Safety and Necessity

Niall Paterson
niall.paterson@protonmail.com

I

Safety from error

Safety

S safely believes that p on m at α if, and only if:

> $\forall\beta$: If β is close to α and S believes that p on m at β, then p is true at β.[1]

Some argue that:

SL Safety captures the sense in which knowledge excludes luck.

Aims of the talk:

A1 To argue that two traditional problems for **SL**, namely the problem of necessary truths and that of 'accidental robustness', arise since epistemic luck but not safety from error, is hyperintensional.

A2 To argue that, by recognising this, it can be shown that the standard solution to these problems, namely the invocation of content variation, fails.

II

Hyperintensionality

A *sentential operator* takes sentential inputs, and outputs appended sentences, where the nature of the appendage is determined by nature of the operator. Three kinds:

O is *extensional* $=_{def}$ the extensions of the outputs of *O* are functions of the extensions of its inputs.

e.g., $\neg p$

O is *intensional* $=_{def}$ the extensions of the outputs of *O* are not functions of the extensions of its inputs, but the intensions of its outputs are functions of the intensions of its inputs.

e.g., $\Box p$

O is *hyperintensional* $=_{def}$ the extensions of the outputs of *O* are not functions of the extensions of its inputs, and the intensions of its outputs are not functions of the intensions of its inputs.[2]

e.g., $B_S p$.

III

Luck as Hyperintensional

Consider:

> Lp It is lucky that p

Question: Is Lp extensional, intensional, or hyperintensional?

i. Lp is not extensional. I rig the lottery, you win fair and square. Lucky for me, not lucky for you.

ii. Lp is not intensional. Two cases:

Caught Red Handed

Detective Dina is looking for two notorious criminals: the murderous Red Hand (so-called due to the large red-hand tattooed on his back), and the fraudulent Jimmy Smith, known to work at a local chartered accountancy firm 'Fraud-U-Lent'. Dina raids Fraud-U-Lent and arrests Jimmy Smith blatantly committing fraud at his desk. Back at the station Jimmy is strip-searched, which reveals a large red hand tattoo on his back. Jimmy subsequently confesses: he is Red Hand.

Lucky Bet

Martha bets all that she holds most dear on two publicly unproven outcomes: (1) that Fermat's last theorem is true, and (2) that Goldbach's conjecture is true. Unbeknownst to her bookie, Martha has proved Fermat's last theorem. Both theorems are subsequently publicly proved. Martha wins both bets.

iii. Hence, Lp is hyperintensional.

IV

Troubles for Safety

Two troubles for *Safety*.

First: Some propositions are necessarily true, and no belief in a necessarily true proposition could, and thus could easily be false. But some beliefs in necessarily true propositions are true by luck. E.g.,

Lucky Calculation

Smith punches in '64 x 78' on her calculator. The calculator is randomly fluctuating, but by chance gives the correct readout of '4992'. On this basis, Smith believes that '64 x 78 = 4992'.

Second: Some propositions can be accidentally robust, in the following sense. The proposition is counterfactually robust to the extent that no belief formed which takes that proposition as content in close cases is a false belief.

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[1] For various formulations, see Sainsbury (1997); Sosa (1999; 2007; 2009), Williamson (2000; 2009), Luper (2003; 2006), Pritchard (2005; 2012), Manley (2007), Lasonen-Aarnio (2010), Hirvelä (2017), and Wedgwood (2018).

[2] These definitions are parasitic on that given by Lewis (2004).

Example:

Colour Blind

Reggie suffers from protanomaly, i.e., reduced sensitivity to red light. As such, she is red-green colourblind; she tends to classify red objects as green. Reggie wanders through the swamps, sees a frog, and comes to believe of the frog that it is green. As it happens, all frogs in the local area are green, though many of the swamp's creatures are red. (Modified from (**?**).)

V

Epistemic Luck but not Safety as Hyperintensional

I argue that:

Both troubles arise from the hyperintensionality of epistemic luck.

Consider:

Sp It could not easily be that p

Question: Is Sp extensional, intensional, or hyperintensional?

i. Sp is not extensional. Eating a berry, Sally may be nourished and unpoisoned. If the berry contains a toxin, she may be safe from being malnourished but not from being poisoned. The extension of the output of 'Sp' is not a function of the extension of 'p'.

ii. Given Sp is not extensional, it can be shown to be intensional. Proof: For any world w, the extension of any output of Sp at w is a function of the extension of p across close worlds, and thus a restriction of its intension. Since a is a function of a restriction of a function f only if a is a function of f, at any world the extension of the outputs of Sp are functions of the intension of p. Hence the intension of Sp is a function of the intension of p.

Now compare:

L[$B_{S,M}^{T}p$]   It is lucky that S truly believes on M that p

S[$B_{S,M}^{F}p$]   It could not easily be that S falsely believes on M that p

a. Both operators are hyperintensional: they inherit their hyperintensionality from the nested 'truly believes on M' and 'falsely believes on M' components respectively.

b. Importantly, whilst S[$B_{S,M}^{F}p$] is hyperintensional only due to the nested component, L[$B_{S,M}^{T}p$] is hyperintensional twice over. Thus, even where distinct outputs of $B_{S,M}^{F}p$ are cointensional, the intensions of the outputs of the compound operator may change. E.g.,

Double Calculation

On Monday, Jones works out '64 x 78' on a calculator. On Friday, Jones uses the same calculator to work out '98 x 27'. For the *first* sum, Jones the calculator operates normally and gives the correct answer '4992'. For the *second* sum, though, the calculator breaks and starts to randomly fluctuate. By chance, though, the calculator gives the correct result '2646'.

Similar points apply to **Colour Blind**. Given one believes on some method, the luckiness of one's belief is not a function of the intension of the proposition believed on that method. That deals with **A1**.

VI

The Inescapability of Hyperintensionality

The standard fix:

Safety*

S safely believes that p on m at α if, and only if:

$\forall\beta\forall p^*$: If β is close to α and S believes that p^* on m at β, then p^* is true at β.

S*p avoids both worries, since it is hyperintensional in both positions. However, it does not deal with all troubles. This is because the Safety* but not the luckiness of a belief (given one believes on some method) is a function of *neither* the intension of p *nor* the intension of all similar propositions.

First: accidental robustness.

Belief Suppressor

Smith has invented the 'Doxablock$^{\text{TM}}$' which functions as a belief suppressor. When active, anyone within a hundred mile radius will have their belief formation capacities masked. Smith asks Jones, who is ignorant of the nature of the machine, to check whether the Doxablock$^{\text{TM}}$ is turned on. Seeing the switch turned to the OFF position, Jones comes to believe that the Doxablock$^{\text{TM}}$ is off. As it happens, though, the switch is not functioning, and thus will display OFF no matter what. Nevertheless, the machine is switched off.

Second: contingent cointensionals.

Lucky Tracking

Dina has placed a tracker on Jimmy Smith and independently on Red Hand, ignorant of their identity. The trackers are associated with two devices. The first she labels 'JIMMY SMITH' the second 'RED HAND'. Unbeknownst to her, a corrupt official paid off by Red Hand, who is also ignorant of his true identity, has switched the labels to foil her operation. Dina wants to track RED HAND. She attends to the readout, and on that basis comes to believe (truly) that Red Hand is in the NYC bagel house.

That deals with **A2**.