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Intermodal Relevant Process Types

Introduction

According to Aristotle's Justified-True-Belief theory of knowledge, *S* knows *p* only if *S* is justified in believing *p*. But what beliefs are justified beliefs? According to Alvin Goldman's Process Reliabilism, *S* is justified in believing *p* when *S'*s belief that *p* was formed by a token-instance of a reliable process type. Richard Feldman objects.[1] *S'*s belief that *p* is produced both by a process that began weeks ago and a process that began ten minutes ago. Which process is relevant? Process Reliabilism is missing an account of relevance-makers for process types, respective belief formation. At least, Feldman cannot come up with an adequate account of relevant process types that avoids these problems, and he wagers that you cannot either.

Feldman files two complaints against process reliabilism, *No Distinction*, the worry that individual experiences affect the reliability of our judgements in a way that process reliabilism is blind to, and *Single Case*, the worry that there are not enough process instances to develop reliability measures. In this paper, I develop an intermodal analysis of process reliabilism and argue such an analysis is adequate to answer Feldman's complaints.

In section 1, I propose that relevant process types are sub-types of what I call the 'cognitive belief-forming process,' the cognitive process essential to belief-formation. In section 2, I develop reliability measures for belief-forming process. I call the prospective class of certain class of sub-types of the cognitive belief-forming process 'coaxal processes.' In section 3, I define the process relevant to the formation as a sub-type of coaxal processes. Hence, I give a comparably descriptive account of relevant process types. In section 4, I present Feldman's challenges and attempt to show that the given account is sufficient to meet those challenges.

[1] Feldman (1985).

Section 1: Relevant Cognitive Process

Process reliabilism requires, for each belief, to identify the process that is relevant to that belief's justificatory status. I propose that a process type is relevant only if it is a sub-type of a particular cognitive process, viz. the cognitive belief-forming process – BFP. BFP is the cognitive process whose essential function is to form beliefs. It is on the same order, kind, or compositional level as other familiar cognitive processes such as visual processing, memory recall, arithmetic reasoning, etc.; it is a fixture of any well-functioning mind. BFP may overlap with other cognitive processes. Beliefs *can* be caused by cognitive processes partly implemented by processes other than BFP, but they are not *necessarily* caused by those processes. Any cognitive process that produces a belief overlaps BFP on the occasion. That the cognitive BFP is essential to belief-formation is useful because it allows us to focus our search for a relevant process type on intervals of BFP.

How does BFP work? BFP is implemented by two sub-processes. The first forms belief-content from perceptual information, and the second somehow transmits that information – globally, to memory, dynamically, or statically – as a product or output. We individuate BFP from other cognitive processes as the process responsible for producing beliefs in response to perceptual information. I caution, however, that 'perceptual information' in my usage *may* be non-standard. By 'perceptual information' and 'perceptual content', I mean both sense impression data and introspective contents. So, I am relying on the idea that introspection is perception. I am also treating contents as Edenic or otherwise internal to the cognizer; perceptual contents are not the Russellian or Fregean contents of our experiences. [2] [3]

The advantage of this hands-off taxonomy: we need not worry about how to carve out a BFP respective the role of inferential reasoning, visual processing, etc. in belief-formation. The products of inferential reasoning, visual processing, and so on, taken together, compose the perceptual contents that BFP relies on to form beliefs. This relation between perceptual contents and BFP is both useful to the individuation of relevant processes and allows us to dispense with Goldman's distinction between belief-dependent and belief-independent processes because the process relevant to the justificatory status of a belief is a sub-process of BFP. [4] [5] [6]

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[2] Chalmers (2006).

[3] Occasionally, we talk about the reliability of the visual process, or the auditory process, or one's inferential reasoning, etc. On the proposed account, this talk is analyzed as the reliability of visual perceptual evidence, auditory perceptual evidence, or inferential perceptual evidence. *S*'s BFP may be more successful overall at forming beliefs about what is standing right beside *S* using visual perceptual evidence, but without such evidence, it is the same cognitive process that forms beliefs about what is standing beside *S* because the BFP forms all of *S's* beliefs.

[4] Goldman (2008, p.340-1).

[5] Dispensing with Goldman's distinction is not strictly an improvement on his theory, but it simplifies matters in important ways.

[6] Extra-cognitive belief forming processes are possible. Blows to the head is an example Feldman discusses (1985, p.169). Is the above proposal that the relevant process types are a sub-class of a cognitive process too restrictive? Only in the strictest sense, but we shouldn't worry. To start, we don't know much about non-cognitive belief forming processes and we certainly don't care too much about them. As far as I am aware, there have been no reported cases of successful belief implantation. The procedure certainly wasn't around when Plato argued that knowledge is JTB. So, we are within reason to set our worries about extra-cognitive BFPs aside for the time being.

Section 2: Reliability Measures

In this section, I begin to enact the strategy of identifying relevant processes as BFP sub-types to work by first developing reliability measures for prospective BFP sub-types I call 'coaxal processes.' Coaxal process tokens are BFP states with causal powers or dispositions to produce certain beliefs in response to certain perceptual contents, which means they are also BFP tokens and, hence, coaxal processes are BFP sub-types. The belief-forming powers or dispositions of coaxal processes are represented as functions from perceptual contents or experiences to belief contents, which can be used to individuate coaxal processes.[7] The domains of coaxal process identifying functions include any set of perceptual contents. The ranges of these functions are always belief singletons.[8] For each possible coaxal process type, there is such a function. Finally, the reliability measure of any coaxal process type is the ratio of the measure of its possible token-instances which form a true belief to the total measure of its possible token-instances.

Experience = $\mathcal{P}\{x : x \text{ is a perceptual content}\}$
Belief = $\{\{x\} : x \text{ is a belief}\}$
Coaxal Belief-Forming Processes = $\{\langle x, y\rangle : x \in$ **Experience** and $y \in$ **Belief**$\}$
Reliability Measure : **Coaxal Belief-Forming Processes** $\rightarrow$ **I** [9]

Suppose *S* forms the belief *p* at time t_2. For any time t_1 prior to t_2 such that *S* exists, *S*'s BFP state at t_1 is a token-instance of some coaxal process type, *r*. Being a BFP instance, *r* has dispositional or causal powers to form certain belief states in response to certain perceptual contents. The set of all perceptual contents that would cause the *r* token-instance to produce a belief state with the propositional content *p* is the domain *D* of the *r*-representing function. Across all possible worlds, for every BFP state with the disposition to produce belief states with the content *p* in response to every and only the members of *D*, that cognitive BFP state is a token instance of *r*. The reliability of *r* is the ratio of the measure of *r* token-instances that form the true belief that *p* to the total measure of *r* token-instances across possible worlds.

[7] I grant that the domains of these functions may vary because there may be necessary restrictions on the kinds of experiences that different mental states can process, e.g. BFP of the mentally colorblind may not be able to take colorful visual contents as inputs. I must insist, however, that all coaxal process tokens of the same type share the same set of possible input experiences, even if some of those experiences are nomologically possible or mental state possible for only a proper subset of the tokens of that type.

[8] To see why, consider an umpire who reliably forms beliefs about the location of baseballs in relation to strike zones but only unreliably forms beliefs about French politics. We don't normally reason that someone's lack of knowledge of French politics has anything to do with their ability to call strikes. But we also cannot insist that the work of umpires and French politicians must be unrelated. To avoid the messy business of grouping kinds of beliefs together, I recommend that relevant BFPs are partly individuated by their token instances, each being responsible for the same contents to prevent the reliability of belief-formation about one subject encroaching on the reliability of belief-formation on another subject.

[9] '**I**' denotes the unit interval, the set of real numbers greater than or equal to 0 and less than or equal to 1.

Section 3: The Difference Between Coaxal Process Types and Relevant Process Types

In the previous section we saw how to come up with a reliability measure for coaxal processes. In this section, I propose a rule to decide which coaxal process is the process relevant to the justificatory status of the produced belief. It cannot be that every coaxal process is relevant to the justificatory status of the belief it produces because (almost) every belief is produced by many distinct coaxal processes with varying reliability measures between them. Consider the following: *S* forms the belief that *p* at time t_n. *S*'s BFP state at time t_{n-1} has the disposition to form the belief that *p* in response to any set of perceptual contents ∈ *D*. Hence, *S*'s cognitive BFP at time t_{n-1} is a token-instance of the coaxal process *r*. The same applies *mutatis mutandis* to a distinct coaxal process *r′*, its domain D′, and *S*'s cognitive BFP state at t_{n-2}. We lack reason to believe *r* and *r′* are necessarily identical. Which process is relevant to the justificatory status of *p*?

There are different plausible answers to this question utilizing coaxal processes. I only consider one.[10] Respective *S*, the chronologically ordered set of distinct coaxal processes that form belief *p* is *R*. Let $r_0 \in R$ refer to the oldest process, $r_1 \in R$ to the next oldest, etc. The difference between the reliability measures of any two coaxal processes in *R* is $\Delta(r_n, r_m)$. When the difference between the reliability measures of two coaxal processes is negligibly small, we will say that $\Delta(r_n, r_m) \leq \varepsilon$. There is some largest whole number *n* such that $n \leq |D|$ and for any whole number $m \leq n$, it follows $\Delta(r_n, r_m) \leq \varepsilon$. Then r_n is the youngest coaxal process of statistical significance, which is the recommended ground that r_n is the relevant process. Hence the sought-after ground is that there exists some coaxal process before which no other coaxal process made significant use of additional perceptual evidence in *S*'s forming the belief that *p*. Hence coaxal processes prior to the relevant process' token-instance in the history of *S* are not relevant, and those individuated *modulo*-'after' are likely to have the wrong reliability measure.

[10] There are at least three unconsidered options for solving this problem. The first is that only the least temporally distant coaxal process from the belief picks out the relevant process, viz. the BFP state a moment before one holds a belief. The second is that the most temporally distant coaxal process picks out the relevant process, viz. the BFP state at the beginning of one's cognitive existence. A third option is to find a suitable representative value, e.g. the average, of the set of reliability measures of each coaxal process and say that this representative value determines the justification of a belief. I endorse none of these options, but I recognize that they may be plausible.

Section 4: Objections: No Distinction and World Counting

In this section, I consider Feldman's complaints individually. The first is *No Distinction*. *S*'s possible experiences that produce the belief *p* with respect to the coaxal process *r* seem to hold *p* in varying epistemic status between them. Following Feldman's example, *S*'s possible belief that *p* ("it's a strike!") formed in response to an experience of seeing a pitch near the edge of the strike-zone should strike us as less justified than *S's* possible beliefs that *p* formed in response to an experience of seeing a pitch right down the center of the strike zone. But *r's* reliability measure doesn't take the epistemic status of individual experiences into account – there is no distinction!

Two responses are available on the proposed analysis. The first is that the lowered reliability of our beliefs about near-strike-zone pitches is irrelevant to justification; the first is to play hardball with Feldman. We should wonder what it means for one possible instance of that belief to be of an "obviously different epistemic status" than another? [11] Suppose 'different epistemic status' refers to the varying reliability of two or more processes that caused the belief *p*. [12] We may both grant the existence of a narrow process type which forms the belief *p* in response to near-strike-zone pitches and that this narrow process type has a reliability measure lower than the relevant process type's reliability measure. But we have no reason to think that this narrow process type is relevant to the justification of *p*. On the contrary, we should doubt its adequacy because narrow process types lack spare degrees of freedom for use on different possible evidence that could produce the belief *p*; narrow processes are individuated too finely for those processes to be able to respond to different perceptual evidence. We care about how one responds to different evidence because what someone would believe given different evidence matters to justification. So, the reliability measures of narrow process types are inadequate to confer justification, hence narrow process types are not in competition with relevant process types.

The second part of the answer is that the proposed analysis, for the most part, is designed to take the conditions under which a belief was formed into account. Consider the shared justificatory status of beliefs formed between ideal and unaccommodating conditions. Will my

[11] Feldman (1985, p.161).

[12] Instead, suppose Feldman has something other than process reliability in mind by "epistemic status." The *raison d'être* of process reliabilism is that the justificatory status of beliefs is a function of the reliability of the relevant processes which produce them, however, so the process reliabilist should not admit non-process-determined epistemic statuses into her theory without hostile scrutiny. I contend that all the process reliabilist really requires is an explanation for our attitudes about the likelihood that either experience corresponds to a true belief.

Here is one such explanation: our epistemically pessimistic attitudes about near-strike-zone pitches are subject-dependent. We are assuming along with Feldman that *S* shares our pessimism. If *S* does not share our pessimism, then the reliabilist should reject that there are any subject-independent differences in the epistemic status of *p* beliefs with respect to different pitch experiences. If *S* does share our pessimism, then *S* has a lower personal credence in his belief that *p* (respective *r*) given the experience of a near-strike zone pitch than *S* would have in his belief that *p* (respective *r*) given the experience of a center-strike-zone pitch. If we wanted to, we could say that the final justificatory status of any belief *p* (formed respective *r* and assuming *r* is the relevant process) is the product of *r*'s reliability measure and the ratio of S's credence in *p* over the maximum credence *S* could have in *p* (respective *r* given any experience in the domain of the *r*-function). I leave it to the reader to decide what role, if any, personal credence plays in the justificatory status of beliefs.

beliefs formed about what is beside me in a dark room be as justified as those beliefs that I would have formed about what is beside me in a well-lit room? Sometimes, but recall, only if I form the *same* belief in the dark room as I would in the well-lit room and only if the *same* process is relevant in both cases. What I expect to find on the proposed theory is that when the same process is relevant to a particular belief about what is beside me in both a dark room and a well-lit room, then visual perceptual evidence is peripheral to the formation of belief. Indeed, if I mostly would form the belief that such-and-such is beside me regardless of whether I could see what is beside me, then either (i) I have good reasons to believe that such-and-such is beside me without visual evidence, in which case my dark-room belief is justified, or (ii) I have poor reasons for foregoing visual evidence, in which case my lit-room belief is unjustified. Alternatively, if I would *not* almost always form the same belief that such-and-such is beside me regardless of lighting conditions, then I form that belief for different evidence, sounds, smells, etc., in which case the processes relevant to the justificatory status of those beliefs is rarely the same across worlds, even if the same coaxal processes are present. If I had to rely on my hearing to form a belief about what is beside me in the dark, we expect that my hearing evidence combines with earlier perceptual evidence of hearing the person beside me. But then the relevant processes between the two cases are unlikely to be the same process because one begins upon acquiring relevant visual evidence, and the other upon acquiring relevant hearing evidence.

An example: under ideal conditions I form beliefs about what is beside me using immediately prior visual evidence. Supposing the lights go out and I can barely see, then I also take into consideration evidence conducive to what I expect to find beside me. Whether I form beliefs using suitable evidence involves going further back in time than immediately prior to belief-formation. But my BFP states at earlier times correspond to different coaxal processes and therefore different relevance measures.

The second problem is *Single Case*. According to *Single Case,* if there are too few instances of a relevant process type, then our reliability measures for those types will be inadequate. In the worst case, there is only one of each relevant process type, such that they are all completely reliable or completely unreliable. The proposed theory is a propensity account or world-counting account of process reliabilism; it quantifies over possible worlds to come up with a reliability measure for relevant process types. If we cannot count instances of a relevant process tokens across possible worlds, then, given the uniqueness of BFP states, the proposed analysis is seemingly stumped by *Single Case*.

John O'Leary Hawthorne and Ralph Baergen have raised a significant objection to world-counting process reliabilism.[13] They object that it is unclear whether we can quantify over possible worlds. Because there is an infinite number of even and odd numbers, the probability of picking an even number out the set of natural numbers at random depends on the ordering of the set of natural numbers. As Russell has pointed out, the natural numbers may be ordered '1, 2, 6, 3, 8, 10, 5, …' such that the probability of picking an even number at random is 1/3. The problem for a world-counting theory of reliable processes is that we do not know which ordering matters to relevant processes, and there may not be an answer. I have three responses.

First, possible worlds are sometimes thought of as local distributions. For simplicity, let us assume that worlds are local distributions of point-sized occupancy in a cartesian coordinate

[13] O'leary-Hawthorne & Baergen (1995).

system. Call the fusion of occupancy instances along the x-y plane at (0,0), (2,0), and (1,1) *Triangle*. If we wanted to know the ordering of worlds to come up with a salient measure of worlds where a triangle exists, we should think of the number of worlds where not-triangle is implied by the redistribution of the necessary parts of triangle. *Triangle* has seven proper parts that bear no necessary connections to one another. [14] Hence, every *Triangle* inhabited world implies the existence of seven other *Triangle* inhabited worlds and the relevant ordering of worlds should reflect this relation. Thus, the measure of *Triangle* inhabited worlds is $1/8^{th}$ the total measure of possible worlds. It is unclear whether being able to find the measure of *Triangle* instances proves that we can also come up with a relevant ordering of worlds with respect to the reliability of relevant processes, but they give us some hope. At least the matter is not settled.

Second, metaphorically, why should we expect epistemologists to come up with a relevant ordering? Spelling out such details will involve telling a story like the one above, only substantially more complex. Such a story will involve weighing in on the fundamental structure of worlds, the extent of possibility, giving a theory of natural laws, the analysis of possibility, etc. That's a lot of work and a lot of metaphysics. Why not ask the metaphysician to do it? Non-metaphorically, I intuit that there is a greater measure of worlds inhabited by any individual simple structure than by any individual complex structure, and a greater measure of worlds where the truth of a belief is connected to some relevant process than others. I counter that it is a desideratum of theories of possibility that they support the existence of a relevant ordering of possible worlds.

Third, contrary to appearances, the proposed theory of relevant process types may not need to quantify over all possible worlds. Relevant process types as defined are somewhat general. If we can show that BFP states are less granular than complete mental states, then we may be able to show that BFP states are shared between persons and times sufficiently often to come up with adequate reliability measures (in most cases at least). If so, then relevant processes will not be completely reliable or unreliable, and the justificatory status of the beliefs they produce will vary as well.

[14] We find this number by taking the cardinality of the set of *Triangle'*s proper parts including the empty set for those worlds where none of *Triangle*'s parts are instantiated.

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