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SENSITIVITY AND CLOSURE

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ABSTRACT

John Hawthorne has two forceful arguments in favour of:

> *Single-Premise Closure* (SPC) Necessarily, if S knows p, competently deduces q from p, and thereby comes to believe q, while retaining knowledge of p throughout, then S knows q.

Each of Hawthorne's arguments rests on an intuitively appealing principle which Hawthorne calls the *Equivalence Principle*. I show, however, that the opponents of SPC with whom he's engaging – namely Fred Dretske and Robert Nozick – have independent reason to reject this principle, and resultantly conclude that Hawthorne's arguments in favour of SPC are not knock-down.

1. INTRODUCTION

John Hawthorne (2004: 39–41) has two forceful arguments in favour of:

> *Single-Premise Closure* (SPC). Necessarily, if S knows p, competently deduces q from p, and thereby comes to believe q, while retaining knowledge of p throughout, then S knows q.

Each of Hawthorne's arguments rests on an intuitively appealing principle which Hawthorne calls the *Equivalence Principle*. I show, however, that the opponents of SPC with whom he's engaging – namely Fred Dretske and Robert Nozick – have independent reason to reject this principle, and resultantly conclude that Hawthorne's arguments in favour of SPC are not knock-down.

1.1

The plan: First, I introduce Hawthorne's Equivalence Principle, and a Sensitivity condition (see 2.2 *infra*) – a condition which features in, and is, *arguendo*, presupposed by, Hawthorne's pro-closure arguments. (Presupposed, in the sense that Hawthorne assumes Sensitivity, *pro tem*, and seeks to chart serious costs – in addition to abandoning SPC – involved with such an acceptance.) Second, I set out one of Hawthorne's pro-closure arguments in which the Equivalence Principle features. Third, I set out and motivate, by means of *reductio*, a modification to the Sensitivity condition. Fourth, I use this motivated modification to the Sensitivity condition to reject the Equivalence Principle, and thus to cast doubt on the decisiveness of both of Hawthorne's arguments for SPC. In so doing, a further principled modification to the Sensitivity condition emerges. None of the foregoing is to clinch the *truth* of a view in the ballpark of

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Sensitivity, but is rather to show a principled way to resist Hawthorne's arguments, by means of well-motivated modifications to Sensitivity (cf. 4.2 and 5.6 *infra*).

2. HAWTHORNE'S EQUIVALENCE PRINCIPLE AND SENSITIVITY

2.1

Hawthorne notes the following intuitively appealing principle:

> *Equivalence*. If you know a priori that p and q are equivalent and you know p, then you are in a position to know q.

(Here, p and q are equivalent iff they have the same truth-value.)

2.2

Hawthorne, while explicitly addressing both Nozick *and Dretske*, glosses his arguments using just Nozick's Sensitivity condition on knowledge:

> *Sensitivity*. S knows p only if S Sensitively believes p, where S Sensitively believes p just in case, were p false, S would not believe p.[1]

Dretske (1971) does not endorse Sensitivity. Instead he requires that, in order to know p, one must have a *conclusive reason* to believe p. While the two requirements are similar, Dretske (2013: 38-9, n.4) himself is at pains to point out situations in which the requirements come apart. Hawthorne's (2004) criticisms of Sensitivity, however, carry over to Dretske's conclusive reasons account (see Hawthorne 2004, 2013), and their differences play no role in my arguments. I will follow Hawthorne (2004) by concentrating on Nozick's Sensitivity account (though what I come to say about Nozick goes, *mutatis mutandis*, for Dretske also).[2]

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1 I suppress mention of *methods* (see Nozick 1981: 179–85, 188–96); I am confident nothing major is lost, in this paper, by so doing. While mention of methods is suppressed, and so not foregrounded, see n.20 *infra*, where I briefly address an effort of some philosophers to appeal to methods – in particular, principles governing the *individuation* of methods – to solve some problem cases for the Sensitivity theorist. In a nutshell, though I suggest where my sympathies lie in debates over the individuation of methods, I am not presently in a position to offer an argument defending my sympathies; and the nub of my current position is that I do not need to commit on this issue for present purposes. Although Nozick confronts issues over methods much more directly than I, I essentially, on these issues, follow Nozick (1981: 184): 'I do not want to underestimate … difficulties [about how to individuate methods] but neither do I want to pursue them here.' (Moreover, Nozick (185) observes that '[a]lthough sometimes it will be necessary to be explicit about the methods via which someone believes something, often it will cause no confusion to leave out all mention of method.') For why this is a permissible strategy on my part, again see n.20 *infra*. And finally, for a recent overview of, and substantive position on, individuation of methods, see Becker (2012). Becker's aim is to 'sketch a particular conception of methods that [he] think[s] Nozick would have accepted, explaining how finely methods are to be individuated and how methods can be conceived internalistically within a broadly externalist epistemology' (82). (Cf. Nozick's (184–5) 'clarifying remarks' on – though not precise formulations of – individuation conditions for methods.)

2 It should be noted that SPC was not Nozick's (or Dretske's) conception of closure. This can be safely bracketed in what follows.

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3. HAWTHORNE'S 'EQUIVALENCE AND DISTRIBUTION' PRO-CLOSURE ARGUMENT

3.1

Hawthorne (2004: 41) notes:

> The following principle ... seems extremely intuitive:
>
> *Distribution*. If one knows that p and q, then one is in a position to know p and to know q.[3]
>
> Suppose I know
>
> (9) That is a zebra.
>
> By Equivalence, I can know
>
> (12) That is a zebra and that is not a cleverly disguised mule.
>
> By Distribution, I can know
>
> (11) That is not a cleverly disguised mule.
>
> But Dretske and Nozick deny this.
>
> In relinquishing SPC, we are thus forced to relinquish certain other principles – ... Distribution (or instead, Equivalence) – that are very compelling. A denial of SPC thus ramifies into costs that are extremely high.

Nozick denies we can know (11) – one's belief in (11) isn't Sensitive. And so Nozick must either deny that we can know (9) (which would involve abandoning his account of knowledge) or else deny the (intuitive) conjunction of Distribution and Equivalence.

3.2

The argument generalises. Take any ordinary proposition p and some proposition, q, known to be entailed by p, such that one's belief in q isn't Sensitive. We thus know a priori p is equivalent to $(p \,\&\, q)$. By Equivalence, if one knows p then one is in a position to know $(p \,\&\, q)$. Then, by Distribution, one is in a position to know q. But, as one's belief in q is not held Sensitively, Nozick denies that q is known. And so Nozick is forced to deny either Distribution or Equivalence.

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3 My footnote: I use Hawthorne's (2004: 41, n.100) weaker formulation of Distribution which, he notes, 'serve[s] [his] current purposes just as well [as the formulation in the main text]'. Is even this weaker principle true? Suppose one knows that one has hands and that one never performs conjunction elimination; one is not, then, in a position to know that one never performs conjunction elimination, *by performing conjunction elimination*. But one may know the conjunction by conjunction introduction or else one's knowing the conjunction might constitute one's knowing its conjuncts (cf. Williamson 2000: 283). In either case, knowledge of this conjunction does not undermine Distribution.

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3·3

Note, however, that Distribution is effectively a restricted form of SPC: SPC claims knowledge is closed under competent deduction, whereas Distribution suggests knowledge is closed under conjunction elimination – a form of competent deduction. So, given that Nozick rejects SPC, it would be no *major* surprise were he to reject Distribution.[4] Indeed, as it stands, Sensitivity doesn't respect Distribution, and so Nozick rejects Distribution.

However, it is not satisfactory to respond to Hawthorne's argument simply by rejecting Distribution. First, Distribution is extremely plausible: it's hard to see how knowing a conjunction doesn't put one in a position to know each conjunct. Nozick (1981: 228, 692, n.63) himself admits the plausibility of Distribution, although he does reject it. (Going further, Dretske (1970: 1009) says 'it seems to me fairly obvious that if someone knows that P and Q, ... he thereby knows that Q'.) And so if Nozick's account of knowledge were Hawthorne's chief target, an argument depending solely on Distribution – and not, additionally, Equivalence – might suffice to undermine it. Second, rejecting Distribution does nothing to undermine Hawthorne's claim that a subject who knows (9), also knows (12). But (12) is in all relevant respects similar to the kind of proposition that motivates the rejection of SPC (i.e. (11)), as there is some intuitive pull to the idea that we cannot come to know (12) via our senses and deduction. So rejecting Distribution is both implausible and fails to address a problem that Hawthorne poses for the intuitive motivation for rejecting SPC.[5]

3·4

It might seem, then, that Nozick ought to reject Equivalence (though Equivalence, like Distribution, is extremely plausible, and so any rejection thereof will have associated costs). Like Distribution, Equivalence is effectively a restricted form of SPC. SPC, recall, claims knowledge is closed under competent deduction, whereas Equivalence suggests knowledge is closed under a priori known biconditional elimination – a form of competent deduction. So, again, given that Nozick rejects SPC, it would be no *major* surprise were he to reject Equivalence. But Hawthorne notes that Nozick's *reasons* for rejecting SPC don't carry over to rejecting Equivalence (although they do carry over to Distribution); and Nozick (1981: 229, 690, n.60) agrees. For example, Nozick's rejection of SPC is based on the fact that a subject may Sensitively believe p without Sensitively believing some q, which that subject knows to be entailed by p. And since, for Nozick, Sensitivity is a necessary condition for knowledge, it can easily be shown that SPC fails *for Nozick*.[6] But, Hawthorne notes, this situation cannot readily arise when p and q

4 I recognise that for any valid principle of inference, V, there is a less restricted principle that is invalid, I. Being 'no *major* surprise' is, thus, a weak claim. *Mutatis mutandis* for ensuing uses of the phrase.

5 Nozick (1981: 228–30, 692, n.64) himself in fact accepts that we can know conjunctions such as (12). (12) is Sensitive: when it is false, there is, say, a horse before you (rather than a zebra), and you do not believe the whole conjunction.

6 This last 'for Nozick' qualification is important. There is no strict entailment from the fact that a (putative) necessary condition on knowledge, such as Sensitivity, is not closed under competent deduction, to the proposition that knowledge itself is not closed under competent deduction: it might be that the Sensitively believed p in question does not satisfy some other condition which the account in question posits as necessary for knowledge. Nonetheless, for Nozick SPC *does* fail. For more on this, see Vogel (1987), Warfield (2004), Brueckner (2004), Murphy (2006), and Holliday (forthcoming).

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are a priori equivalent. That is, we cannot get $(\sim p \;\Box\!\!\rightarrow\; \sim B_S p)$[7] & $\sim(\sim q \;\Box\!\!\rightarrow\; \sim B_S q)$ *when p and q are a priori equivalent*, except, perhaps, in some recherché cases.

I will show, however, that, Sensitivity is (likely) unacceptable as it stands and should be modified for reasons independent of Hawthorne's argument. Moreover, my modification conflicts with Equivalence, thereby allowing Nozick to reject Equivalence in a principled way. So a plausible Sensitivity condition on knowledge *does* provide reason to reject Equivalence, just as Nozick's account of knowledge provides reason to reject Distribution. And so a plausible condition on knowledge does rule out Equivalence, even if, as Hawthorne notes, Nozick's original condition does not. Moreover, once Equivalence is rejected Nozick is able, I will show, to retain the attractive Distribution.

4. MODIFYING SENSITIVITY: A REDUCTIO OF NOZICK'S ACCOUNT OF KNOWLEDGE

4.1

Consider the following case for *reductio*.[8] Suppose you have a headache. Now consider the following (ex hypothesi true) proposition:

(*P*) I have a headache and I have all my limbs.

Suppose you form the belief, (*P*), based solely on your evidence of having a headache. (To form the belief, (*P*), on this basis, is to display an epistemic failing: this is not an apposite method for forming beliefs of this general nature. But it is not incoherent to make the foregoing supposition. Next time you have a headache, try forming the belief, (*P*), solely on that basis. You will see for yourself that it can be done.) This is not to stipulate that having a headache is the only evidence you have; just that it is the only evidence on the basis of which you form the belief, (*P*). Thus, this leaves open that you have whatever evidence is necessary to have the conceptual/cognitive resources to form the belief, (*P*), provided such evidence is not playing a basing role. (For more on the basing relation, which is left undeveloped here, see Korcz 2006.) Given your basing evidence, you will hold that belief Sensitively: in the closest world in which (*P*) is false (a world in which you fail to have a headache but retain all your limbs) you won't believe (*P*). (Assume, uncontroversially,

7 '$B_S p$' designates: A subject, S, believes *p*.

8 Why a *reductio* (and not a (mere) *counterexample*)? The *reductio* operates as follows: assume (for *reductio*) Nozick's account of knowledge; such an assumption leads to absurdity (given the generalisability of the case); therefore, not-Nozick's account of knowledge. (It is the generalisability of the case which generates the absurdity, and thus elevates the case from a (mere) counterexample to a *reductio*.) As I note later (in 4.2), the dialectic of this paper assumes that something like Sensitivity is necessary for knowledge. Given this assumption, and again as I note later (in 4.2), the obvious, and natural, first response to this *reductio* is to modify Sensitivity. The inspiration for this *reductio* comes, somewhat ironically, from a distinct case presented by Hawthorne (2004: 44); Hawthorne does not notice his case's ramifications. I elsewhere (McBride 2009) use an argument similar to the *reductio* here to stake out a principled modification to Dretske's conclusive reasons condition on knowledge.

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Nozick's *adherence* condition on knowledge – were p true, S would believe p[9] – is met in this case.) But, your belief in (P) does not constitute knowledge.[10]

And the case is generalisable: Stipulate that a subject's sole basing evidence is a headache, and construct a conjunctive proposition, which the subject believes on the basis of that evidence, in which the first conjunct is the statement that the subject has a headache and the second conjunct is a (ex hypothesi true) quotidian proposition for which the subject has no basing evidence,[11] which comes out false only in worlds more remote than worlds in which the subject fails to have a headache.[12]

4.2

So something has gone badly wrong with Nozick's account of knowledge (on which truth, belief, Sensitivity, and adherence are severally necessary and jointly sufficient) in relation

9 See Nozick's (1981: 680–1, n.8) account of the semantics of subjunctive conditionals for how to interpret the adherence condition. Discussion of Nozick's adherence condition has not been vast (but cf. Roush (2005, 2010), and her discussion of multi(ple)-premise closure), and many have thought that it is forgoable (by Nozick) as a necessary condition on knowledge (cf. Roush). Given this, and given a chief aim of this paper is to make Sensitivity – and not adherence – as plausible as it can be, I ask the reader to assume the following: Either (1) In all cases of (intuitive) knowledge, the adherence condition is met (in advance of compelling counterexamples coming in, in which case see disjunct (2)). Or (2) The adherence condition is not a necessary condition on knowledge. This assumption enables me, in what follows (5.5–5.6), to talk of Nozick's adoption of CON and DIS *allowing* him to endorse Distribution and AC, respectively.

10 Isn't this case essentially the same as Kripke's (2011: 186) 'red barn' variation on the 'fake barns' case? No. First, note that one can – indeed, most epistemologists do – take the 'red barn' proposition in Kripke's case as involving a (complex) conjunctive predicate, rather than a conjunction. Insofar as this is the case, and insofar as my account treats these closely related parsings differently (cf. 5.8 *infra*), we have a difference between my reductio and Kripke's case. Second, and more importantly, insofar as one takes Kripke's case to involve a conjunction, my *reductio* and Kripke's case *do*, for Nozick, share the form: S knows that (p & q), but does not know that q. However, even on this alternative, permissible parsing, we have an important difference between the two cases: In my *reductio*, the subject has *no basing evidence* for q (cf. n.11), whereas in Kripke's case the subject *does* (albeit, as in my case, the belief in q isn't held Sensitively). It is a corollary of this that it is highly counterintuitive in my case that the subject knows (p & q), whereas that is not so highly counterintuitive in Kripke's case. And that is why my case, but not Kripke's, serves as a *reductio* of Nozick's account of knowledge *with respect to the belief in* (p & q) *considered alone*. That is not the moral of Kripke's case. Third, and relatedly, in my case q comes out false only in worlds more remote than worlds in which p comes out false, whereas this is not so in Kripke's case.

11 Put somewhat metaphorically, the subject's belief *outstrips his evidence*. Indeed, this is a general problem for Sensitivity accounts of knowledge (*modulo* the adherence condition being met): a Sensitively held belief can outstrip one's evidence – cf. Martin's (1983) case in which a subject believes p Sensitively when his evidence, intuitively, only entitles him to believe (p or q). At a general level, any modification to Sensitivity must somehow *link* belief and evidence. My ensuing modifications to Sensitivity – modifications which do not accommodate Martin's case – are means of linking belief and evidence for conjunctions and disjunctions, respectively.

12 There is nothing special about headaches. Further *reductios* can be constructed, using other sources of evidence, that exhibit the same structure. Indeed, the reader unsatisfied with the outré nature of my *reductio* can substitute a preferred *reductio* (with an alternative source of evidence, but exhibiting the same structure) in its stead. A word of caution, however: My suspicion is that the less outré one's *reductio* is, the more contestable will be the 'closeness result' constituting the required structure. In essence, my suspicion is that there is a trade-off in play between the benefit of being 'less outré' and the benefit of securing the 'closeness result'.

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to conjunctive propositions.[13] And we might think that the Sensitivity condition is to blame. But we need not abandon Sensitivity *tout court*. (And note the dialectic between Hawthorne and Nozick: it is not that Hawthorne is, in his arguments under consideration in this paper, denying that something like Sensitivity is necessary for knowledge. Thus to offer – as I come to do – principled modifications to the Sensitivity condition is not, to repeat, perforce to be a card-carrying Sensitivity theorist; it's simply to make Sensitivity as plausible as it can be.) Here is the obvious, and natural, fix. Supplement Sensitivity with an alternative (strengthened) necessary condition:

> CON: If *p* is a conjunctive proposition, S knows *p* only if S believes each of the conjuncts of *p* Sensitively.[14]

This supplementation straightforwardly enables us to avoid the *reductio*: in a world in which you're an amputee sitting alone basing your beliefs on your headache, you would still believe that you had all your limbs. Given you do not believe the second conjunct of (*P*) Sensitively, you cannot, on the modified account, know (*P*).

A word about applying CON (which also goes, *mutatis mutandis*, for DIS, my coming proposal with respect to disjunctions): We suppose Sensitivity is a necessary condition on knowledge. We then test propositions for Sensitivity as we check for knowledge. If a conjunctive proposition comes to be checked thus, we filter it off from unmodified Sensitivity to CON. And iff that conjunctive proposition meets CON's necessary condition on knowledge, (modified) Sensitivity is met.

This observation enables me to be a little more precise about what I mean when I talk of 'modifying Sensitivity' (where Sensitivity states a putative necessary condition on knowledge). I do *not* mean that I am modifying what it is *to believe a proposition Sensitively*. That is just what it has always been: it is a matter of meeting the condition that if the proposition were not true, one would not believe it. What I am instead doing is modifying the *connection between Sensitivity and knowledge*. For a conjunction, it is not required for knowledge of the conjunction that the conjunction should be believed Sensitively. Rather, it is required that each conjunct should be believed Sensitively. (Again, the same goes, *mutatis mutandis*, for DIS.)

4·3

Can I do better than simply contending that CON is the 'obvious, and natural, fix'? Clearly, it would be better if I can. Here is one possible bolstering of CON: CON is true because belief in a conjunction *just is* belief in the conjuncts, and so knowledge of a conjunction

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13 Take, as a default rule, the logical form of propositions to be determined by the logical form of the sentences semantically expressing them in this or that case (cf. n.10 supra and 5.8 *infra*).

14 Note that Becker (2012: 95) raises, but does not develop or pursue, something in the region of CON. Finally, note that if Sensitivity is a necessary condition for knowledge, then the effect of this condition CON could also be achieved by a condition stating that:

> DIST: If S knows a conjunction, then S knows each conjunct.

For if Sensitivity is necessary for knowledge, then DIST requires that each conjunct is believed Sensitively.

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just is knowledge of the conjuncts. Therefore, whatever account is plausible for knowledge of 'atomic' propositions, we can use that account to give an account of conjunctive propositions. Since a Sensitivity account is plausible for 'atomics', CON should be endorsed.

However, even assuming, *pro tem*, its validity, pretty quickly, two problems arise with the soundness of any such line of argument – a line of argument reliant, in its opening premise, on the following biconditional:

BEL CON*: S believes a conjunctive proposition, p iff S believes each of p's conjuncts.

First, and more sketchily, it might be objected that belief in a conjunction somehow involves (in addition to believing its conjuncts) the concept of CONJUNCTION, whereas belief in the conjuncts does not. Second, and less sketchily, 'lottery' issues become salient. Take some $p_1, \ldots, p_n$, where one's rational credence for each p_i is very very high and the p_is are independent. If we make n large enough, the conjunction can have a very low probability – presumably one incompatible with belief.

These two objections share the goal of breaking down BEL CON* in the right–left direction. That is, each is designed to falsify the thesis that belief in each conjunct is sufficient for belief in the conjunction in question. And, insofar as they work – and I think they do –, they belie any efforts to bolster CON by reliance on BEL CON*.

But, even prior to consideration of these objections, one might well have had instinctive doubts about a proposal seeking to bolster CON – a principle only stating *necessary* conditions on knowing a conjunction – by so ambitiously trying to reach the interim conclusion that knowledge of a conjunction *just is* knowledge of the conjuncts (cf. n.23 *infra*). Indeed, one might wonder whether one needs an interim conclusion as strong as this to provide *some* bolstering of CON. Thus, one might – new proposal –, less ambitiously, seek to bolster CON by exploring weakening BEL CON* so as to be read in just the left–right direction:

BEL CON: S believes a conjunctive proposition, p only if S believes each of p's conjuncts.

I do not seek here to conclusively defend BEL CON (other than to note it is not counterexampled by the above objections to BEL CON*). It has some initial plausibility, however. Insofar as it is true, it could offer some extra support for CON beyond a bare appeal to its intuitiveness as a fix. Appeal could be made, that is, to BEL CON – a *grounding* principle concerning belief.

What, though, *can* be validly inferred from BEL CON? Specifically, can one infer that S knows a conjunctive proposition, p only if S *knows* each of p's conjuncts? It would seem not. (Likewise, even though I initially granted the validity of the original, more ambitious, proposal, I do not think one can infer that knowledge of a conjunction *just is* knowledge of the conjuncts, from the proposition that belief in a conjunction *just is* belief in the conjuncts.) All that can be validly inferred from BEL CON would appear to be that S knows a conjunctive proposition, p only if S *believes* each of p's conjuncts. (Likewise, all that can be validly inferred from BEL CON* would appear to be the immediately foregoing conditional *and* S knows each of p's conjuncts only if S *believes* the conjunctive proposition, p.) Thus, this new, less ambitious, proposal, with BEL CON as a first premise, does not promise to vindicate CON in the dramatic manner promised by the original, more ambitious, proposal.

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Now, all of the foregoing is, concededly, fairly inchoate. Nonetheless, it seems we *can* conclude the following: Insofar as BEL CON (and, indeed, BEL CON*) offers *some* (additional) reason to accept CON (beyond a bare appeal to its intuitiveness as a fix), further exploration of it, its truth, what it *supports*, and what can be validly inferred therefrom, by the Sensitivity theorist will be worthwhile (cf. Williamson 2000: 283).

5. REJECTING EQUIVALENCE

5.1

Recall Equivalence:

> *Equivalence*. If you know a priori that p and q are equivalent and you know p, then you are in a position to know q.

As I have just argued, CON is an independently motivated modification of Sensitivity. But if Sensitivity is modified with CON, we can see why Equivalence fails for Nozick. When you know a priori that p and q are equivalent and you know p, *and where q is a conjunctive proposition the second conjunct of which you do not believe Sensitively* (*on the basis of your evidence for p*), then you are *not* (*confining yourself to your evidence for p*) in a position to know q.[15]

Moreover, supplementing Sensitivity with CON enables Nozick to maintain the attractive Distribution, since one can know a conjunction only if one Sensitively believes each conjunct. Nozick can thus accept Distribution but deny knowledge of (12) (since one does not Sensitively believe its second conjunct) which blocks the route to knowledge of (11).

5.2

And so, returning to Hawthorne's 'Equivalence and Distribution' pro-closure argument, the step from (9) to (12) is no longer legitimated. You can know (presumably on the basis of an experience as of a zebra): (9) that is a zebra. But, with Equivalence falsified, it doesn't follow that you can know: (12) that is a zebra and that is not a cleverly disguised mule. On the basis of your experience as of a zebra you won't believe the second conjunct of (12) Sensitively. With the route to (12) blocked there is now no route to Hawthorne's conclusion that you can know – *pace* Nozick – that is not a cleverly disguised mule.

With CON, we can follow Nozick in relinquishing SPC, not by relinquishing Distribution, but instead by relinquishing Equivalence, which fails when CON is added,

15 Of course, this response assumes that there can be distinct a priori equivalent propositions. Moreover, CON requires, *pace* Lewis and Stalnaker, that propositions are more finely individuated than necessary equivalence. Rejection of the Lewis–Stalnaker picture is independently motivated by consideration of necessary truths, such as those of mathematics and a posteriori symmetric supervenience. The non-identification of a priori equivalent propositions is also motivated by consideration of mathematical truths and cases of the contingent a priori. In any case, what Hawthorne's discussion brings out is that this fine-grained individuation is a commitment of those who wish to accept that we can know (9) without knowing (12).

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as an alternative necessary condition, to a Sensitivity account as it needs to be. Given that this failure of Equivalence is independently motivated, the costs of denying SPC by rejecting Equivalence are not as high as Hawthorne suggests (more on this later, in 6.1).[16]

5.3

Next, note Hawthorne has a second, 'Equivalence and Addition', pro-closure argument (2004: 39–41) resting on Equivalence and a second principle:

> *Addition Closure* (AC). Necessarily, if S knows p and competently deduces (p or q) from p, thereby coming to believe (p or q), while retaining knowledge of p throughout, then S knows (p or q).
>
> … Nozick grant[s] that I know:
>
> (6) I have a hand.
>
> With AC I can then deduce:
>
> (7) Either I have a hand or I am not a brain in a vat.
>
> This is a priori equivalent to:
>
> (8) It is not the case that: I lack hands and am a brain in a vat

So from (6), by applications of AC and Equivalence, we can come to know (8). But according to Nozick we cannot know that we are not handless brains in vats.

5.4

As with Distribution and Equivalence, note that AC is also a form of SPC, claiming that knowledge is closed under disjunction introduction – a form of competent deduction. Given that Nozick rejects SPC it would be no *major* surprise if he were also to reject AC. But, as with Distribution, AC is extremely compelling. As Nozick (1981: 230, 692, n.64) admits, rejection of AC 'surely carries [things] too far. … Surely our knowledge

16 The failure of Equivalence will be a general phenomenon; that is, it will occur outside the limited circumstance detailed in 5.1 – if my Sensitivity account is adopted. More on this later (see 5.7–5.8 *infra*). For now, consider the following case (similar to Kripke's 'red barn' variation on the 'fake barns' case): Suppose a red ball is before one, and if it failed to be red it would appear blue. One thus believes that is a red ball Sensitively. Suppose, though, that if the ball failed to be coloured it would appear grey (rather than colourless). One thus fails to believe that it is a coloured ball Sensitively. One thus knows a priori that that the ball is red and that the ball is red and coloured are equivalent, and one knows that the ball is red. But, by CON, one fails to (be in a position to) know that the ball is red and coloured: one fails to believe the second conjunct of the conjunction Sensitively. Note, however, that, independently of CON, one fails to know that the ball is coloured. That one fails to know the *conjunction* that the ball is red and coloured, then, is not obviously an *extra* cost of my Sensitivity account.

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that p does not stand in such splendid isolation from knowledge of other things so closely connected to p'.[17] It would be a cost to Nozick if he were forced to reject it.

As it stands, however, Nozick does reject AC, since we can believe *p* Sensitively and yet fail to believe (*p* v *q*) Sensitively. For example, let *p* be (6) and let (*p* v *q*) be (7). Although, if I had no hands, I would not believe I had hands, it is not the case that if I were a handless BIV, I would not believe I had hands or was not a BIV. Rather, if I lacked hands and were a BIV I would, ex hypothesi, believe I had hands and was not a BIV. Put differently: I know, hence Sensitively believe, that I have hands. Now suppose that I deduce and come to believe that either I have hands or I am not a BIV. If that disjunction were false – i.e. if I had no hands and was a BIV – I would still believe that it was true. So the disjunctive belief is not Sensitive. So Nozick rejects AC.

5.5

But my introduction of CON to account for Sensitivity with respect to conjunctions, makes salient, and suggests an answer to, the question: What is the appropriate account of Sensitivity for disjunctive propositions? We might think that, if Sensitivity with respect to a conjunction requires that we Sensitively believe each conjunct, then Sensitivity with respect to a disjunction requires only that we Sensitively believe some disjunct. We would then need to add the following further modification to Sensitivity:

DIS*: If *p* is a disjunctive proposition, S knows *p* only if S believes one of *p*'s disjuncts Sensitively.

DIS* allows Nozick to say that a subject can know Hawthorne's disjunctions (e.g. (7)) and to endorse AC, just as CON allows Nozick to endorse Distribution.

5.6

DIS*, however, is not plausible in general. We can know a disjunction without knowing or believing any disjunct. For example, we can narrow down the epistemic possibilities: we can know that Danny is in the kitchen or he is in the lounge by knowing Danny is not in the bedroom. Similarly, suppose one knows a city is in France; one can then know that city is in either the north of France or the south of France. DIS*, then, is too strong.

What these cases show is that we can come to know a disjunction without knowing any disjunct. But when we infer a disjunction from one of its disjuncts, we know a disjunction *in virtue* of knowing one of its disjuncts. In such a case, our evidence for the disjunction is our evidence for the disjunct from which it is inferred. So, in this event, in order to know the disjunction we need only believe the disjunct from which it is inferred Sensitively rather than the disjunction itself. This suggests:

17 Dretske (1970: 1009) accepts that if one knows *p* one knows (*p* v *q*) – a principle which entails AC. Williamson (2000: 283), however, notes that knowing a proposition entails grasping that proposition, and grasping a complex proposition involves grasping its components. So given that knowing *p* is not sufficient for grasping *q*, Dretske's claim is subject to counterexample. AC, however, is not subject to such worries.

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DIS: If S infers (p v q) from p, S knows (p v q) on that basis only if S believes p Sensitively.

With DIS, Nozick can endorse AC. That is, we are countenancing a version of the principle Sensitivity that imposes a less demanding necessary condition on a disjunctive proposition when it is inferred from one of its disjuncts (see 4.2 *supra* for how to apply DIS). This will guarantee that modified Sensitivity does not present any obstacle to closure of knowledge under AC. Of course, this does not yet suffice to avoid Hawthorne's argument. Indeed the validity of AC is a premise of Hawthorne's argument. But, as we saw above, Nozick should reject Equivalence. And he should reject the instance of Equivalence in this case too. Although Sensitivity can be met with respect to (7) (i.e. (H v ~BIV)), since one can Sensitively believe (6) (i.e. H), it is not the case that Sensitivity can be met with respect to (8) (i.e. ~(~H & BIV)) even though this is equivalent to (7). And the reason for this is just as it is in Nozick's original rejection of SPC: one can know that one has hands via one's senses or via one's senses and deduction, but one cannot, in any such manner, know that one is not a handless BIV.[18]

So by accepting DIS and endorsing AC, Nozick can once again reject Equivalence in a motivated way. The facts that lead to Nozick's original rejection of SPC are exactly the facts that should lead to his rejection of the transition from (7) to (8). So Hawthorne's second pro-closure argument does nothing to increase the costs that Nozick must face – once, that is, he accepts DIS.[19]

5.7

Let me close by noting two (additional) costs of my proposal. Cost 1: What is the appropriate account of Sensitivity for negations of propositions? Negations of atomic propositions are to be treated just like the propositions they are negations of. That is, Nozick's unmodified Sensitivity condition suffices as a necessary condition for knowledge of the negation of an atomic proposition. But what about the negations of molecular propositions? In particular, what about the De Morgan equivalents of conjunctions and disjunctions? As we have just seen, on my proposed modification of Sensitivity, one can know (7) but not (8) – a negated conjunction. As a result, we cannot treat disjunctions and their De Morgan equivalents alike. But unmodified Sensitivity explains our failure to know (8),

18 Although (7) and (8) are a priori equivalent, the Sensitivity condition does not apply to them equivalently. Because (7) has the logical form of a disjunction, and is inferred from its first disjunct, all that is required is that its first disjunct be believed Sensitively. Similarly, one can know: that is a zebra or it is not a cleverly disguised mule, without knowing that it is not a cleverly disguised mule, even though the latter is equivalent to the former. One can Sensitively believe the first disjunct of this disjunction but one cannot Sensitively believe the second disjunct. But, on my revised version of Sensitivity, such a state of affairs is sufficient for the Sensitivity condition to be met with respect to this disjunction. Finally, note that Roush (2010), who *employs* a Sensitivity condition, and who uses probability rather than counterfactuals, contends that, if one knows H, one knows ~(~H & BIV) (and, more generally, ~(~H & Whatever)). Crucially, this is because, for Roush (2005, 2010, 2012), Sensitivity does not operate as a necessary (or, indeed, a sufficient) condition on knowledge (and thus Roush does not need to forsake SPC; indeed she endorses it).

19 As with CON (4.3 *supra*), one might explore bolstering a defence of DIS by appeal to a *grounding* principle concerning belief. This time, however, the relevant biconditional seems plausible:

BEL DIS: If S infers (p v q) from p, S believes (p v q) on that basis iff S believes p.

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since if I lacked hands and were a BIV, I would still believe that it is not the case that I lack hands and am a BIV.

This might suggest that negations are subject to unmodified Sensitivity. But the *reductio* of Nozick's account of knowledge, which motivated CON, shows that we cannot apply unmodified Sensitivity to negations of disjunctions. If someone believes:

(*P*) I have a headache and I have all my limbs,

solely on the basis of their headache, we concluded that they would not know (*P*) despite satisfying unmodified Sensitivity. Similarly, the same considerations show that we do not know the De Morgan equivalent of (*P*) – viz. It is not the case that I neither have a headache nor all my limbs – even though we satisfy unmodified Sensitivity.

This all suggests the following, then. First, we should treat negations of disjunctions as conjunctions: one can know them only if one believes the negation of each disjunct Sensitively. Second, we should treat negations of conjunctions as subject to unmodified Sensitivity. Finally, note there will be no problematic interactions between CON and DIS, as we can never move directly from a disjunction to a conjunction or vice versa. Overall, however, it must be conceded that these manoeuvres may appear somewhat ad hoc.

5.8

Cost 2: Consider the following case which brings out an upshot of my proposal. Jones gets to know Peter, a paediatrician, by observing him medically treating children, and forms the Sensitive belief that Peter is a paediatrician on the basis of such observation. Nevertheless, Jones, who is in other relevant respects normal, holds the strange misconception that everyone is some kind of physician. So Jones believes the following conjunction: Peter is a paediatrician and Peter is a physician. By CON Jones does not know this conjunction, since his belief in the second conjunct is not Sensitive. But what about if Jones holds a belief concerning Peter involving, not a conjunction, but a complex (conjunctive) predicate? Specifically, what about if Jones believes: λx[x is a paediatrician and x is a physician](Peter)? Jones believes this proposition Sensitively since if Peter did not satisfy the predicate: λx[x is a paediatrician and x is a physician], Jones would not believe that he did.

In sum, we here have a case where Jones *does not* know:

(A) Peter is a paediatrician and Peter is a physician.

But Jones *does* know:

(B) λx[x is a paediatrician and x is a physician](Peter).

Now it is clear that on some fine-grained and plausible way of individuating propositions (A) and (B) express distinct propositions. But how plausible is it to say Peter knows (B) but not (A)? Of course, the approach I have explored denies the general validity of

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Equivalence, but the link between (A) and (B) is, concededly, tight. Indeed, we usually do not distinguish between the two propositions.

(Perhaps, though, the cost of this case is not so bad. I have already allowed that Equivalence is not generally valid. I have also allowed that the very same proposition (a disjunction) needs to meet only a weaker Sensitivity condition, rather than the standard Sensitivity condition for knowledge, depending on whether the disjunction was arrived at by inference from one of its disjuncts. The relevant point here is that (B) is not in the form that allows *immediate* inference to 'Peter is a physician'. And it is only when there is an inference from (p & q) to q, for a proposition that is not believed Sensitively and so not known, that it is important that CON should be applied to give the result that the conjunction (p & q) is not known either.)

Relatedly, consider the following case. Suppose that we have three birds: a male blackbird, a female bird that looks like a female blackbird but is of a different species, and a female sparrow. (Male blackbirds are black and easily recognizable, but females are brown and superficially similar to birds of other species.) Suppose S never makes mistakes identifying male blackbirds; but S would mistake the bird that looks like a female blackbird for a female blackbird; and S always mistakes female sparrows for male sparrows. Suppose that we pick a bird at random and show it to S; suppose we pick the male blackbird. And suppose, to simplify, that the picked-the-female-blackbird-lookalike world and the picked-the-female-sparrow world are equally close to the actual picked-the-male-blackbird world.

It seems that S knows, and Sensitively believes, that the bird is a male blackbird. If the bird had not been a male blackbird then it might have been the female blackbird lookalike or it might have been the female sparrow. So S might have believed that the bird is a female blackbird and might have believed that the bird is a male sparrow but, either way, S would not have believed that the bird is a male blackbird. However, it seems that S does not Sensitively believe that the bird is male. If the bird had not been male, it might have been the female sparrow, and so S might still have believed that the bird is male. Equally, it seems that S does not Sensitively believe that the bird is a blackbird. If the bird had not been a blackbird, it might have been the female blackbird lookalike, and so S might still have believed that the bird is a blackbird.

Nonetheless, as noted, when S sees a male blackbird, it seems that S comes to know, and Sensitively believe, that the bird is a male blackbird. Here is a preliminary way of summarising the point of the case: If the subject were to infer, from the seemingly known premise 'That is a male blackbird' either 'That is a male bird' or 'That is a blackbird', then the inferred conclusion(s) would not be known.[20]

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20 This case bears obvious similarities to Kripke's 'red barn' case (cf. nn.10 & 16 *supra*). Note that Adams and Clarke (2005: 214–16) attempt to rescue Nozick from Kripke's case by appeal to methods: the subject in Kripke's case, for Adams and Clarke, comes to know that a red barn is before her by the 'red barn (look) method' – a method the subject also employs, for Adams and Clarke, to come to know that a barn is before her. A similar *thin slicing of methods* approach could be used, *mutatis mutandis*, to dissolve the force of the male blackbird case against Nozick (cf. Becker 2012: 94). Adams and Clarke are aware of the objection that they have 'slic[ed] methods too thinly or without principle merely to rescue Nozick', and make a somewhat terse effort to address this objection. Myself, I am sympathetic to this objection (hence my presentation of the male blackbird case in the main text), though I do

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What do I say about this case? The proposition believed by S – that the bird is a male blackbird – could involve a conjunction:

(A*) The bird is male and the bird is a blackbird,

which, by CON, S *does not* know. Or it could instead (more naturally) involve a complex predicate:

(B*) λx[x is male and x is a blackbird](the bird),

which S *knows*. In sum, the paediatrician/physician case told us that Equivalence is to be given up in these cases where we have alternative, though closely related, parsings of a single sentence;[21] and now the male blackbird case tells us, moreover, that we can know a proposition involving a (complex) conjunctive predicate without knowing *any* of the corresponding propositions involving the simple predicates – and without knowing the equivalent conjunctive proposition. Overall, however, it must (again) be conceded that these upshots are a cost of my proposal.[22]

6. CONCLUSION

6.1

Where, then, does this leave us? Let me summarise the dialectic thus: (1) Hawthorne raises an objection to Sensitivity, namely that it cannot satisfy Equivalence and Distribution

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not presently have an argument defending my sympathies (cf. Goldman's (1983: 84) 'Dack the dachshund' case). (While Nozick's (1981: 179) treatment of his 'grandmother' case would suggest visual perception being the operative, and intuitive, method in cases such as these, it would be mistaken to take this to be Nozick's final, considered view. Nozick (179–85, 188–96) goes on to consider, with some sympathy, (much) more narrow individuations of methods.) For present purposes, I do not need to commit on this debate. All I need to commit on is the following. Either (1) Adams and Clarke's (and others') thin slicing of methods is apposite, and consequently the cost of Cost 2 for my proposal is diminished (though not eliminated). Or (2) It is not apposite, and the cost of Cost 2 remains undiminished. As my project is not to provide a bullet-proof defence of Sensitivity, I can remain neutral between (1) and (2). (Nozick (193), meanwhile, explicitly states that '[s]ince [he has] not…specified precisely how to identify a method and tell when it is held fixed, there is some leeway in [his] account', and does not take this to be problematic 'provided … discussion of [problem] cases [does] not exploit the leeway … inconsistently.')

21 The sentence, in that case, could either be 'Peter is a paediatrician and Peter is a physician' (with the conjunction parsing being more natural), or 'Peter is a paediatrician and a physician' (with the complex predicate parsing being more natural).

22 Here is an approach which promises to avoid cost 2 by effectively giving the same treatment for conjunctive propositions and propositions involving conjunctive predicates. Supplement CON with:

> CON*: If *p* is a proposition of the form λx[Fx and Gx](a), S knows *p* only if S believes the proposition λx[Fx](a) Sensitively and S believes the proposition λx[Gx](a) Sensitively.

Beyond the obvious cost of further complicating one's account of knowledge (by further modifying Sensitivity), I do not at present know if there are further (perhaps severe) costs of endorsing CON*. (And insofar as CON requires bolstering beyond an appeal to its intuitiveness as a fix (cf. 4.3 *supra*), so too does CON*.) Finally, note that Becker's (2012: 95, n.13) 'large shrimp' case is relevantly similar to the cases I discuss here in 5.8.

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or Equivalence and AC. (2) Nozick explicitly rejects both Distribution and AC. And that is a cost of his account. (3) Hawthorne's argument shows that a Sensitivity account which respects Distribution and AC cannot respect Equivalence. So a dilemma arises: either reject both Distribution and AC or reject Equivalence. (4) I note that a Sensitivity account ought to reject Equivalence in any case (the reductio of section 3), and so Nozick picked the wrong horn of the dilemma: Sensitivity is free to respect Distribution and AC. Of course, rejecting Equivalence is itself a cost. (5) But the best way for the Sensitivity theorist to go is problematic. As well as giving up on Equivalence, Sensitivity has to engage in manoeuvring which might appear ad hoc in the special cases of De Morgan's equivalents, and also has to give up on providing similar treatments of different parsings of 'conjunctive claims' (but cf. n.22).

No grand conclusion is warranted, to the effect that, once the Sensitivity theorist picks the right horn of Hawthorne's dilemma, there are no associated costs. We can, though, conclude that the costs to the Sensitivity theorist are somewhat more bearable once it is recognised that those costs are being incurred for principled reasons (the *reductio* of section 3). To that extent, then, we can conclude that Hawthorne's pro-closure arguments are not knock-down.[23,24]

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23 Note in closing that Nozick (1981: 227–8, 230) also rejects the plausible claim that knowledge is closed under universal instantiation and existential generalization. What I say about conjunctions and disjunctions applies, *mutatis mutandis*, to quantified statements too. If we take universal statements to be conjunctions and existential statements to be disjunctions, the natural application is that to know the universal statement 'for all x, F(x)' one must believe all its instances Sensitively, and to know the existential statement 'for some x, F(x)' one must believe (at least) one of its instances Sensitively (subject to DIS's proviso). The application to universal statements threatens to be the more problematic application. (Though note one pseudo-problem: As we are only here considering necessary conditions for knowledge, it is no problem that knowing universal statements requires more than believing all its instances Sensitively. In particular, it is no problem that it also requires a *that's all* belief to be held Sensitively.) Consider: The subject might not be able to express all the instances. Indeed, it might be that no natural language has names for all the objects quantified over (e.g. if the domain is very large). This worry can be defused by keeping clear that belief is a dispositional mental state; not an action. And so actual limitations on the part of the subject or natural language need not preclude Sensitive belief provided the subject has an appropriate set of dispositions.

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