). Urn 1 contains 80 red balls and 20 black balls; urn 2 contains 95 red balls and 5 black balls. The first ball is drawn from Urn 1. For any $n \geq 1$, if the nth ball drawn is black, then the $n + 1$th ball is taken from Urn 2; otherwise, the $n + 1$th ball is drawn from urn 1. Given this setup, there is a .2 propensity for there to be a .95 propensity for the second ball drawn to be red and a .8 propensity for there to be a .8 propensity for the second ball drawn to be red.

described in the previous section, for any $1 \leq n \leq 100$, it would be abnormal for the nth coin to land tails. However, it would not be abnormal for some coin to land tails (since, in the associated subject matter, there are guaranteed to be maximally normal states which entail that not all the coins land heads).

The point generalizes to our other, qualitative examples. There is some $n \geq 30$ such that, for any $k \leq 30$, the probability that someone born in the US this year will die at k years old is much lower than the probability that they will die at n years old. However, for every pattern of mortality over the entire population of people born in the US this year in which none die before the age of 30, there is a much more probable pattern of mortality in which at least one person dies before the age of 30.

4 A Non-Standard Model of Normality

In this section, we implement our theory more rigorously, by giving a class of models for a modal propositional language which implement the proposals of the previous section. Readers uninterested in the details of this implementation can skip the section. The most important observations will be that, on our theory, the modality of normality is (i) closed under necessary equivalence, modus ponens and necessitation, but (ii) not closed under single-premise closure.

Definition 1 (Language)**.** $\mathcal{L}$ is the smallest set containing the sentential atoms $\{\mathsf{A}, \mathsf{A}', ..., \mathsf{B}, \mathsf{B}', ...\}$ and which is closed under boolean connectives $(\neg, \wedge, \vee)$ and a unary modal operator ($\blacksquare$).

A model for $\mathcal{L}$ is a tuple $\mathcal{M} = \langle \mathcal{W}_\mathcal{M}, \Pi_\mathcal{M}, Pr_\mathcal{M}, t_\mathcal{M}, [\![\cdot]\!]_\mathcal{M} \rangle$. $\mathcal{W}_\mathcal{M}$ is a domain of worlds. We identify worlds with characteristic functions on the sentential atoms. $\Pi_\mathcal{M}$ is a non-empty set of countable partitions on $\mathcal{W}_\mathcal{M}$. Intuitively, we think of each $\pi \in \Pi_\mathcal{M}$ as representing a relevant subject matter. $Pr_\mathcal{M}$ is a function from worlds to probability measures over $\mathcal{P}(\mathcal{W}_\mathcal{M})$. $t_\mathcal{M} \in (0, 1]$ is a constant, representing the lower bound on how probable the most normal states in a subject matter must be. $[\![\cdot]\!]_\mathcal{M}$ is an interpretation function, which maps sentences in $\mathcal{L}$ onto $\mathcal{P}(\mathcal{W}_\mathcal{M})$. Where possible, we suppress indexation to a model.

We say that p is about π iff p is the union of some non-empty subset of π. We can then define a function, $|\cdot|$, which maps states to the set of relevant subject matters which they are about. Intuitively, we think of $|p|$ as representing the subject matters associated with p.

Definition 2 (Association)**.** $|p| = \{\pi \in \Pi : \exists X \subseteq \pi : p = \bigcup X\}$.

Finally, for each $w \in \mathcal{W}$ and $\pi \in \Pi$, we distinguish a privileged subset of π comprising the states which are sufficiently probable at w. Mildly abusing notation, let $\uparrow^{\pi}_{w}(p)$ be the set of states in π which are more probable that p at Pr_w; i.e., $\uparrow^{\pi}_{w}(p) = \{q \in \pi : Pr_w(q) > Pr_w(p)\}$. Then:

Definition 3 (Maximality)**.** $Max_w(\pi) = \bigcup\{p : Pr(\bigcup \uparrow^{\pi}_{w}(p)) < t\}$

$p \subseteq Max_w(\pi)$ iff $p \in \pi$ and the states in π which more probable than p are no more probable than t. Given **Probability**, we can think of $Max_w(\pi)$ as the disjunction of most normal states within π at w.

We are now in a position to introduce our semantics.

Definition 4 (Semantics)**.**

i.	$[\![\mathsf{A}]\!]$	$=$	$\{w : w(\mathsf{A}) = 1\}$
ii.	$[\![\neg\phi]\!]$	$=$	$\mathcal{W} - [\![\phi]\!]$
iii.	$[\![\phi \wedge \psi]\!]$	$=$	$[\![\phi]\!] \cap [\![\psi]\!]$
iv.	$[\![\phi \vee \psi]\!]$	$=$	$[\![\phi]\!] \cup [\![\psi]\!]$
v.	$[\![\blacksquare\phi]\!]$	$=$	$\{w : \lvert[\![\phi]\!]\rvert \neq \varnothing \wedge \forall\pi \in \lvert[\![\phi]\!]\rvert : \varnothing \subset Max_w(\pi) \subseteq [\![\phi]\!]\}$

Each atom is mapped to a set of worlds. Negation, conjunction and disjunction behave in the usual boolean way. $\blacksquare\phi$ is true at w iff there is some subject matter associated with $[\![\phi]\!]$ and for every π associated with $[\![\phi]\!]$, ϕ is true throughout every most normal state in that π (relative to w). Observe that where, for some $w, v \in \mathcal{W}$ and $\pi \in \Pi$, $Max_w(\pi) \neq Max_v(\pi)$, we allow that $\varnothing \subset [\![\blacksquare\phi]\!] \subset \mathcal{W}$. This reflects the idea that what is abnormal is a contingent matter.[27]

We define entailment in the expected way.

Definition 5 (Entailment)**.**

i. $\Gamma \models_{\mathcal{M}} \phi$ iff $(\bigcap_{\psi_i \in \Gamma} [\![\psi_i]\!]_{\mathcal{M}}) \subseteq [\![\phi]\!]_{\mathcal{M}}$.
ii. $\Gamma \models \phi$ iff for all $\mathcal{M}$: $\Gamma \models_{\mathcal{M}} \phi$.

Where $\Gamma \models_{\mathcal{M}} \phi$, we say that the inference is valid-in-$\mathcal{M}$. Where, $\Gamma \models \phi$, we will say that the inference is valid (and, more loosely, we will say the same of a meta-rule, where the validity in all models of one inference implies the validity in all models of a second).

Fact 1. Agglomeration is invalid.

[27]Since, for any $\pi \in \Pi$ we impose no constraints between Pr_w and Pr_v, we also predict $\blacksquare$ will not obey the 4 axiom (cf. fn.26). See Carter (2019) for arguments this is desirable.

As a counter-model, consider the four-world domain and set of partitions depicted in **Figure 1**. Assume that $[\![\mathsf{A}]\!] = \{w_{\mathsf{HH}}, w_{\mathsf{HT}}\}$ and $[\![\mathsf{B}]\!] = \{w_{\mathsf{HH}}, w_{\mathsf{TH}}\}$. Suppose further that, for all w in the domain: $Pr_w([\![\mathsf{A}]\!]) = Pr_w([\![\mathsf{B}]\!]) = \frac{3}{5}$ and that $[\![\mathsf{A}]\!]$ and $[\![\mathsf{B}]\!]$ are probabilistically independent. Accordingly, we have that for all w in the domain: (a) $Pr_w(w_{\mathsf{HH}}) = \frac{9}{25}$; (b) $Pr_w(w_{\mathsf{HT}}) = Pr_w(w_{\mathsf{TH}}) = \frac{6}{25}$; and (c) $Pr_w(w_{\mathsf{TT}}) = \frac{4}{25}$. Finally, suppose $t \in (0, \frac{12}{25})$. It follows that, for all w, $Max_w(\pi_1) = [\![\mathsf{A}]\!]$ and $Max_w(\pi_2) = [\![\mathsf{B}]\!]$. So $\blacksquare\mathsf{A}$ and $\blacksquare\mathsf{B}$ are true throughout the model. Yet, in contrast, $Max_w(\pi_3) = \{w_{\mathsf{HT}}, w_{\mathsf{TH}}\}$. So $\blacksquare(\mathsf{A} \wedge \mathsf{B})$ is false throughout the model. Hence **Agglomeration** is not valid in all models.

Since **Agglomeration** fails, the logic of $\mathcal{L}$ generated by our models is not a normal modal logic. Indeed, $\blacksquare$ is not closed under implication within a model (**Fact 2.1**) or (strictly weaker) single premise entailment (**Fact 2.2**).

Fact 2. 1. It is not the case that for all $\mathcal{M}$: if $\phi \models_{\mathcal{M}} \psi$, then $\blacksquare\phi \models_{\mathcal{M}} \blacksquare\psi$.
2. It is not the case that: if $\phi \models \psi$, then $\blacksquare\phi \models \blacksquare\psi$

Fact 2 follows from the observation that it is not in general the case that if $[\![\phi]\!]_{\mathcal{M}} \subseteq [\![\psi]\!]_{\mathcal{M}}$ then $|[\![\phi]\!]_{\mathcal{M}}| \subseteq |[\![\psi]\!]_{\mathcal{M}}|$. As a simple counter-model, observe that within the model above, $|[\![\mathsf{A} \vee \mathsf{B}]\!]| = \varnothing$. So $[\![\blacksquare(\mathsf{A} \vee \mathsf{B})]\!] = \varnothing$, despite the fact that $[\![\blacksquare\mathsf{A}]\!] = [\![\blacksquare\mathsf{B}]\!] = \mathcal{W}$. Since $\models$ is classical, this implies **Fact 2.2**,. **Fact 2.1** is an immediate consequence of **Fact 2.2**.

Nevertheless, our logic retains a number of properties of objective modalities.

Fact 3. 1. For all $\mathcal{M}$: if $\models_{\mathcal{M}} \phi \leftrightarrow \psi$, then $\models_{\mathcal{M}} \blacksquare\phi \leftrightarrow \blacksquare\psi$.
2. If $\models \phi \leftrightarrow \psi$, then $\models \blacksquare\phi \leftrightarrow \blacksquare\psi$.

Fact 3 follows from the observation that if $[\![\phi]\!]_{\mathcal{M}} = [\![\psi]\!]_{\mathcal{M}}$, then $|[\![\phi]\!]_{\mathcal{M}}| = |[\![\psi]\!]_{\mathcal{M}}|$. Intuitivly, **Fact 3.1** corresponds to the idea that $\blacksquare$ is not a hyper-intensional operator. If $\phi \leftrightarrow \psi$ is true throughout a model, then $\blacksquare\phi \leftrightarrow \blacksquare\psi$ will be, too. **Fact 3.2** is an immediate consequence of **Fact 3.1**.

Similarly, our models preserve **Modus Ponens** and **Necessitation** as valid inference and meta-inference rules, respectively.

Modus Ponens $\phi, \phi \rightarrow \psi \models \psi$
Necessitation If $\models \phi$, then $\models \blacksquare\phi$.

The validity of **Modus Ponens** is immediate from **Definition 5**. **Necessitation** follows from the requirement that Π be non-empty.

Fact 4. Modus Ponens and **Necessitation** are valid.

These facts are reassuring. They demonstrate that our logic is not departing further than necessary from a normal modal logic.[28]

In addition to these points of comparison with objective modalities, we close by briefly observing some other notable properties of our framework.

Fact 5. (i)-(ii) are valid. (iii) is invalid.

(i)	$\models \neg\blacksquare\bot$	(**Coherence**)
(ii)	$\models \blacksquare\phi \rightarrow \neg\blacksquare\neg\phi$	(**D Axiom**)
(iii)	$\blacksquare\phi, \blacksquare\psi \models \blacksquare(\phi \vee \psi)$	(**Weakening**)

(i) follows directly from **Definition 4.5**. (ii) follows from **Definition 4.5** along with the observation that for any p, $|p| = |\mathcal{W} - p|$.[29] For (iii), the counter-model discussed for **Fact 2** generalizes to provide a counter-model to **Weakening** (since both $\blacksquare\mathsf{A}$ and $\blacksquare\mathsf{B}$ are true throughout the model).

5 Objections and Replies

Objection: If what subject matters are relevant varies according to context, how is the proposed approach any better than the contextualist variant of the standard model rejected in §2?

Reply: It is important to distinguish between what we might call 'heavyweight' and 'lightweight' versions of contextualism about normality talk. Heavyweight contextualism combines two ideas: first, that what property is expressed by normality talk can vary according to the context of utterance. And, second, that changes in context explain the apparent invalidity of certain inference rules (such as **Agglomeration**) which should, in fact, be classified as valid when the context is held fixed. Lightweight contextualism differs from heavyweight contextualism in subscribing

[28] In fact, we can reformulate our semantics as an instance of a well-understood family of models for an interesting class of non-normal modal logics. In neighborhood semantics (Segerberg (1971); Chellas (1980)), modality is characterized by a relation, $\mathcal{N}$, which associates a world, w, with a neighborhood $\mathcal{N}(w) \subseteq \mathcal{P}(\mathcal{W})$. Where $\mathcal{O}$ is a necessity modal, $w \in [\![\mathcal{O}\phi]\!]$ iff $[\![\phi]\!] \in \mathcal{N}(w)$. For any $\mathcal{M}$, let $\mathcal{N}_\mathcal{M}$ be a neighborhood relation defined such that $\mathcal{N}_\mathcal{M}(w) = \{p : |p| \neq \varnothing \wedge \forall\pi \in |p| : Max_{w,\mathcal{M}}(\pi) \subseteq p\}$. Then we have the following correspondence between our semantics $\blacksquare$ and $\mathcal{N}_\mathcal{M}$:

Observation 1. $w \in [\![\blacksquare\phi]\!]_\mathcal{M}$ iff $[\![\phi]\!]_\mathcal{M} \in \mathcal{N}_\mathcal{M}(w)$.

Based on **Observation 1**, it is easy to define a map, $*$, from our models into the class of neighborhood semantic models such that, for all $\mathcal{M}$, $\Gamma \models_{\mathcal{M}} \phi$ iff $\Gamma \models_{\mathcal{M}^*} \phi$. Let $\mathcal{M}^* = \langle \mathcal{W}_{\mathcal{M}^*}, \mathcal{N}_{\mathcal{M}^*}, [\![\cdot]\!]_{\mathcal{M}^*}\rangle$ be defined such that $\mathcal{W}_{\mathcal{M}^*} = \mathcal{W}_\mathcal{M}$; $\mathcal{N}_{\mathcal{M}^*} = \mathcal{N}_\mathcal{M}$ and $[\![\cdot]\!]_{\mathcal{M}^*}$ is such that (i) $[\![\mathsf{A}]\!]_{\mathcal{M}^*} = \{w \in \mathcal{W}_{\mathcal{M}^*} | w(\mathsf{A}) = q\}$; and (ii) $\neg, \wedge, \vee$, and $\blacksquare$ are defined in the normal way for neighborhood semantics. The proof proceeds by induction.

[29] Suppose, for contradiction, that $w \in [\![\blacksquare\phi]\!]$ and $w \in [\![\blacksquare\neg\phi]\!]$. Since $|[\![\phi]\!]| \neq \varnothing$, consider some $\pi \in |[\![\phi]\!]|$. We know that $Max_w(\pi) \subseteq [\![\phi]\!]$ and $Max_w(\pi) \subseteq [\![\neg\phi]\!]$. So it follows $Max_w(\pi) = \varnothing$. But $Max_w(\pi)$ is guaranteed to be non-empty, $[\![\blacksquare\phi]\!]$ is non-empty. Contradiction.

to the former idea but not the latter.

Our objections, in §2, were directed exclusively at the second commitment of heavyweight contextualist theories. It strikes us as highly plausible that our talk about the modality of normality, like our talk about other modalities, would be context sensitive. What strikes us as implausible is that the context can shift in exactly the places and in exactly the ways required to explain apparent cases of **Agglomeration** failure. The problem is not just that the heavyweight contextualist lacks an explanation of why specific sentences elicit the orderings they do. It is that there must be specific orderings which can be elicited by one sentence, but never by another. For example, to for (1b) to be judged true, it must elicit an ordering which ranks only worlds in which every coin lands heads as maximally normal. However, for (1a) to be judged false, it must not elicit this same context.

By contrast, on our account, explaining why (1a) is judged false requires us only to assume that it is extremely difficult to reach a context in which the threshold t approaches extremely close to 0 (cf. footnote 20). That's because the only contexts in which (1a) is true are those in which the unique most normal state in each relevant subject matter is the state of every coin landing heads (which is extremely improbable). We think that this assumption about contexts is quite natural. It corresponds to the idea that it is difficult to access a context on which what is most normal is extremely unlikely. Importantly, this assumption does not require there to be any connection between what sentences are uttered and what context is occupied.

Whereas the contextualist variant of the standard model is a type of heavyweight theory, the kind of contextualism espoused above is strictly lightweight. Our explanation of cases of **Agglomeration** failure is compatible with the context remaining unchanged across the evaluation of the premises and the conclusion. We assume only that what property is expressed by normality talk is partially dependent on context.

Objection: According to the proposal, the modality of normality is not closed under single-premise entailment (as observed in **Fact 2**). Even if **Agglomeration** fails, surely this makes it too weak?

Reply: We think that, in fact, this is precisely what we should want the framework to predict. To see why, imagine a bag containing 250 balls of six different colors and two different sizes. Suppose that the bag contains 125 black balls, all of which are small. Additionally, suppose that for each remaining color, it contains 25 balls that color, of which 5 are small and 20 large (as summarized in **Figure 2**).

In line with our observations above, we claim that it is coherent to hold that both

	Small	Large
Black	125	0
White	5	20
Red	5	20
Blue	5	20
Green	5	20
Yellow	5	20

Figure 2: The contents of a bag of 250 balls.

(a) it would be abnormal not to draw a black ball from the bag and (b) it would not be abnormal not to draw a small ball from the bag. After all, the ratio of black balls to balls of any other color is 5:1. In contrast, the ratio of small balls to large balls is only 3:2. Together, however, these claims amount to a failure of single-premise closure. After all, drawing a black ball from the bag necessitates drawing a small ball.

Our proposal is able to accommodate these judgments. Suppose that the only relevant subject matters are the subject matters: `What color of ball is drawn?` and `What size of ball is drawn?`. The state of affairs of drawing a black ball will be uniquely associated with the former. In contrast, the state of affairs of drawing a large ball will be uniquely associated with the latter. Suppose that it is certain that some ball or other will be drawn from the bag. Then, wherever $1.5 \leq t \leq 5$, drawing a black ball will be necessitated by all the most normal states in the former but drawing an large ball will be compatible with some of the most normal state of affairs in the latter.

Objection: Even if normality is not closed under single-premise entailment, isn't giving up **Weakening** (as observed in **Fact 5**) unmotivated?

Reply: We don't think so. Despite superficial appeal, on reflection the principle also admits of counter-examples. Imagine a square board divided into nine equal-sized regions, as depicted in **Figure 3**. A dart landing in the centre square scores forty points, while a dart landing in any corner square scores 15 points. A dart landing in any other square scores nothing. Imagine an expert dart player throws a dart at the board so that its probability of hitting any given square is proportional to the points value of the square.[30]

[30] Note that for closely related reasons, the theory also invalidates the inference schema $\blacklozenge\phi, \blacklozenge\psi \models \blacklozenge(\phi \vee \psi)$. Similar considerations apply here as with **Weakening**. For example, we think that there are contexts in which it would be it be abnormal for the dart to fail to land in one of the corner squares, although it would be normal for the coin to land in the central row and normal for it to land in the central column.

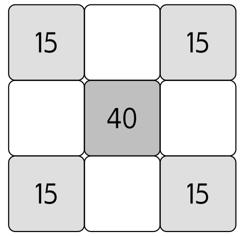

Figure 3: An unusually shaped dartboard.

The squares on the board can be grouped into rows, columns and numerous other ways. In different contexts, different ways of grouping the squares may be salient. Nevertheless, we claim that it is possible to get in a state of mind in which each of the following three judgments are appealing. First, it would be abnormal for the dart not to land in the central row. After all, the chance of the dart landing in the central row is $\frac{1}{3}$ greater than that of it landing in the top row and, similarly, $\frac{1}{3}$ greater than that of it landing in the bottom row. Second, it would be abnormal for the dart not to land in the central column. After all, the chance of the dart landing in the central column is likewise $\frac{1}{3}$ greater than that of it landing in the left column and, similarly, $\frac{1}{3}$ greater than it landing in the right column. Third, it would be abnormal for the dart not to land in one of the corner squares. After all, the chance of the dart landing in one of the corner squares is $\frac{1}{2}$ greater than that of it not landing in one of the corner squares.[31]

On our lightweight contextualist view, the explanation for these judgements is simple. There is a context in which all of the three sentences expressing them are true. Yet, together, they amount to a counter-example to **Weakening** (and, *a fortiori*, single premise closure). After all, for the dart to land in one of the corner squares just is for it not to land in the central row or column.

Where there is some subject matter both ϕ and ψ are associated with, instance of this inference will preserve truth, however. This may account for why, in many contexts, it appears safe to infer that it would be normal of one of a set of states of affairs to obtain from the claim that it would be normal for each of those states of affairs to obtain. We are grateful to a referee at *The Journal of Philosophy* for encouraging us to discuss these kinds of issues.

[31]It may help with sharpening these judgments if we imagine that certain regions of the dartboard are also associated with different, non-point-based prizes. This framing may serve to increase the salience of the relevant subject matters. For example, imagine that a dart landing in the central row wins a toy bear, a dart landing in central column wins a gift card, and a dart landing in any of the corners wins a bottle of wine. Imagining the dart player throws their dart in the same way as above, we think that it would be abnormal for them not to win the toy bear, abnormal for them not to win the gift card and also abnormal for them not to win the bottle of wine.

6 Normality and Justification

Normality has played an increasingly prominent role in recent work in epistemology. This work has tended, whether tacitly or explicitly, to assume a version of the Standard Model. Accordingly, it has generally taken **Agglomeration** for granted. In this section, we consider the implications of our account for epistemology. We will suggest that, in at least one key respect, epistemic theorizing in terms of normality is better-placed under our proposal than it would be under the Standard Model.

A number of authors have proposed a close connection between normality and epistemic justification (Smith (2010, 2013, 2016, 2018, 2021); Goodman (2013); Goodman & Salow (2018)).

Justification An agent is justified in believing that ϕ obtains iff given things are the way her evidence represents them to be, $\neg\phi$ would be abnormal.

Justification does not appeal to what would be abnormal, *simpliciter*. Rather, it is framed in terms of conditional normality. What an agent is justified in believing is a matter of whether one state of affairs (corresponding to the content of her belief) would be abnormal conditional on a second (corresponding to how her evidence represents things to be) obtaining.

The framework introduced above does not permit us to formulate claims about conditional normality. The language introduced in **Definition 1** is limited to claims about what would be normal or abnormal, *simpliciter*. To remedy this, we could always move to a richer language containing every sentence of $\mathcal{L}$ as well as a binary operator such that, if ϕ, ψ are sentences of the enriched language, then $\blacksquare^{\phi}\psi$ is, too. Intuitively, $\blacksquare^{\phi}\psi$ is interpreted as saying that, given ϕ obtains, $\neg\psi$ would be abnormal.[32]

What is the logic of conditional normality? An appealing null hypothesis is that it is at least as strong as the logic of unconditional normality (Boutilier (1994a,c,b); Smith (2007)). That is, if some argument involving only sentences of in $\mathcal{L}$ is valid, then, for any ϕ, the result of substituting $\blacksquare^{\phi}$ for every instance of $\blacksquare$ will likewise be a valid argument.[33] This null hypothesis has the advantage of tying the relatively unfamiliar modality of conditional normality to the comparatively familiar modality

[32]It is plausible that something may be conditionally normal despite being unconditionally abnormal and unconditionally normal despite being conditionally abnormal. For example, while it would be abnormal for a fair coin to land heads 100 times in a row, it would not be abnormal for it to do so given that it landed heads on the first 99 flips. Equally, while it would not be abnormal for a coin to land heads at least 10 times on 100 flips, it would abnormal for it to do so conditional on landing tails on the first 90 flips.

[33]We may wish to leave open that the logic of conditional normality will be strictly stronger. For example, it is plausible that $\blacksquare^{\phi}\phi$ should be a theorem, for any ϕ in the enriched language.

of unconditional normality. We can reasonably hope to learn a lot about the features of the former by investigating the features of the latter.

Yet, at least under this null hypothesis, **Justification** will generate some surprising results, given the standard model. It is widely assumed that justification does not agglomerate. An agent may be justified in believing each of a set of claims, given some evidence, and yet fail to be justified in believing their conjunction (Kyburg (1961); Makinson (1965)). Indeed, failures of agglomeration for justification can be motivated by cases of exactly the kind which motivated failures of agglomeration for normality. For any person born in the US this year, we would be justified in believing that they will not die before reaching the age of 30. Yet, equally, we would not be justified in believing that no-one born in the US this year will die before 30. Indeed, we would seem justified in believing that at least some person born this year will die before 30.

The proponent of **Justification** who accepts the standard model cannot accommodate these judgments. As long as they maintain that the logic of conditional normality is at least as strong as that of unconditional modality, they are committed to accepting that justification agglomerates. As a result, they face a dilemma. Either they must deny that an agent is justified in believing, of any person born in the US this year, that that person will live to 30, or else they must accept that we are justified in believing that no-one born in the US this year will die before reaching 30. Neither alternative looks particularly tenable.[34]

On our account, in contrast, the proponent of **Justification** faces no such tension. By allowing for failures of **Agglomeration** for normality in precisely the kind of cases which lead to agglomeration failure for justification, the account is able to accommodate the kinds of judgments reported above.

7 Conclusion

The modality of normality is not an objective modality. It does not have a normal logic and, as a result, cannot be characterized as a restriction of metaphysical modality. This conclusion is at odds with the prevailing approach to theorizing about normality.

In failing to satisfy **Agglomeration**, the modality of normality resembles other putatively non-objective modalities, such as deontic and epistemic modality. However, at least on the account developed in the latter half of this paper, it also preserves a number features of the objective modalities which its epistemic and deontic counterparts are often assumed to lack. In this way, normality occupies

[34] Smith (2016, §4.3) is sensitive to this tension and opts for the latter horn of the dilemma.

an interesting, medial place in the space of modalities. Despite not being a restriction of metaphysical modality, it remains a property of states of affairs (rather than being sensitive to modes of presentation) and exhibits a number of common logical features. While the formal properties of modalities of this type have been well-studied, specific examples have been rare, making the modality of normality worthy of further consideration.

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