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- Two key principles regarding inferential knowledge.

Closure (C). If *S* knows that *P* and *S* competently deduces *Q* from *P* (while maintaining her knowledge that *P*), then *S* (thereby) comes to know that *Q* (*via* deductive inference).

Counter-Closure [9] (CC). If *S* competently deduces *Q* from her belief that *P*, (thereby) coming to know *Q* (*via* deductive inference), then *S* knew that *P* (and she maintained her knowledge of *P* throughout the inference).
- My main focus will be on (CC), but I'll return to (C) in the end. I'll also discuss the following *generalization* of (CC).

Generalized Counter-Closure (GCC). If *S* infers *Q* from her belief that *P*, (thereby) coming to know *Q* (*via* said inference), then *S* knew that *P* (and she maintained her knowledge of *P* throughout the inference).
- Before getting into the historical dialectic concerning (CC) & (GCC), I'll make some preliminary remarks about (C) & (CC).

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- I'm interested in (C) and (CC) as *explanatory* principles — not merely as *classificatory* principles. This will explain my usage of “thereby” and “*via*” (much more on this below).
- There are some key symmetries and asymmetries in my formulations of (C) and (CC). Consider this *explanandum*:
 - (1) *S* came to know (*in contrast to merely truly believing*) that *Q* (*via* a deductive inference from her belief that *P*).
- One epistemological *symmetry* between (C) and (CC) — with respect to (1) — involves the following *explanans*.
 - (2) *S* knew that *P* (and she maintained this knowledge through a competent deduction of *Q* from her belief that *P*).
- (C) implies that (2) is *sufficient* for (1), while (CC) implies that (2) is *necessary* for (1). In this sense, (C) and (CC) are (explanatorily) *symmetric*. There are also some *asymmetries*.
- I'll focus on three of these asymmetries...

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- Those who accept (CC) are also inclined to accept (GCC). But, the analogous generalization of (C) is *absurd*.

Generalized Closure (GC). If *S* knows that *P* and *S* infers *Q* from *P* (while maintaining her knowledge that *P*), then *S* (thereby) comes to know that *Q* (*via* said inference).
- Another interesting asymmetry between (C) and (CC) can be seen *via* an analogy with deductive entailment.
- Entailment (or whatever your favorite explication of entailment is) involves the preservation of certain (alethic) *good-making* features of premises (*e.g.*, *truth*).
- Entailment does *not* involve the preservation of (alethic) *bad-making* features of premises (*e.g.*, *falsehood*).
- (C) implies the inferential preservation of an (epistemic) *good-making* feature of premises (*knowledge*); and, (CC) implies the inferential preservation of an (epistemic) *bad-making* feature of premises (*non-knowledge*).

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Closure (C). The epistemic good-making feature of premises: *being known* is necessarily preserved by (single-premise) competent deductions (if the premise retains the property of *being known*, throughout).

Counter-Closure (CC). The epistemic bad-making feature of premises: *being unknown* is necessarily preserved by (single-premise) competent deductions.

Generalized Counter-Closure (GCC). The epistemic bad-making feature of premises: *being unknown* is necessarily preserved by *all* (single-premise) inferences.

- One final (preliminary) asymmetry between (C) and (CC): the usual (alleged) counterexamples to (C) involve “heavyweight” conclusions [4]; whereas, the alleged counterexamples to (CC) involve *mundane* conclusions.
- Before delving into the contemporary dialectic surrounding (CC) and its problems, it is worth noting that this genre actually began with (alleged) counterexamples to (GCC).

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- In the immediate wake of Gettier, Saunders & Champawat [12] presented (something similar to) the following case.

Urn. An urn contains 2 balls of unknown (to Sam) color distribution (each ball is either red or blue). Sam samples one ball (with replacement) from the urn many, many times. He is a very reliable counter and observer (and Sam knows all of the above facts). Sam then reasons as follows:
“(P) I have sampled a red ball from the urn exactly n times in a row. \therefore (Q) Both of the balls in the urn are red.”
- As it happens, the streak of red balls observed by Sam had length $n + 1$. So, P is false, but (intuitively) Sam knows Q .
- I will return to **Urn**, below. But, first, I will rehearse some of the recent literature on KFF. Here, I follow Luzzi’s [9].
- Recently, there’s been a flurry of papers on KFF (and KFNK) [7, 14, 8, 2, 10, 5, 1, 9, 11, 13]. I won’t attempt a survey here. Rather, I’ll focus on one recurring theme (and one worry).

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- Here is a typical (putative) counterexample to (CC) [9].

Handouts. Counting with some care the number of people present at my talk, I reason: “(P) There are 53 people at my talk; therefore (Q) 100 handout copies are sufficient.”
- As it happens, P is false. There are 52 people in attendance — I double counted one person who changed seats during the count. Nonetheless, I (intuitively) know that Q .
- The standard (initial) response to such examples is to posit the existence of an *alternative epistemicizer*, P' , such that (a) S is disposed to believe P' , (b) S is in a position to know P' , and (c) P' would suffice to epistemicize S ’s belief that Q .
(P') There are *approximately* 53 people at my talk.
- Unfortunately, this choice of P' will not always work. Luzzi [9] reports the following example due to Crispin Wright.¹

¹I had independently come up with similar examples in a seminar I taught at Berkeley in 2010 [6]. Luzzi & Wright scooped me on various things, in fact.

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Marbles. As they swiftly roll by on the wooden track I have assembled for them, I count a series of marbles. The procedure yields 53 as a result. With some confidence, I come to believe that there are 53 marbles on the wooden track. Recalling that my logic professor told me earlier that day that precision entails approximation, I competently deduce that there are approximately 53 marbles (without any loss of confidence in my belief that there are 53).

- Despite my best efforts in the difficult task of counting the rapidly-rolling marbles, I double-counted one marble; there are actually only 52. So, P is false, but I know that Q .
- ☞ In this case, retreating to P' is not helpful, since $P' = Q$.
- At this point, there are various *alternative*, alternative epistemicizers that the defender of (CC) might try to appeal to. Specifically, consider the following two alternatives:

(P'_α) My total evidence (E_P) regarding P .
(P'_β) E_P and if E_P , then Q .

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- As Luzzi [9] points out, using P'_α as one’s alternative epistemicizer has the consequence of turning a (seemingly) deductive inference into an ampliative (or inductive) one.
- We can try to restore the intuitively deductive nature of the inference in this case by using something like P'_β instead.
- ☞ But, the availability of P'_β is not limited to deductive cases.
- By combining Saunders & Champawat’s **Urn** and Wright’s **Marbles**, we can generate an inferential chain that results in a dilemma for the [GCC] alternative epistemicizer strategy.

Wright’s Urn. An urn contains 2 balls of unknown (to Wright) color distribution (each ball is either red or blue). Wright samples one ball (with replacement) from the urn many times. He is a very reliable counter and observer (and he knows all of this). He then reasons as follows: “(P) I have sampled a red ball from the urn *exactly* n times in a row. \therefore (Q_1) I have sampled a red ball from the urn *approximately* n times in a row. \therefore (Q_2) Both of the balls in the urn are red.”

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- As before, Wright seems to know (Q_2) in this case. But, his pair of inferences trace back to a false initial premise (P).
- As in **Marbles**, appealing to an *approximation* claim P' as our alternative epistemicizer for Q_1 will not work (since $P' = Q_1$). Using P'_ξ would ensure that Q_1 is “deduced”.

☞ But, then, what prevents us from epistemicizing Q_2 via P''_ξ ? (P''_ξ) E_P and if E_P , then Q_2 .

- This would seem to turn Q_2 into *deductive* inferential knowledge. But, intuitively, this inference was *ampliative*.

- **Factivity**. If P is (an explanatorily essential) part of S 's epistemic basis for her belief that Q , then — provided that S knows that Q — P must be true.
- **Actuality** [1]. If S comes to believe that Q via competent deduction from her belief that P (while maintaining her belief that P), then P is (an explanatorily essential) part of S 's epistemic basis for her belief that Q .

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- **Factivity** + **Actuality** jointly entail the following:
 - (+) If S comes to know that Q via competent deductive inference from her belief that P (while maintaining her belief that P), then P must be true.
- Those (like me) who reject (+) *must* reject *either Factivity or Actuality*. I accept **Actuality** and reject **Factivity**.
- Defenders of (CC) also accept (+). And, while they accept **Factivity**, they *reject Actuality*. They distinguish:
 - (1) Why does S **believe** that Q (in contrast to **not believing** Q)?
 - (2) Why does S **know** that Q (in contrast to **merely truly believing** that Q)?
- (1)'s *explanans* include S 's inference from her belief that P , but (2)'s *explanans* **do not** (they incl. *another* epistemicizer P').

☞ This disunified explanatory strategy threatens *Closure's* (epistemic) explanatoriness, since ampliative alternative epistemicizers P'_α are *almost always* available.

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- In the (apparent) *good* cases of closure, we answer question (2) with an epistemological explanation that makes essential reference to the deduction from the agent's belief that P .
- I think this is because our usual epistemological explanations in *good* cases of closure *presuppose Actuality*.
- Once we give up **Actuality**, we run the risk of undermining (C)'s explanatory power, since we now need a principled way to determine when the agent's inference from P is an essential part of the explanation of why the agent knows Q .
- As I see it, we face a choice between two “packages”.
 - Unified Package.** {(C), ¬(CC), **Actuality**, ¬**Factivity**}
 - Disunified Package.** {(C), (CC), ¬**Actuality**, **Factivity**}

☞ I favor the **Unified Package**. My diagnosis: it was a mistake to expect the question “when are *bad*-making features of premises preserved by competent deduction?” to have a simple, lawlike answer (*i.e.*, via a general principle like CC).

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