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REPLY

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Inference and identity

Elmar Unnsteinsson[1,2]

[1]School of Philosophy, University College Dublin, Dublin, Ireland

[2]Institute of Philosophy, University of Iceland, Reykjavík, Iceland

Correspondence
Elmar Unnsteinsson, School of Philosophy, University College Dublin, Newman Building, Office 505, Dublin, Ireland.
Email: elmar.geir@gmail.com

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I argue that beliefs about the identity or distinctness of objects are necessary to explain some normal inferential transitions between thoughts in humans. Worries about vicious regress are not powerful enough to dismantle such an argument. As an upshot, the idea that thinkers "trade on" identity without any corresponding belief remains somewhat mysterious.

KEYWORDS
cognitive architecture, fregentity, identity, implicit belief, inference

1 | INTRODUCTION

Rachel Goodman (2024) raises some important questions about inference and identity. How exactly is object-identity incorporated into human inferential transitions? That is, when such a transition between thoughts depends on assumptions about the identity or distinctness of objects, what is the status or role of those assumptions? Are they added as premises or are they not explicitly represented by the cognitive system?

The theory of confusion in *Talking about* (2022), the so-called *belief model*, is compatible with a naturalistic approach to these questions. I will have more to say about this below. Before that, however, I will make two general comments about Goodman's objections. First, she points out that the belief model should explain both success and failure relative to which confusion is postulated. I focus much more on failure but, as I try to show in the book, the model also explains some aspects of what goes right when thinkers are not confused. Now, my point here is that Goodman's comments focus on one narrow phenomenon of this sort, namely identity-dependent inference. The model is relevant to this phenomenon. However, if it were not, it would still earn its keep in multiple other domains; that is, we would still need to posit beliefs about identity to explain all sorts of cognitive achievements, even in human infants (e.g., Hochmann, 2021; Hochmann et al., 2016). Anyway, Goodman's challenge retains some bite if she can establish that the relevant belief is redundant in inference.

Second, the apparent power of Goodman's objections sometimes depends on her imputing unwanted theoretical ambitions to the belief model. As I see it, she suggests that the *referential* content of the relevant belief does not *fully* explain why the inference in question is *valid*. I agree. I would only worry if it were shown that belief-like *states*, whose contents are referential and involve identity or distinctness, do not *partly* explain some patterns of inferential *behavior* in normal or average humans. I am sorry to disappoint, but a piecemeal approach is best. So, one should start with a partial, descriptive project and only later see how it fits with normative or epistemological theories of explicitly formalized and consciously endorsed valid inferences. Again, the challenge remains if one is worried that the partial theory is incompatible with plausible assumptions whose purview is more ambitious. The objection is now limping and looking for a cane, however.

With Quilty-Dunn and Mandelbaum (2018), I assume that inference is a transition between thoughts, grounded in the rules of a mental logic which applies to the constituent structures of thoughts. Thoughts, rules, structures, and the transitions themselves can all be unconscious and automatic. Logical rules are not plausibly thought of as explicit beliefs, if only because they are impervious to interference by other beliefs. Rather, they appear to be part of the mental architecture of normal humans. *Modus ponens* might be one such rule. Well-worn worries about regress are avoided because the rules are not necessarily represented explicitly by the system but, still, the system normally tokens mental representations in accordance with the rule, within the limits set by memory, attention, and other structural features.

Now, is object-identity part of the basic mental architecture or the content of some intentional state, like belief? The answer is not obvious, but in *Talking about* I assume that it is belief-like. We do indeed revise our beliefs about identity on the basis of evidence. So, object-identity is probably not always like a logical rule in accordance with which inferential transitions occur. We can certainly imagine rules which approximate the job done by the belief that $x = y$. The *rule of identity* might be: *If* $x = y$, *then* $F(x)$ *iff* $F(y)$ *for every extensional context*. The logicality of such a rule is doubtful, however. Still, if I see x today and y tomorrow, certain inferential transitions will tend to occur *only if* the two objects are somehow coordinated in my mind. Ultimately, I think we should be pluralists here. Sometimes, the cognitive system proceeds as if $x = y$, even when there is no concrete mental token which explicitly represents that $x = y$. Since Goodman does not dispute this point, I will carry on, as I do in *Talking about*, assuming that this is a form of *implicit* belief. So, identity-beliefs can either be implicit or explicit, and both types of belief can be either conscious or unconscious. In my view, belief can be conscious by being the content of a representational act whereby the thinker represents themselves as having that belief, or is disposed to do so. Notice that to have such a conscious belief that p does not entail that one has the belief that p, implicitly *or* explicitly.[1] However, if a thinker really does believe that $x = y$, then this is somehow built into their mental architecture, or it is explicitly represented in their minds. The *or* is inclusive. I will make no commitment about whether the belief is also a rule of mental *logic*; for it could be a structural property of a different sort.

2 | REGRESS AND FREGENTITY

With these background assumptions on the table, we can consider the inferences themselves more carefully. Start with a simple case:

[1]In *Talking about*, I tried to avoid the terminology of "conscious belief" and, instead, allowed "explicit belief" to be ambiguous between what I am calling "conscious/explicit" belief here. This was mostly to avoid giving the impression that the book argues for theory of consciousness or conscious states in general.

Inference 1

1. Fa
2. Gb
3. $a = b$
4. $\exists x(Fx \wedge Gx)$

As Goodman would point out, Inference 1 is only formally valid if 1.4 is inferred from 1.1 to 1.3. It is not formally valid if the inference proceeds directly from 1.1–2 to 1.4. But, she argues, we do not get that result if we only consider the *referential* content of 1.3. This is simply because the referential content of 1.3 is identical to the referential content of $a = a$. So Inference 2 ought to be similarly valid, if referential content is sufficient.

Inference 2

1. Fa
2. Gb
3. $a = a$
4. $\exists x(Fx \wedge Gx)$

But Inference 2 is not formally valid. Goodman concludes that the validity of an inference "with coreferential premises, which relies on this coreference to generate its conclusion, is explained by more than just the referential content of its premises" (2024). I agree. But notice that Goodman's argument also works for any *non-referential* content, with an even more damning conclusion for that type of content. Say that x "is fregentical to" y if and only if x and y are related in all possible ways *excluding only* the identity of x and y. So, the truth of the proposition that x and y are fregentical is independent of the question of whether x and y are identical, referentially speaking. Fregentity can consist in object-tracking, coreference, sameness of representational vehicle, or whatever else. But, even so, an assertion of fregentity involves no commitment to the identity of the objects referred to. Now consider a third inference.

Inference 3

1. Fa
2. Gb
3. a is fregentical to b
4. $\exists x(Fx \wedge Gx)$

This inference is simply not valid, even with 3.3 added to the mix. The *identity* of a and b, referentially speaking, is essential to the validity of the inference. The identity of a and a is *also* essential. As we will see in more detail in the next section, this much is implied by a common conception of explanation. Roughly, if the falsity of 1.3 or 2.3 partly explains what goes awry in each inference, when they are false (or disbelieved), then their *truth* (or being believed) is part of what explains the corresponding success. My false belief that there is an apple in front of me partly explains why I failed to grasp it. The truth of that same belief will partly explain why I grasped it successfully. This still does not amount to a disagreement with Goodman, because she argues, more narrowly, that referential content is not *sufficient*.

But what exactly needs to be added to referential content? And what kind of non-referential content is compatible with the idea that the belief model of confusion plays some role in explaining identity-dependent inference? These questions implicitly pose Goodman's most serious challenge, which is, roughly; would not any appeal to non-referential content make the model collapse into a Millikanian *concept model* of confusion?

I hope my response is fairly predictable by now. Consider Inference 1 again. Strictly speaking, in light of my background assumptions, 1.3 is not really a *premise* in an inferential transition. Neither is 1.1 or 1.2. Rather, 1.3 is the written record of an act of intentionally endorsing a particular belief. Such an act cannot be a premise in the sense at issue. What is the sense at issue? Well, a premise is something which functions as a premise in an actual inferential transition between thoughts. If so, we have two options to choose from when considering the ontological status of the mental state whose content is recorded by the sentence in 1.3. First, the mental state could consist in the tokening of a concrete representation whose explicit referential content is that $a = b$. Assuming that the transition from the thoughts specified in 1.1–3 to the thought specified in 1.4 still counts as an inference, we need some logical rule which helps to explain the transition. This seems easy enough, since tokening representations with the structure of the premises could, *ceteris paribus* and in virtue of some rule of mental logic, result in the tokening of a representation with the structure of the conclusion. This assigns premisehood to the state specified in 1.3.

Second, the mental state could consist in the proposition or rule $a = b$ being built into the mental architecture. Again, then there is no token representation which has this proposition as its content but the identity is an implicit and non-discrete belief of the cognitive system. On this alternative, the thought specified in 1.3 is not a premise in any sense. This line indicates a rule or a rule-like feature of the cognitive system, which partly explains the cogency of an inferential transition from 1.1–2 to 1.4. Notice that Inference 1 is *valid* whether or not we interpret 1.3 as a rule or as a premise. But either option makes it possible to avoid the vicious regress lurking in the background. And in both cases the implicit identity belief is part of the explanation why this is a normal and cogent way of going inferentially from truths to other truths.

But wait a minute: There is still no difference between 2.3 and 1.3 in referential content, so, at least, the referential content seems not to be doing any explanatory work? Well, we have already seen that both beliefs are necessary and thus part of the explanation. But more importantly, does the belief model have any resources to actually distinguish between the two thoughts? The thought that $a = b$ and that $a = a$? Indeed it does. The two thoughts have different constituent structures which can thus correspond to differences in mechanistic implementation. Again, the belief can be implicit or explicit, and for each case the two thoughts, $a = b$ and $a = a$, will have different structural properties. Roughly, one thought has a reoccurring constituent while the other has two distinct constituents. Assuming that they are implicit rules of the system, they would be expressed in different ways, using variables, for example:

(1) If $x = y$, then ...
(2) If $x = x$, then ...

Let us assume that (1) and (2) specify the antecedent of some actual rules built into our cognitive architecture. Then the belief that $a = b$ will satisfy the constituent structure of the antecedent of (1) and the belief that $a = a$ will satisfy the constituent structure of the antecedent of (2), and not vice versa. The two beliefs may still have the same referential content.

What if we assume that the two beliefs are premises in some inferential transition? Will we also find a way to distinguish between the two? Yes, indeed. In virtue of their different constituent structures, different rules will apply directly to the two beliefs. This can be seen with a simple example. If we assume that mental logic incorporates some part of the predicate calculus, we get the result that the two beliefs have different existential generalizations:

(3) From $a = b$, infer $\exists x \exists y(x = y)$
(4) From $a = a$, infer $\exists x(x = x)$

Again, this is explained by a difference in the constituent structures of the two belief-states, that is, the two representational states satisfy rules which differ in their structural specifications. Similarly, we can try to imagine an organism whose cognitive architecture instantiates the rule: $\forall x \forall y(x = y)$. Presumably, this would be different from our own, which plausibly only instantiates the rule: $\forall x(x = x)$.

But does this amount to a concession to the concept model of confusion? I do not think so. The concept model states that singular concepts function to keep track of objects in such a way that the function does not reduce to the avoidance of false beliefs about identity and distinctness. The reduction seems eminently compelling, however. Concepts do more than object-tracking, if they do that. They compose with other concepts and categorize objects. Assuming that they can be object-trackers, however, the singular concept C is designed to track objects x and y if and only if $x = y$. If the latter part of the biconditional *can* be written into the very constitution of the cognitive system, by being an implicit belief, the belief model is explanatorily more basic than the concept model. Notice that according to the concept model, concepts are also *distrackers*. The concept D is designed to distrack objects x and y if and only if $x \neq y$. That is to say, for example, if Bill and Biff are identical twins, my singular concept of Bill is not supposed to track Biff at the same time. The distracking function is also explained in terms of belief-states according to the belief model. Finally, it is worth emphasizing that object-tracking is not sufficient to explain the validity of Inference 1. That is, if we interpret 1.3 as saying that the concept of a is designed to track the same object as the concept of b, 1.4 does not follow from 1.1 to 1.3. The referential content of the identity is necessary, and any fregentity is superfluous, at least to that narrow question.

In summary, as such concepts do not function to keep track of objects. They are only designed to do so if the objects are identical. This is partly what makes the relevant concepts singular. And thus the function is readily reduced to the truth of certain beliefs. Also, belief-states with the same referential content are distinguished in terms of constituent structures, which determines their participation in genuinely inferential transitions between thoughts. The concept model seems to be on the losing side.

3 | BELIEF AND EXPLANATION

In this final section, I will make two points, one about explanation and one about the symbolic or natural language representation of inference. Start with explanation. Even within the narrow domain of inferential transition, identity-beliefs will have various explanatory roles to play. The concept models—including the various versions of relationism Goodman mentions—tend to concede too much to regress arguments, and lose sight of other desiderata. Consider Inference 4, which shares the structure of Goodman's example of Lana Lange who is *not* confused about Superman and Clark Kent.

Inference 4

1. Fa
2. Ga
3. $a = a$
4. $\exists x(Fx \wedge Gx)$

Goodman argues that 4.3 is redundant and we should rather have a theory on which 4.1 and 4.2 somehow *directly encode the coreference* of the two occurrences of "*a*". If 4.3 is required we invite regress because another premise would need to state the coreference of 4.3 with 4.1–4.2. I have already shown why this is not correct, both for the assumption that 4.3 corresponds to an implicit belief or rule and for the assumption that 4.3 corresponds to an explicit (but still possibly unconscious) belief. There is not enough space here to argue against direct encoding of coreference, but the resources of the belief model suggest that such encoding is superfluous. As we saw before, it must at least involve identity to be relevant to validity, letting the belief model in through the back door.

As we shall see, Goodman is certainly right that within the conventions of symbolic or natural language *representation* of inference, 4.3 is easily dismissed as redundant and regress-inviting. But this has no immediate consequence for the nature of inferential transitions between thoughts. More obviously, perhaps, it has no consequence for other kinds of explanatory relevance of identity-beliefs. To see this, consider two examples where the status of the "premises" as beliefs is made explicit.

Inferential transition 1

1. $a = b$
2. S believes $a \neq b$
3. S believes *Fa*
4. S believes *Gb*
5. S infers $\exists x(Fx \wedge Gx)$

Inferential transition 2

1. $a \neq b$
2. S believes $a = b$
3. S believes only a is F
4. S believes only b is G
5. S infers $\neg\exists x(Fx \wedge Gx)$

In both cases, S makes a mistake by her own lights. Assume that beliefs number 3 and 4 are true in both transitions. In IT1, the inferred belief is true but not safely or validly arrived at on the basis of beliefs 1.2–1.4. Roughly, since S believes $a \neq b$ it is not safe—or rational for that matter—for her to infer 1.5. But the identity-belief happens to be false (because of IT1.1), so the concluding thought is true. Crucially, if S had *believed* IT1.1 and thus had a relevant and true belief about identity, she would have been safe *and* arrived at the truth. In IT2, the inferred belief is again true but not safely arrived at on the basis of 2.2.-2.4. The crucial point is similar, namely, if S had *believed* 2.1 rather than 2.2, she would have been safe *and* arrived at the truth.

Explanation is often thought to be sensitive to counterfactuals. In these two examples, it is easy to see how a true belief about identity *would* have made a significant difference to the status of the inferential transition. Intuitively, if we manipulate the situation with respect to what S believes, we reach a different result about the validity, safety, or normality of the transition. And the belief in question must be about the identity or difference of the relevant objects, while fregentity seems irrelevant. It seems again that the belief model provides the resources needed to explain what needs to be explained. Notice that it does not matter whether IT1.2 or IT2.2 are architectural or explicitly represented in the system. Their presence explains what goes wrong and their replacement by the corresponding true identity-beliefs would be sufficient to make things right.

Finally, the issue of symbolic or other external representation can be made fully explicit. I have pointed out that a premise is something that plays the premise role in inferential transitions. I have also claimed that regress is indeed an issue when inferential steps are represented by explicit inscriptions on a page. But regress is only an issue about the recorded or spoken material. This is because inscriptions do not interpret themselves—they are all created equal—and, thus, rules and non-rules appear the same. We can keep adding lines, calling for new lines, to the last syllable of recorded time. Now I will add a third point. Basically, to focus on logical inferences which are valid in virtue of belonging to one of the logical systems which humans have formalized rigorously, especially since Frege, can make one lose sight of the simpler features of inferential transitions. It is a mere convention of the logical language that two occurrences of x in the same formula will receive the same assignment, or that two occurrences of the same individual constant refer to the same object. Since these are conventions, there is no need to state them as premises, and doing so makes it seem like every other convention should also be a premise. Chaos ensues.

In terms of cognitive architecture, however, this kind of regress makes less sense. The mind could very well token representations which explicitly encode the type of content in question, for example, that two name-like devices refer to the same object. But this need not make any difference to the normal operation of the machine within. That is, the explicit representation could be false and still not disrupt the normal operation of the mechanism of inference. It might simply not be playing the premise-role. Or, if it is, then the rule is going to be different (but then the rule might be implausibly complicated as an architectural property). To be clear, the case being imagined here is one where, for example, there is an explicit false belief that $a = b$ while, at the same time, inferential transitions operate according to an architecturally encoded rule on which $a \neq b$. Remember, the belief can be unconscious or unavailable to any intentional, representational action. Now, consider IT2 again. Certainly, *something* goes wrong if we imagine that 2.2–2.5 are all true, even if 2.1 is *true* and specifies the content of an architecturally encoded implicit belief in S's cognitive system. But the only thing that goes wrong, in that case, is that S has formed an explicit belief about identity which is both false and does not accord with another state in S which is only implicit. In fact, the inferential transition itself is flawless if 2.2 does not function as a premise.

4 | CONCLUSION

Beliefs about identity have many roles to play in explaining human inferential transitions. When they are implicit, they are built into the cognitive architecture like logical rules. When they are explicit, they may function as premises in inferential transitions where the rules apply directly to beliefs with such a structure. Two belief-states with the same referential content can have different constituent structures, and can be either implicit or explicit. None of these states need to be conscious in any way that is generally accepted. Since identity-beliefs with the same referential content can have different constituent structures, they can have slightly different roles to play in inferential transitions. This suggests that the belief model of confusion has plenty of resources to explain how true beliefs about identity can be part of the explanation of a successful inference. It remains unclear, however, that the concept model adds anything to this picture. More generally, this vindicates a view according to which the human mind is a representational and computational machine, even if some representations happen to be structural or architectural in nature.

DATA AVAILABILITY STATEMENT

There is no data available.

ORCID

Elmar Unnsteinsson https://orcid.org/0000-0001-5333-1784

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