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A Note on a Remark of Evans*

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Abstract. In his seminal paper, 'Can There Be Vague Objects?' (1978), Gareth Evans advanced an argument purporting to prove that the idea of indeterminate identity is incoherent. Aware that his argument was incomplete as it stands, Evans added a remark at the end of his paper, in which he explained how the original argument needed to be modified to arrive at an explicit contradiction. This paper aims to develop a modified version of Evans' original argument, which I argue is more promising than the modification that Evans proposed in his remark. Last, a structurally similar argument against the idea of indeterminate existence is presented.

1. Introduction

In his seminal paper, 'Can There Be Vague Objects?' (1978), Gareth Evans advanced an argument purporting to prove that the idea of indeterminate identity is incoherent. Given that '∇' is a sentential operator that expresses the idea of vagueness[1], the argument runs as follows:[2]

(1) $\nabla(a=b)$	The claim to be refuted
(2) $\lambda x[\nabla(x=a)]b$	From (1) by lambda-abstraction
(3) $\neg\nabla(a=a)$	Unquestionable statement
(4) $\neg\lambda x[\nabla(x=a)]a$	From (3) by lambda-abstraction
(5) $\neg(a=b)$	From (2) and (4) by Leibniz's Law

As it stands, however, Evans' proof seems to be incomplete because it does not arrive at an explicit formal contradiction. Suppose, for example, that *a* and *b* are definitely identical. Then, both (1) and (5) are false. Thus, (1) and (5) are not contradictions, they are contraries. For this reason, Evans added the following remark at the end of his paper:

> If 'Indefinitely' and its dual, 'Definitely' ('Δ') generate a modal logic as strong as S5, (1)–(4) and, presumably, Leibniz's Law, may each be strengthened with a 'Definitely' prefix, enabling us to derive
>
> (5') $\Delta\neg(a=b)$
>
> which is straightforwardly inconsistent with (1) (Evans, 1978, p. 208).

Evans' argument initiated a lively discussion.[3] However, my purpose in this paper is not to discuss the question of whether the inferential steps from (1) to (5) are flawless. Nor am I interested in assessing

* This paper has profited enormously from discussions with Daniel Milne-Plückebaum.
[1] Evans uses three different notions in his paper: 'vagueness', 'indeterminacy', and 'indefiniteness'. I take it that he regards them as synonymous. '$\nabla\phi$' is standardly interpreted as 'it is indeterminate whether'.
[2] My formulation slightly deviates from that of Evans. However, it is in accord with the spirit of the original argument, or so I hope.
[3] As a few examples, see Broome (1984), Burgess (1989), Burgess (1990), Cook (1986), Garrett (1988; 1991), Gibbons (1982), Hawley (1998), Johnsen (1989), *Keefe (*1995), Lewis (1988), Lowe (1994; 1997; 1999; 2001), van Inwagen

the transition from (1) to (5) from the standpoints of different conceptions of vagueness, such as the epistemic, linguistic, or ontic view. Instead, the aim of my paper is much more modest. I am merely interested in the question of whether there is a reasonable way to extend Evans' original argument so that it arrives at a conclusion that explicitly contradicts the premise from which it began. It is a common view in the current literature that the proposal made by Evans in the remark cited above is not practicable. For example, Harold Noonan (1990: 157) mentions 'some confused remarks on Evans's part' in this regard. Although I would not go as far as that, I agree with Noonan that Evans' remark is at least puzzling. Thus, I do not try to derive '$\Delta\neg$(a=b)' by strengthening (1)–(4) with a 'definitely' prefix. Rather, I choose another, more promising, path that, as far as I can see, has not yet been explored.

2. The weaknesses of Evans' suggestion

To develop my account, let us first remember what is wrong with Evans' remark at the end of his paper. Evans introduces a determinacy operator, 'Δ', and suggests that 'Δ' and '∇' are *duals*, that is, that 'Δ' and '∇' conform to the following definitions:

$$\nabla\phi =_{Def} \neg\Delta\neg\phi$$
$$\Delta\phi =_{Def} \neg\nabla\neg\phi$$

This becomes particularly clear when Evans claims that '$\Delta\neg$(a=b)' is 'straightforwardly inconsistent' with '∇(a=b).' Given that '$\Delta\phi$' is defined as '$\neg\nabla\neg\phi$', '$\Delta\neg$(a=b)' is equivalent to '$\neg\nabla$(a=b)' which, in turn, contradicts premise (1). According to Evans, then, '∇' relates to 'Δ' in exactly the same way as modal logic's diamond, '$\Diamond$', relates to modal logic's box, '$\Box$'. In other words, vagueness and definiteness stand in the same logical relation as possibility and necessity – or so Evans suggests. Thus, it is tempting to interpret Evans' remark along the following lines: first, treat '∇' as '$\Diamond$' and 'Δ' as '$\Box$'; second, derive '$\neg\Diamond$(a=b)' by strengthening the premises with a box by applying axioms characteristic of S5. It seems, then, that Evans had the following extended argument in mind:

(P1)	$\Diamond$(a=b)	The claim to be refuted
(P2)	$\Box\Diamond$(a=b)	From (P1) by applying '$\Diamond p \rightarrow \Box\Diamond p$'
(P3)	$\Box\lambda x[\Diamond(x$=a)]b	From (P2) by lambda-abstraction

(1988), *Noonan (1982)*, Noonan (1984), Noonan (1990), Noonan (1995), Noonan (2004), Noonan (2008), Over (1989), Parsons (1988), Pelletier (1989), Rasmussen (1986), Thomasson (1982), Tye (1990), Wiggins (1986), Zemach (1991).

(P4)	$\neg\Diamond(a=a)$	Unquestionable statement
(P5)	$\Box\neg\Diamond(a=a)$	From (P4) by, first, applying '$\neg\Diamond p \rightarrow \Box\neg p$'; second, applying '$\Box p \rightarrow \Box\Box p$'; and, third, applying '$\Box\Box\neg p \rightarrow \Box\neg\Diamond p$'
(P6)	$\Box\neg\lambda x[\Diamond(x=a)]a$	From (P5) by lambda-abstraction
(P7)	$\forall x\, \forall y\, (\exists F\, (\Box Fx \wedge \Box\neg Fy) \rightarrow \Box\neg(x=y))$	Leibniz's law strengthened
(P8)	$\Box\neg(a=b)$	From (P3), (P6), and (P7) (that's Evans' (5'))
(P9)	$\neg\Diamond(a=b)$	From (P8) by '$\Box\neg p \rightarrow \neg\Diamond p$'. Negation of (P1)!

In my opinion, this argument is somewhat odd. Note, for example, that under the standard interpretation of modal operators, (P4) translates into 'It is not possible that *a* is identical to *a*' – which is clearly false. One could ignore this difficulty, however, because the standard interpretation of modal operators is not relevant here. Instead, we must read the diamond as 'it is indeterminate whether'. According to this interpretation, (P4) translates into 'It is not indeterminate whether *a* is identical to *a*' – which seems true.

However, there remains a fundamental problem with this argument, which cannot easily be remedied. Recall that box and diamond are mutually defined. Consequently, (P4) is logically equivalent to '$\Box\neg(a=a)$'. Thus, by courtesy of '$\Box p \rightarrow p$', we arrive at '$\neg(a=a)$' – which is necessarily false. Therefore, I believe that the treatment of '∇' and 'Δ' as diamond and box was mistaken from the outset: Contrary to what Evans suggests, vagueness and definiteness do *not* stand in the same logical relation as possibility and necessity.

3. An alternative proposal

From my perspective, the problems outlined in the previous section could be avoided if we modelled the idea of vagueness not on the idea of possibility, but on the idea of contingency.[4] According to this proposal, '$\nabla\phi$' is not analogous to '$\Diamond\phi$', but to '$\Diamond\phi\wedge\Diamond\neg\phi$'. Consequently, '$\nabla$' does not relate to '$\Delta$' as '$\Diamond$' relates to '$\Box$'. Instead, '$\Delta$' and '$\nabla$' are mutually defined as follows:

$$\nabla\phi =_{Def} \neg\Delta\neg\phi \wedge \neg\Delta\phi$$

$$\Delta\phi =_{Def} \neg\nabla\phi \wedge \phi$$

This proposal puts us in a position to formulate an argument much more promising than (P1)–(P9) in the sense that all its premises seem true – even on the standard interpretation of modal operators. Furthermore, we do not need to invoke any axiom of modal logic to derive a contradiction. Instead, all of the work is done by axioms of non-modal propositional logic:

4 This has often been suggested in the literature. However, as far as I know, the analogy to contingency has yet to be used to improve Evans' suggestion as to how to derive a contradiction from '$\nabla(a=b)$'.

(Q1)	$\Diamond(a=b) \wedge \Diamond\neg(a=b)$	The claim to be refuted
(Q2)	$\lambda x[\Diamond(x=a) \wedge \Diamond\neg(x=a)]b$	From (Q1) by lambda-abstraction
(Q3)	$\neg[\Diamond(a=a) \wedge \Diamond\neg(a=a)]$	Unquestionable statement
(Q4)	$\neg\lambda x[\Diamond(x=a) \wedge \Diamond\neg(x=a)]a$	From (Q3) by lambda-abstraction
(Q5)	$\forall x\, \forall y\, (\exists F\, (Fx \wedge \neg(Fy)) \rightarrow \neg\Diamond(x=y))$	Leibniz's law moderately strengthened
(Q6)	$(\lambda x[\Diamond(x=a) \wedge \Diamond\neg(x=a)]b \wedge \neg\lambda x[\Diamond(x=a) \wedge\Diamond\neg(x=a)]a) \rightarrow \neg\Diamond(a=b)$	From (Q5) by replacing 'F' by '$\lambda x[\Diamond(x=a) \wedge \Diamond\neg(x=a)]$', '$x$' and '$y$' by 'a' and 'b'
(Q7)	$(\Diamond(a=b) \wedge \Diamond\neg(a=b) \wedge \neg[\Diamond(a=a) \wedge \Diamond\neg(a=a)]) \rightarrow \neg\Diamond(a=b)$	From (Q6) by lambda elimination
(Q8)	$\neg((\Diamond(a=b) \wedge \Diamond\neg(a=b) \wedge \neg[\Diamond(a=a) \wedge \Diamond\neg(a=a)]) \wedge \Diamond(a=b))$	From (Q7) by '$(p\rightarrow q) \rightarrow \neg(p \wedge \neg q)$'
(Q9)	$\neg(\Diamond(a=b) \wedge \Diamond\neg(a=b) \wedge \neg[\Diamond(a=a) \wedge \Diamond\neg(a=a)]) \vee \neg\Diamond(a=b)$	From (Q8) by '$\neg(p \wedge \neg q) \rightarrow (\neg p \vee q)$'
(Q10)	$\neg\Diamond(a=b) \vee \neg\Diamond\neg(a=b) \vee [\Diamond(a=a) \wedge \Diamond\neg(a=a)] \vee \neg\Diamond(a=b)$	From (Q9) by '$\neg(p \wedge q) \rightarrow (\neg p \vee \neg q)$'
(Q11)	$\neg\Diamond(a=b) \vee \neg\Diamond\neg(a=b) \vee [\Diamond(a=a) \wedge \Diamond\neg(a=a)]$	Elimination of redundancy
(Q12)	$\neg\Diamond(a=b) \vee \neg\Diamond\neg(a=b)$	From (Q11) and (Q3) by '$((p \vee q) \wedge \neg q) \rightarrow p$'
(Q13)	$\neg(\Diamond(a=b) \wedge \Diamond\neg(a=b))$	From (Q12) by '$(p \vee q) \rightarrow \neg(\neg p \wedge \neg q)$'. Negation of (Q1)!

Note that, in the present context, '$\Diamond\phi$' must not be read as 'it is indeterminate whether ϕ'. Although the logical interrelations between 'Δ' and '∇' have changed, the equivalence between '$\Diamond$' and '$\neg\Box\neg$' still holds. Thus, '$\Diamond\phi$' is equivalent to '$\neg\Box\neg\phi$', which, under the current interpretation of '$\Box$', means 'it is not determinately true that not-ϕ'. Accordingly, (Q5) amounts to something along the following lines:

> If there is a property that *x* possesses but *y* lacks, then it is determinately true that *x* is different from *y*.

At this point, it might be objected that (Q5) is untenable. Many theorists of vagueness, whether they hold an epistemic, linguistic, or ontic view, assume that properties can be possessed (or be lacked) indeterminately.[5] These philosophers would probably suggest that there might be an object *a* that possesses a certain property, but indeterminately so, and an object *b* that lacks the property in question, but indeterminately so. Given that this is the only difference between *a* and *b*, it is tempting to say that *a* is different from *b*, not determinately, but indeterminately so – in symbols:

$$\neg(a=b) \wedge \nabla\neg(a=b).$$

Thus, one could simply reject (Q5) because one could say that it ignores the possibility of objects that are indeterminately different.

[5] See, for example, Akiba (2004), Sorensen (2001), Williamson (1994), and Barnes (2010).

In my opinion, this objection is not convincing, but not because there are no objects that are indeterminately different. Rather, *assuming* there are such objects is not admissible in the current dialectical situation. Recall that the goal of Evans' argument is to refute the claim '$\nabla(a=b)$'. Consequently, the opponent should not make any use of '$\nabla(a=b)$' while arguing against (Q5). At first glance, it seems that the opponent is not guilty of that offence because she does not make use of '$\nabla(a=b)$', but of '$\nabla\neg(a=b)$'. Note, however, that one cannot assume '$\nabla\neg(a=b)$' without presupposing '$\nabla(a=b)$'.

This becomes particularly clear if we reformulate '$\nabla\neg(a=b)$' in terms of modal logic's diamond. Recall that, according to the current account, '$\nabla\phi$' could be represented as '$\Diamond\phi \wedge \Diamond\neg\phi$'. Thus, '$\nabla\neg(a=b)$' could be translated into '$\Diamond\neg(a=b) \wedge \Diamond(a=b)$' which, in turn, could be retranslated into '$\nabla(a=b)$'. It turns out then that the notions of indeterminate identity and indeterminate difference are irresolvably intertwined: it is indeterminate whether *a* is identical to *b* if and only if it is indeterminate whether *a* is different from *b*. In my opinion, this result should not surprise us because it is already obvious from pretheoretical considerations. Now, the upshot of all of this is that philosophers who, in order to argue against (Q5), invoke the claim that there might be objects that are indeterminately different commit a *petitio principii* against Evans because they presume that the notion of indeterminate identity is coherent. Thus, I conclude that (Q5) is not particularly problematic in the current dialectical situation.

4. An argument against indeterminate existence

In this section, I present an interesting by-product of the foregoing considerations, which is an argument against the idea of indeterminate existence at least as powerful as (Q1)–(Q13). To develop this argument, I begin with the existentially generalized version of Evans' original argument:

(1∃) $\exists x \nabla(x=a)$	The claim to be refuted
(2∃) $\exists x\, (\lambda y[\nabla(y=a)]x)$	From (1∃) by lambda-abstraction
(3∃) $\neg\nabla(a=a)$	Unquestionable statement
(4∃) $\neg\lambda y[\nabla(y=a)]a$	From (3∃) by lambda-abstraction
(5∃) $\forall x\, (\exists F\, (Fx \wedge \neg(Fa)) \rightarrow \neg(x=a))$	Leibniz's Law (relativized to *a*)
(6∃) $\forall x\, (\lambda y[\nabla(y=a)]x \wedge \neg\lambda y[\nabla(y=a)]a) \rightarrow \neg(x=a)$	From (5∃) by replacing 'F' by '$\lambda y[\nabla(y=a)]$'
(7∃) $\neg\exists x\, (\lambda y[\nabla(y=a)]x \wedge \neg\lambda y[\nabla(y=a)]a \wedge (x=a))$	From (6∃) by applying '$\forall x(Fx \rightarrow \neg Gx) \rightarrow \neg\exists x(Fx \wedge Gx)$'
(8∃) $\neg\exists x\, (\nabla(x=a) \wedge \neg\nabla(a=a) \wedge (x=a))$	From (7∃) by lambda elimination
(9∃) $\neg\exists x\, (\nabla(x=a) \wedge (x=a))$	From (8∃) by conjunction elimination

Again, this argument seems incomplete because (9∃) is not the contradictory counterpart of (1∃).[6] Furthermore, as long as we hold to the idea that vagueness relates to definiteness as possibility relates to necessity, it is not clear how the argument might be modified so that the conclusion simply reads '$\neg\exists x\nabla(x{=}a)$'. Perhaps, one might be inclined to invoke some axioms and theorems characteristic of quantified S5 and try the following (where '*a* exists indeterminately' is symbolized by '$\exists x\Diamond(x{=}a)$'):

(P1∃)	$\exists x\,\Diamond(x{=}a)$	The claim to be refuted
(P2∃)	$\exists x\,\Box\Diamond(x{=}a)$	From (P1∃) by applying '$\exists x\Diamond A \rightarrow \exists x\Box\Diamond A$'
(P3∃)	$\exists x\,\Box\lambda y[\Diamond(y{=}a)]x$	From (P2∃) by lambda-abstraction
(P4∃)	$\neg\Diamond(a{=}a)$	Unquestionable statement
(P5∃)	$\Box\neg\Diamond(a{=}a)$	From (P4∃) by, first, applying '$\neg\Diamond p \rightarrow \Box\neg p$'; second, applying '$\Box p \rightarrow \Box\Box p$'; and, third, applying '$\Box\Box\neg p \rightarrow \Box\neg\Diamond p$'
(P6∃)	$\Box\neg\lambda y[\Diamond(y{=}a)]a$	From (P5∃) by lambda-abstraction
(P7∃)	$\forall x\,(\exists F\,(\Box Fx \wedge \Box\neg Fa) \rightarrow \Box\neg(x{=}a))$	Leibniz's law (relativized to *a*) strengthened
(P8∃)	$\forall x\,((\Box\lambda y[\Diamond(y{=}a)]x \wedge \Box\neg\lambda y[\Diamond(y{=}a)]a) \rightarrow \Box\neg(x{=}a))$	From (P7∃) by replacing '*F*' by '$\lambda y[\Diamond(y{=}a)]$'
(P9∃)	$\neg\exists x\,\Box\lambda y[\Diamond(y{=}a)]x \wedge \Box\neg\lambda y[\Diamond(y{=}a)]a \wedge \neg\Box\neg(x{=}a)$	From (P8∃) by applying '$\forall x(Fx\rightarrow\neg Gx) \rightarrow \neg\exists x(Fx \wedge Gx)$'
(P10∃)	$\neg\exists x\,\Box\Diamond(x{=}a) \wedge \Box\neg\Diamond(a{=}a) \wedge \neg\Box\neg(x{=}a)$	From (P9∃) by lambda elimination
(P11∃)	$\neg\exists x\,\Box\Diamond(x{=}a) \wedge \Diamond(x{=}a)$	From (P10∃) by conjunction elimination and equivalence of '$\neg\Box\neg$' and '$\Diamond$'
(P12∃)	$\neg\exists x\,\Diamond(x{=}a)$	From (P11∃) by '$\exists x\Box\Diamond A \rightarrow \exists x\Diamond A$' and elimination of redundancy. Negation of (P1∃)!

However, this argument is as unreasonable as (P1)–(P9) because, as already noted, '$\neg\Diamond(a{=}a)$' is equivalent to '$\Box\neg(a{=}a)$', which, in turn, implies a necessary falsehood. Therefore, I propose the following alternative, drawing on the idea that vagueness relates to definiteness as contingency relates to necessity:

(Q1∃)	$\exists x\Diamond(x{=}a) \wedge \Diamond\neg(x{=}a)$	The claim to be refuted ('$\exists x\nabla(x{=}a)$')
(Q2∃)	$\exists x\lambda y[\Diamond(y{=}a) \wedge \Diamond\neg(y{=}a)]x$	From (Q1∃) by lambda-abstraction
(Q3∃)	$\neg[\Diamond(a{=}a) \wedge \Diamond\neg(a{=}a)]$	Unquestionable statement
(Q4∃)	$\neg\lambda y[\Diamond(y{=}a) \wedge \Diamond\neg(y{=}a)]a$	From (Q3∃) by lambda-abstraction
(Q5∃)	$\forall x\,(\exists F\,(Fx \wedge \neg(Fa)) \rightarrow \neg\Diamond(x{=}a))$	Leibniz's law moderately strengthened (and relativized to *a*)

[6] (9∃) is not even contrary to (1∃). Rather, it seems that (9∃) and (1∃) are *subcontraries*. Suppose that every *x* that is vaguely identical to *a* is simply not identical to *a*. In this case, both (9∃) and (1∃) could be true. On the other hand, it is difficult to see how (9∃) and (1∃) could both be false: If (1∃) is false, then there is nothing vaguely identical to *a*; so, there cannot be something both vaguely and simply identical to *a* either. Hence, (9∃) must be true. If (9∃) is false, then there is something which is both vaguely and simply identical to *a*; thus, there is something vaguely identical to *a*; and, hence, (1∃) must be true.

(Q6∃)	$\forall x\,[(\lambda y[\Diamond(y{=}\mathrm{a}) \wedge \Diamond\neg(y{=}\mathrm{a})]x \wedge \neg\lambda y[\Diamond(y{=}\mathrm{a}) \wedge \Diamond\neg(y{=}\mathrm{a})]\mathrm{a}) \rightarrow \neg\Diamond(x{=}\mathrm{a}))]$	From (Q5∃) by replacing ‘F’ by ‘$\lambda y[\Diamond(y{=}\mathrm{a}) \wedge \Diamond\neg(y{=}\mathrm{a})]$’
(Q7∃)	$\forall x\,[(\Diamond(x{=}\mathrm{a}) \wedge \Diamond\neg(x{=}\mathrm{a}) \wedge \neg[\Diamond(\mathrm{a}{=}\mathrm{a}) \wedge \Diamond\neg(\mathrm{a}{=}\mathrm{a})]) \rightarrow \neg\Diamond(x{=}\mathrm{a})]$	From (Q6∃) by lambda elimination
(Q8∃)	$\neg\exists x\,[\Diamond(x{=}\mathrm{a}) \wedge \Diamond\neg(x{=}\mathrm{a}) \wedge \neg[\Diamond(\mathrm{a}{=}\mathrm{a}) \wedge \Diamond\neg(\mathrm{a}{=}\mathrm{a})] \wedge \Diamond(x{=}\mathrm{a})]$	From (Q7∃) by applying ‘$\forall x\,(Fx \rightarrow \neg Gx) \rightarrow \neg\exists x\,(Fx \wedge Gx)$’
(Q9∃)	$\neg\exists x \Diamond(x{=}\mathrm{a}) \wedge \Diamond\neg(x{=}\mathrm{a})$	From (Q8∃) by conjunction elimination and elimination of redundancy. Negation of (Q1∃)!

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