

# Gavagai again

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## Abstract

Quine (1960, ch.2) claims that there are a variety of equally good schemes for translating or interpreting ordinary talk. ‘Rabbit’ might be taken to divide its reference over rabbits, over temporal slices of rabbits, or undetached parts of rabbits, without significantly affecting which sentences get classified as true and which as false. This is the basis of his famous ‘argument from below’ to the conclusion that there can be no fact of the matter as to how reference is to be divided. Putative counterexamples to Quine’s claim have been put forward in the past (see especially Evans, 1975; Fodor, 1993), and various patches have been suggested (e.g. Wright, 1997). One lacuna in this literature is that one does not find any detailed presentation of what exactly these interpretations are supposed to be.

Drawing on contemporary literature on persistence, the present paper sets out detailed semantic treatments for fragments of English, whereby predicates such as ‘rabbit’ divide their reference over four-dimensional continuants (Quine’s rabbits), instantaneous temporal slices of those continuants (Quine’s rabbit-slices) and the simple elements which compose those slices (undetached rabbit parts) respectively. Once we have the systematic interpretations on the table, we can get to work evaluating them.

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Might there be no fact of the matter which object ordinary names such as ‘London’ refer to? Some indeterminacy in its reference would not be greatly surprising: for example, if it turned out that ‘London’ was indeterminate in reference between various agglomerations of land and housing with slightly different boundaries.<sup>1</sup> Some philosophers have argued for much more surprising indeterminacies: indeed, for results that might strike one initially as absurd or paradoxical: some even argue that ‘London’ is indeterminate in reference between *all objects whatsoever*.<sup>2</sup> One does not have to go all the way to these extremes to find arguments for surprising indeterminacies. Perhaps the most famous of all arguments for the indeterminacy of reference—Quine’s discussion of ‘gavagai’—targets a fairly modest range of inscrutability. These gavagai arguments contend that it is indeterminate whether predicates such as ‘gavagai’ or ‘rabbit’ divide their reference over temporal continuants, or over instantaneous temporal slices of such continuants, or over undetached parts thereof.<sup>3</sup>

Gavagai arguments stand out amongst the range of arguments for inscrutability. The various rival candidates to be the reference of ‘gavagai’: rabbits, rabbit-slices and undetached parts thereof, are all ‘in and around’ the areas one would expect to find rabbits in. Utterances that are causally related to four-dimensional continuant rabbits are typically also related to rabbit slices and undetached rabbit parts (assuming such things exist).<sup>4</sup> This means that the rival interpretations considered in gavagai arguments involve no blatant violation of the sort of causal constraints on reference that some take to be a central element of the metaphysics of reference.<sup>5</sup> This makes the gavagai arguments challenging for a greater range of theorist than would be worried with other types of inscrutability argument. Simply endorsing a theory of meaning that builds in causal constraints would not be enough to remove the gavagai worries: there is no avoiding engaging with the details.<sup>6</sup>

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<sup>1</sup>This is one way of responding to an instance of Unger’s ‘problem of the many’ (Unger, 1980; McGee, 2005). For a worry about this response, see Weatherson (2003), Williams (2006a).

<sup>2</sup>For arguments to this effect, see Quine (1964), Wallace (1977), Davidson (1979), Putnam (1981). For discussion, see Field (1975), Lewis (1984), Hale and Wright (1997), Williams (2007), Williams (2008) and the references therein.

<sup>3</sup>I treat inscrutability arguments in general, and the gavagai arguments in particular, as arguing for indeterminacy in word-world *interpretation* relations. In this, I am following a rich tradition of relocating Quinean considerations from their original home: see especially Field (1974), Evans (1976), Fodor (1993).

If one wishes to transpose one what follows back into a Quinean setting, one will have some more work to do, though I take it no problems of principle would arise. To get a sense of how this would go, compare what follows to the translation-based presentation of counterpart theory in (Lewis, 1968).

<sup>4</sup>In this respect, Gavagai arguments draw on the sort of issues that generate the so-called ‘*qua*’ problem for causal theories of reference. See Sterelny (1990, ch.6.) for a survey of the latter issue.

<sup>5</sup>Quine himself, of course, seems to regard preservation of ‘stimulus synonymy’ as the principal constraint on acceptable *translation*. Latter-day Quineans do not always follow him in this regard. For example, Field (1994), defending a very Quinean combination of disquotational notions of truth and reference and important theoretical roles assigned to translation, suggests *inter alia* that good translations should preserve approximate conceptual role and *causal* ‘indication relations’ in which utterances stand.

<sup>6</sup>Arguments for extreme inscrutability mentioned earlier are committed to maintaining that among the optimal candidate referents for ordinary names are objects that are not relevantly causally connected to the use of that name. (If you want to say that it is not determinately the case that ‘London’ fails to refer to Betelgeuse, you better not have any substantial causal constraints on reference.)

The upshot of this is that arguments for extreme inscrutability typically *either* have to presuppose e.g. that causal connections between speaker’s utterances and objects play no role in fixing what the utterances refer to, *or* rely on the notorious ‘just more theory’ maneuvers to argue that causal constraints can somehow be bypassed. (Thus, they are most directly significant to *interpretationist* metasemantic theories (for example Davidson (1973), Lewis (1974)) which often disregard causality in this way. (For explicit discussion and rejection of causal constraints, see Lewis (1984); for discussion of the general class of views here, see Williams (2007).)

For the just-more-theory attempt to generalize the applicability of arguments for extreme inscrutability, see Davidson (1977, 1979) and Putnam (1981, 1980). For a paradigmatic response, see Lewis (1984). For an alterna-

Gavagai arguments for division-inscrutability are unexpected enough to shock, moderate enough not to generate *quite* the sense of paradox of extreme inscrutability theses, and *prima facie* robust in the face of a wide variety of positions on the metaphysics of meaning. They are worthy, therefore, of study in their own right.

The plan in what follows is to take stock of putative counterexamples to the gavagai arguments in the literature (section 1); to develop interpretations embedding the rival ‘divisions of reference’ systematically and in detail (section 2); and to evaluate whether a *prima facie* case for inscrutability in reference-division follows.

## 1 Evans and Fodor against the gavagai argument

Quine’s argument for inscrutability of the division of reference focuses on three candidate kinds of entities which general terms like ‘rabbit’ or ‘gavagai’ might divide their reference over: continuant entities (which a four-dimensionalist such as Quine regards as composed of point-events spread out over time); maximal instantaneous temporal parts of such entities; and undetached parts thereof. Let us call these respectively ‘rabbit worms’, ‘rabbit slices’ and ‘undetached rabbit parts’.<sup>7</sup>

Gareth Evans’ paper ‘Identity and Predication’ (1975) includes a subtle examination of Quine’s argument from below. Of the points he makes, the ones of most interest to us simply point to certain sentences that it is not clear how to handle within interpretations incorporating strange reference-division.<sup>8</sup>

As Evans concedes in the final paragraph of his paper, he does not offer an assurance that *no* semantic proposal will vindicate Quine. His methodology is rather to ‘try out’ some plausible candidates and show that they break down. Since I will be developing detailed proposals in an attempt to vindicate Quine (or at least put his case in its strongest form) it would be pointless to examine in detail the views that Evans tries out. What we can usefully extract from the consideration of Evans and others is a sense of the kind of problems that a semantic theory incorporating strange reference-division must meet, and a range of test cases for the semantic theories we shall propose.

The first set of Evansian objections concern the proposal whereby ‘Rabbit’ divides its reference over all and only undetached rabbit parts. Evans asks about the objects that supposedly fall under adjectives such as ‘white’. He offers a trilemma:

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tive take on the issue, see Field (1975).

<sup>7</sup>I use ‘rabbit worms’ rather than Quine’s rabbits, because it avoids the appearance of begging questions, and also because these candidate interpretations should be intelligible to other theorists who would recognize the existence of the rabbit-worms (say under the title ‘the history of a rabbit’) but would not wish to identify them with rabbits. Both endurantists and the stage theorists to be discussed later might fall into this camp.

Throughout this paper, I will be presupposing a setting which allows all the entities required to formulate the semantic theories I will present, one that Quine would have found very familiar: an eternalist, four-dimensionalist metaphysics (more recent defenders of this metaphysics include Sider (2001a) and Lewis (1986), among many others. This I take to be a setting where we can make the strongest case possible for Quinean division inscrutability: but it should be borne in mind that challenging the metaphysical presuppositions might well be a way of the viability of the interpretations to be presented.

<sup>8</sup>Evans makes several different kinds of points against the inscrutability arguments Quine offers. Some, for example, involve clever *ad hominem* attacks on Quine (See the discussion of the identity of indiscernibles at Evans (1975, p.113)). Others involve disputing the Quinean methodology for detecting predication and divided reference in a language (The basic contention seems to be (1) that Quine misses the constraint of *simplicity* on semantic theory. (2) That predicates should divide their reference over objects to whose spatial and temporal boundaries we are sensitive. Evans seems to regard (1) as the more fundamental principle, and (2) as resulting from an application of this principle. I will not discuss this further here.)

- If all and only white things fall under ‘white’, then a brown rabbit with a white foot will satisfy “white rabbit”.
- If all and only things which are parts of a white rabbit fall under ‘white’, then the conditions of “white rabbit” will be fine, but the truth-conditions of “white house” will be wrong.
- If all and only things which are parts of a white *thing* fall under ‘white’, we get white rabbits and houses: but we overgenerate. A white rabbit foot is part of a white thing: on the current proposal, we would have ‘white rabbit’ satisfied in the presence of a brown rabbit with a white foot.

The Evansian question for any attempt to vindicate Quinean division-inscrutability is the following:

- (A) Show how the semantics allegedly supporting the division of ‘rabbit’ over undetached rabbit parts can cope with the interaction of adjectives and general terms.

Fodor (1993), inspired by Evans, provides another challenge for the undetached rabbit part proposal. Rather than looking to adjectives, he focuses on cases where we have predicates both for a thing and for some distinctive part of that thing. The case he chooses is a language containing both ‘rabbit’ and ‘ear’. There is nothing that is both an ear and a rabbit, but any undetached part of a rabbit’s ear (say, the ear itself) will be an undetached part both of a rabbit, and of an ear. Therefore, on a systematic Quinean proposal, it looks as if the following will be true:

there is something that is both a rabbit and an ear.<sup>9</sup>

The strength of Fodor’s objection is that there seems no way that we can assign to ‘ear’ an extension that does not include some rabbit parts: but any such overlap will render true the strange generalization given above. Thus, we have a second challenge:

- (B) Show how the semantics allegedly supporting alternative divisions does not generate false positives in the context of a pair of general terms, one of which (intuitively) applies to a part of the other.

In considering the rabbit-stage proposal, Evans focuses on tense. He maintains that *either* one will end up with a situation where if there is any stage of the rabbit which satisfies ‘*F*’, any stage of the rabbit at any time will satisfy ‘*F*’; *or* one will be able to render true ‘a rabbit was running’ where the rabbit no longer exists. Here I am convinced by the rebuttals of Evans’ specific arguments in Wright (1997) and Richard (1997). The general challenge is well taken however: a systematic development of the stage proposal will have to show how it is compatible with tensed ascriptions.

- (C) Show how the semantics allegedly supporting alternative divisions can cope with tensed predications.

Having noted these concerns, I think that the best tactic to meet these concerns is to develop a systematic semantic proposal for each candidate ‘division’ of reference. We can then evaluate whether the challenges (A-C) that we have extracted from Evans and Fodor cause problems. This is the burden of the following sections.

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<sup>9</sup>Fodor’s concern is actually with the conjunctions “A is an ear and A is a rabbit” and “A is an ear and a rabbit”. I think the existential generalization presents the harder case for the division inscrutabilist.

## 2 Worms, stages, and undetached parts

The task of the present section is to spell out three candidate semantic theories for (a fragment of) English. In the first, ‘rabbit’ divides its reference over four-dimensional rabbit-worms; in the second, it divides its reference over three-dimensional (instantaneous) rabbit-stages. In the third, it divides its reference over one-dimensional undetached rabbit parts or ‘dots’.<sup>10</sup>

In the literature on theories of persistence, semantic theories have been developed that suit our purposes exactly. I will be appealing to the basic semantic framework of the perdurance theory of persistence—“worm theory”, and the semantic framework of what Haslanger (2003) calls the *exdurance* theory of persistence—the “stage theory” advocated by Sider (1996a, 2001a) and Hawley (2001). For terminological convenience, I use ‘perdurance’ and ‘exdurance’ for the *metaphysical* theories of what it takes for an ordinary object to persist through time; I will use ‘worm theory’ and ‘stage theory’ to refer to associated *semantic* views.

Some inscrutability arguments are based on formal results proving that candidate semantic theories are ‘sententially equivalent’—assign the same semantic values to sentences (see especially the appendices to each of Putnam (1981), Hale and Wright (1997) and Williams (2006b)). I do not believe this to be possible here.<sup>11</sup> My methodology, rather, is one of providing a semantics for a *fragment* of a language: albeit a rather rich one. In each case, it will be a first-order intensional language with time and world indices, allowing modal and temporal operators to be defined. A full defense would require extensions to a setting adequate for natural languages as a whole. However, the present fragments provide more than enough material for the key issues over division inscrutability—including those due to Evans and Fodor—to be formulated.

### 2.1 Worm theory

The perdurance theorists of persistence have two central theses—first, that ordinary objects like candles and rabbits are *perduring* space-time worms; secondly, such things undergo alteration in virtue of their stages successively possessing different properties. Haslanger outlines the view:

On the perdurantist’s conception of persistence, an object persists through time in a way analogous to how an object is extended through space. The candle is spatially extended through its 7-inch length . . . by having parts at the different regions. Likewise, according to the perdurantist, the candle is extended through time. . . by having parts or stages at different times. . . . The notion of perdurance provides the resources for a relatively straightforward account of alteration: . . . the persisting candle is composed of temporal parts or stages that only briefly exist; distinct *candle-stages* are the proper subjects of incompatible properties, *being straight* and *being bent*, and the temporal composite which consists of the stages is the subject of persistence. . . . On this account, persisting things are temporally extended composites, also known as . . . space-time worms

(Haslanger, 2003, p.318)

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<sup>10</sup>I do not think that there would be any objection to extending the account respectively to non-atomic rabbit parts, or to more-than-instantaneous stages, but I shall not discuss this here.

<sup>11</sup>Wolfgang Schwarz (2005a) makes this claim for versions of the stage and dot theories below; but his versions have richer semantic structure, and it is not clear that they can be described as involving predicates whose reference is divided over undetached rabbit parts/stages rather than *sets of* such parts/stages. See also the discussion archived at Schwarz (2005b).

A semantic theory that accords with the perdurantist theory of persistence, then, would be one where ‘rabbit’ divided its reference over rabbit-worms. Obtaining such a semantic theory is not without its difficulties. In particular, it looks as if we have to discern two forms of predication, depending on whether the predicate at hand applies to a thing throughout its existence (arguably including: rabbit, chair, person); or can apply to a thing at some times and not at others (paradigmatic examples include ‘runs’, ‘is green’, ‘wobbles’, etc).

Following Parsons (2005), let us divide predicates into two sorts: s-predicates (e.g. ‘is a rabbit’, ‘is a chair’, ‘is a person’, etc) and c-predicates (e.g. ‘is running’, ‘is green’ etc).<sup>12</sup> Parsons presents his theory taking the notion of s- and c-predicates as primitive, and deals only with the monadic case. To generalize to the polyadic case, we shall take predicates to be given with an assignment of sorts (s and c) to their name-places. An s-predicate is then a monadic predicate whose name-place is of sort *s*, and a c-predicate one whose name-place is of sort *c*; but more generally, an *n*-place relation might have *k* places of sort *s*, and *n* – *k* places of sort *c*.

I will present the worm theory *together with a counterpart theoretic treatment of modal operators*. There is no reason why the world-shifting operators should not be treated in other ways, but I include it here because the stage and dot theories to be discussed later contain formally similar apparatus.

A commitment of all the theories that follow will be the possibility of analyzing tenses into a tenseless language—tense operators such as ‘was’ and ‘will be’ in terms of generalizations over operators such as ‘at *t*’. For example “Was:  $\phi$ ” is true relative to  $\langle t, w \rangle$  on *I* iff for some time *t*’ prior to the time of utterance, “At *t*’:  $\phi$ ” is true at  $\langle t, w \rangle$  on *I*. “It has always been that  $\phi$ ” is true relative to  $\langle t, w \rangle$  on *I* iff for every time *t*’ prior to the time of utterance, “At *t*’:  $\phi$ ” is true at  $\langle t, w \rangle$  on *I*.<sup>13</sup> Assuming this has been accomplished, the challenge for our theories is to provide a semantics for the ‘at *t*’ operator. Analogous remarks apply to modal operators such as ‘necessarily’ and ‘possibly’, which are to be defined in terms of an ‘at *w*’ operator; and (in the case of dot theory), to location operators.

In what follows, we write  $|e|^I$  for the semantic value of the expression *e*. A semantic theory that allowed for indexical phenomena would give a story about how  $|e|^I$  is determined by the context in which *e* is uttered—we should therefore regard *I* as the assignment of content to expressions *in a given context*. The modal operators are to be defined using a primitive symbol of the framework  $C^m$ , which may itself be indexical.<sup>14</sup>

- “ $\phi \wedge \psi$ ” is true at  $\langle w, t \rangle$  on *I* iff  
“ $\phi$ ” is true at  $\langle w, t \rangle$  on *I* and “ $\psi$ ” is true at  $\langle w, t \rangle$  on *I*.
- “ $\neg\phi$ ” is true at  $\langle w, t \rangle$  on *I* iff  
“ $\phi$ ” is not true at  $\langle w, t \rangle$  on *I*.
- “ $\exists x\phi x$ ” is true at  $\langle w, t \rangle$  iff  
“ $\phi(c)$ ” is true at  $\langle w, t \rangle$  on some extension  $I^*$  of *I* to the language  $L \cup \{c\}$  where  $|c|^{I^*}$  exists

<sup>12</sup>The terminology here is intended to recall the distinction between ‘substance sortals’ and ‘characterizing predicates’ of Wiggins (1980): but neither Parsons nor I wish to be committed to the Wigginsian understanding of the distinction. Some features carry over: for example, an s-predicate *F*, will be something such that in order to cease to be *F*, one must cease to be—a Wigginsian result. But, for example, no kind-essentialism need follow from this. For discussion, see Parsons (op cit) for further discussion.

<sup>13</sup>See Parsons (op cit, appendix) for a sample translation of some temporal vocabulary into a tenseless language. However see Dowty (1979, ch.3) for an argument that, to handle tense and aspect in English, we need not only relativization to instants, but relativization to intervals of time. This is briefly discussed below.

<sup>14</sup>Notice also that I use the quasi-substitutional way of handling quantifiers found in Benson Mates. In an already complex presentation, this allows us to drop at least one of the respects in which truth is relativized.

at  $\langle w, t \rangle$ .<sup>15</sup>

- “At  $w'$ ,  $\phi(c_1, \dots, c_n)$ ” is true at  $\langle w, t \rangle$  on  $I$  iff “ $\phi(c_1^*, \dots, c_n^*)$ ” is true relative to  $\langle w', t \rangle$  on some extension  $I^*$  of  $I$  to the language  $L^* = L \cup \{c_1^*, \dots, c_n^*\}$  where  $C^m(|c_i|^I, |c_i^*|^{I^*})$  and  $|c_i^*|^{I^*}$  exists at  $\langle w', t \rangle$ .
- “At  $t'$ ,  $\phi$ ” is true at  $\langle w, t \rangle$  on  $I$  iff “ $\phi$ ” is true relative to  $\langle w, t' \rangle$ .
- “ $n$  is  $F$ ” is true relative to  $\langle w, t \rangle$  on  $I$  iff either:
  - (1)  $F$  is a s-predicate and “ $n$ ” <sup>$I$</sup>  is a member of “is  $F$ ” <sup>$I$</sup> ; or
  - (2)  $F$  is a c-predicate and some t-stage of “ $n$ ” <sup>$I$</sup>  is a member of “is  $F$ ” <sup>$I$</sup> .<sup>16</sup>

Worm theory reflects the perdurance view. Perdurance says that ordinary objects—things like rabbits—are space time worms. Correspondingly, it is this kind of object that ‘rabbit’ or ‘gavagai’ divides its reference over.<sup>17</sup> Perdurance theories say that a thing alters by having successive temporal parts that instantiate different properties—and this is reflected in worm theory by the account of c-predication, whereby a thing satisfies ‘is running’ at  $t$ , and fails to satisfy it at  $t'$ , by having temporal parts at those times that respectively do and do not fall under the extension of ‘is running’.

## 2.2 Stage theory

Stage theoretic semantics reflects the *exdurance* theory of persistence advocated by Sider (1996a, 2001a) and Hawley (2001).

According to the [exdurance] theory, ordinary persisting objects are stages that persist . . . by having distinct stage counterparts at other times. [Exdurance] says that in the afternoon when I find my bent candle on the shelf, the candle is the bent-stage coexisting with me then, but that stage persisted from before (in the relevant sense) by virtue of having a (straight) counterpart stage on the shelf in the morning. . . . Although on this view ordinary objects are stages and so (strictly speaking) only exist momentarily, they can nonetheless persist by virtue of having counterpart antecedent and/or successor stages.

(Haslanger, 2003, p.318)<sup>18</sup>

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<sup>15</sup>The quantifier is ‘ontologically loaded’ in the sense that it only ranges over objects *at one time*. I see no reason why there should not be tenseless and ‘possibilist’ quantification where this restriction is lifted (it is easy to see how the clauses would be altered). Likewise, one can imagine intensional operators which do not invoke relations. We may be using such devices when we say “there is some German composer who is now famous”. (For an alternative strategy, see (Cresswell, 2004)).

<sup>16</sup>More generally, if we have a polyadic predicate  $R$ , with  $k$  s-places and  $l$  c-places then “ $Rn_1, \dots, n_k, m_1 \dots m_l$ ” is true relative to  $\langle w, t \rangle$  on  $I$  iff  $\langle n_1, \dots, n_k, m'_1, \dots, m'_l \rangle$  is a member of “is  $F$ ” <sup>$I$</sup> , where  $m'_i$  is some t-stage of  $m_i$ , for each  $i$ .

Note that we will now have a *variety* of relations with claim to be the identity relation  $a = b$ , according to whether  $a$  and  $b$  are regarded as of sort  $s$  or sort  $c$ . This leads to real differences in the context of counting.

<sup>17</sup>Or at least, it will do so so long as we regard ‘gavagai’ as what Wiggins would call a ‘pure sortal’, and not, for example, a phase of the underlying sortal ‘organism’. In the former case, ‘gavagai’ will be a s-predicate, holding of all rabbit-worms; in the latter case, ‘gavagai’ will be divide its reference over rabbit-stages. See Parsons (op cit) and the references therein.

<sup>18</sup>Haslanger (2003) uses ‘exdurance’ and ‘stage theory’ interchangeably. I find it useful to regiment the terminology to distinguish metaphysical from semantic theories, and have altered the above quote accordingly.

The key features of the exdurance theory are that ordinary objects are strictly speaking momentary stages, persisting vicariously through their counterparts located elsewhere in time; and that things change their properties through having counterpart-stages at successive times instantiating different properties.

To set up stage theoretic semantics to reflect the exdurance theory of persistence and alteration, we need an additional primitive: the two-place relation  $C^t$  (“is a temporal counterpart of”). This holds between temporal slices. Intuitively,  $C^t(x, y)$  will hold if  $x$  and  $y$  are stages of the same persisting object—in the case at hand, if they are stages of the same rabbit.

- “ $\phi \wedge \psi$ ” is true at  $\langle w, t \rangle$  on  $I$  iff “ $\phi$ ” is true at  $\langle w, t \rangle$  on  $I$  and “ $\psi$ ” is true at  $\langle w, t \rangle$  on  $I$ .
- “ $\neg\phi$ ” is true at  $\langle w, t \rangle$  on  $I$  iff “ $\phi$ ” is not true at  $\langle w, t \rangle$  on  $I$ .
- “ $\exists x\phi x$ ” is true at  $\langle w, t \rangle$  iff  
“ $\phi(c)$ ” is true at  $\langle w, t \rangle$  on some extension  $I^*$  of  $I$  to the language  $L \cup \{c\}$  where  $|c|^{I^*}$  exists at  $\langle w, t \rangle$ .
- “At  $w'$ ,  $\phi(c_1, \dots, c_n)$ ” is true at  $\langle w, t \rangle$  on  $I$  iff  
“ $\phi(c_1^*, \dots, c_n^*)$ ” is true relative to  $\langle w', t \rangle$  on some extension  $I^*$  of  $I$  to the language  $L^* = L \cup \{c_1^*, \dots, c_n^*\}$  where  $C^m(|c_i|^I, |c_i^*|^{I^*})$  and  $|c_i^*|^{I^*}$  exists at  $\langle w', t \rangle$ .
- “At  $t'$ ,  $\phi(c_1, \dots, c_n)$ ” is true at  $\langle w, t \rangle$  on  $I$  iff  
“ $\phi(c_1^*, \dots, c_n^*)$ ” is true relative to  $\langle w, t' \rangle$  on some extension  $I^*$  of  $I$  to the language  $L^* = L \cup \{c_1^*, \dots, c_n^*\}$  and  $C^t(|c_i|^I, |c_i^*|^{I^*})$  and  $|c_i^*|^{I^*}$  exists at  $\langle w, t' \rangle$ .
- “ $n$  is  $F$ ” is true relative to  $\langle w, t \rangle$  on  $I$  iff  
 $|“n”|^I \in |“F”|^I$ .<sup>19</sup>

This stage theory reflects the exdurance view. Exdurance says that ordinary objects—things like rabbits—are momentary stages. Correspondingly, ‘rabbit’ or ‘gavagai’ divides its reference over this kind of object. Exdurance theories say that a thing alters in virtue of distinct counterparts having distinct properties—and indeed, we find that “a rabbit was running and is now sitting still” will be true iff some present rabbit-stage that falls under “sitting still” has a past temporal counterpart that falls under “is running”.

## 2.3 Dot theory

When it comes to undetached rabbit parts, there is no corresponding theory in the literature to draw on. One can see what such a theory would look like, however: it would be a theory of extension through space that paralleled the exdurance theory of persistence through time. On such a view, a rabbit that is partially at a position  $p$  would extend through space, not by having parts located at other places, but through having *counterparts* at those positions.

<sup>19</sup>The generalization to polyadic predicates is not immediate. In particular, we would like to be able to handle *cross-temporal relations*—for example “William I was the ancestor of Elizabeth II”. The problem is that there may be no single instant where both relata have counterparts. However, nothing in the above requires that the objects in the extension of a predicate to exist at a single time. If we adopt this setup, then there is no objection to having  $\langle William, Elizabeth \rangle$  within the extension of ‘is an ancestor of’. If the temporal operator featuring in the above is construed as ranging over past intervals, and counterparts need only exist at some time during that interval, no problems should arise.

We can modify the stage theoretic ideas to get a corresponding semantic theory, which I shall call ‘dot theory’.<sup>20</sup> As before, we have primitive counterpart relations  $C^m$ ,  $C^t$ , and in addition a relation  $C^p$  relating one object to another at a single time. In the case at hand, the intended relation will hold of the pair  $x,y$  if they are parts of the same rabbit (stage).

- “ $\phi \wedge \psi$ ” is true at  $\langle w,t,p \rangle$  on  $I$  iff “ $\phi$ ” is true at  $\langle w,t,p \rangle$  on  $I$  and “ $\psi$ ” is true at  $\langle w,t,p \rangle$  on  $I$ .
- “ $\neg\phi$ ” is true at  $\langle w,t,p \rangle$  on  $I$  iff “ $\phi$ ” is not true at  $\langle w,t,p \rangle$  on  $I$ .
- “ $\exists x\phi x$ ” is true at  $\langle w,t,p \rangle$  iff  
“ $\phi(c)$ ” is true on some extension  $I^*$  of  $I$  to the language  $L \cup \{c\}$  on which  $|c|^{I^*}$  exists at  $\langle w,t,p \rangle$ .
- “At  $w'$ ,  $\phi(c_1, \dots, c_n)$ ” is true at  $\langle w,t,p \rangle$  on  $I$  iff  
“ $\phi(c_1^*, \dots, c_n^*)$ ” is true relative to  $\langle w',t,p \rangle$  on some extension  $I^*$  of  $I$  to the language  $L^* = L \cup \{c_1^*, \dots, c_n^*\}$  such that  $C^m(|c_i|^I, |c_i^*|^{I^*})$  and  $|c_i^*|^{I^*}$  exists at  $\langle w',t \rangle$ .
- “At  $t'$ ,  $\phi(c_1, \dots, c_n)$ ” is true at  $\langle w,t,p \rangle$  on  $I$  iff  
“ $\phi(c_1^*, \dots, c_n^*)$ ” is true relative to  $\langle w,t',p \rangle$  on some extension  $I^*$  of  $I$  to the language  $L^* = L \cup \{c_1^*, \dots, c_n^*\}$  where  $C^t(|c_i|^I, |c_i^*|^{I^*})$  and  $|c_i^*|^{I^*}$  exists at  $\langle w,t' \rangle$ .
- “At  $p'$ ,  $\phi(c_1, \dots, c_n)$ ” is true at  $\langle w,t,p \rangle$  on  $I$  iff  
“ $\phi(c_1^*, \dots, c_n^*)$ ” is true relative to  $\langle w,t,p' \rangle$  on some extension  $I^*$  of  $I$  to the language  $L^* = L \cup \{c_1^*, \dots, c_n^*\}$  where for each  $i$ ,  $|c_i^*|^{I^*}$  where  $C^p(|c_i|^I, |c_i^*|^{I^*})$  and  $|c_i^*|^{I^*}$  exists at  $p'$ .
- “ $n$  is  $F$ ” is true relative to  $\langle w,t,p \rangle$  iff  
 $|“n”|^I \in |“F”|^{I21}$

We can now let the extension of “Rabbit” or “Gavagai” be all and only *mereologically atomic* undetached parts of a rabbit.<sup>22</sup> An atomic part falling under ‘gavagai’ will extend in space vicariously through having positional-counterparts in other places. It will change its properties through space through (for example) having white counterparts in one place; and counterparts in another place that are black.<sup>23</sup>

## 2.4 The primitives

One of the most striking things about the move from worm to stage to dot semantics is the need to appeal to additional primitives in each case. For worm theory, we appealed to the counterpart relation  $C^m$  (and recall, this was inessential—we could have used some other treatment of modality if preferred.). For stage theory we have in addition the temporal counterpart relation  $C^t$ , and for dot theory, we also have the positional-counterpart relation  $C^p$ .

<sup>20</sup>Wolfgang Schwarz (2005a), discusses an ‘atomistic’ theory he calls ‘general counterpart theory’. The version presented here derives from an early version of Schwarz’s paper though with some variations to parallel more exactly the counterpart theoretic paraphrases of Lewis (1968). Schwarz has subsequently reformulated his theory in ways that are less congenial to my present purpose.

<sup>21</sup>To deal with cross-temporal and spatial relations, similar moves to that used in stage theoretic setup will be needed.

<sup>22</sup>To get arbitrary undetached parts within the extension of ‘gavagai’, as on Quine’s original proposal, we would need to combine elements of the dot theory with elements of the worm theory. I will not give details here.

<sup>23</sup>For purposes of exposition, we indulge in the fiction that mereological atoms are intrinsically coloured.

The modal counterpart relation as Lewis understands it, is a contextually inconstant relation, so that statements about necessary properties (and *de re* modal predication in general) become highly sensitive to peculiarities of conversational context.<sup>24</sup> Lewis thinks of the counterpart relation as being fixed by facts about the *similarity* of objects to others. Although facts about similarity are not treated as in any way subjective by Lewis, *which respects* of similarity are called upon in a given case will depend on the demands of the conversation.<sup>25</sup>

The *formal* appeal to ‘counterpart’ relations, however, does not commit us to anything substantive of this kind. For example, it as yet says nothing about whether we can further analyze it (as Lewis analyzes modal counterparthood in terms of similarity); or whether we should treat it as primitive. Even in the modal case, compatibly with all that has been said, which objects are the modal counterpart of one another might depend on their instantiating special ‘haecceities’ (individual essences). This could lead to a treatment of modal predication very different from Lewis’, though sharing the same formal setting.

Appreciating the distinction between the flexibility of the *formal* apparatus of counterpart theory and the particular doctrines endorsed by its inventor is important when thinking of the stage and dot theoretic versions. It may help to think of the stage-theorist’s “temporal counterpart relation” as a relation of temporal *unity*. Every participant in the current debate owes a story about how stages hang together to form continuing objects, even if this only amounts to taking the notion of a ‘natural united’ object as primitive. This ‘hanging together’ is exactly what *C<sup>t</sup>* expresses (cf Hawley, 2001, ch.3).<sup>26</sup>

We can categorize ‘substantive’ accounts of the counterpart relations in numerous cross-cutting ways: (1) It could be taken as primitive, or an analysis could be offered. (2) It could be *constant*—a single relation-in-extension no matter what the context is; or *inconstant*—which relation-in-extension is picked out by *C<sup>t</sup>* might vary.<sup>27</sup> (3) Further, *grades* of inconstancy might arise. One might hold that there are only two temporal counterpart relations; say counterpart-*qua*-body and counterpart-*qua*-person.<sup>28</sup> Or, like Lewis, one might think of endless counterpart relations, whose selection is highly dependent on context. (4) On an inconstant view, one might hold that distinct counterpart relations are associated with each sortal predicate (so that sortal predicates ‘carry with them’ criteria of diachronic persistence)<sup>29</sup>; or one might not endorse such a connection. (5) One might think of the counterpart relations as subjectively constituted—for example, in terms of the classificatory dispositions of agents; or objectively constituted—for example, in terms of objective similarity (in the modal case)<sup>30</sup> or constitutive causal relations (in the temporal case)<sup>31</sup>. Of course, the modal, temporal and part counterpart relations may require analysis in different ways.

My concern here has been solely to set up the formal frameworks of three semantic theories that develop Quine’s suggestions for what ‘rabbit’ or ‘gavagai’ might divide its reference over. For the purposes of mounting a Quinean argument for division-inscrutability, all we need is that *some version or other* of each of these three frameworks succeeds. Though I shall occasionally

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<sup>24</sup>Lewis (1968), Lewis (1986, §4.5)

<sup>25</sup>Lewis (1983). Perhaps the most extreme example of Lewis endorsing context-sensitivity is to be found in “Things *qua* truthmakers” (2003).

<sup>26</sup>On a role for similarity in uniting successive stages, see Lewis (1976). It is clear that *similarity* will not find much use in an account of the p-counterpart relation involved in dot theories.

<sup>27</sup>As Parsons (2005) notes (in a slightly different context), the kind of views on diachronic identity espoused by Ayers (1974) and Armstrong (1980) may lead to a constant temporal unity relation.

<sup>28</sup>A picture that suits this case is one where we appeal to a small number of temporal unity relations, each paired with a specific natural kind. Hawley (2001, ch.3, esp. p.70).

<sup>29</sup>See Hawley (2001, §5.5)

<sup>30</sup>See Lewis (1986, p.254)

<sup>31</sup>See Armstrong (1980)

fill out the proposal in one direction or another, in the present context neutrality is a virtue, and one that I shall seek to preserve as far as possible.

### 3 Objections

Having developed our candidate semantic theories as an attempt to make good on Quine’s argument for division-inscrutability, we can begin to assess whether each semantic theory fits with ordinary patterns of assent and dissent. It is exactly the contention of Evans and Fodor that the Quinean ‘rabbit stage’ and ‘undetached rabbit part’ proposals *fail* to fit with aspects of natural language use.

I shall first cover Evans’ concerns about how stage-division handles tense ((C) on 4, above). Second, I look at concerns arising in the literature on stage theories of persistence, over whether the view handles *counting* correctly. Lastly, I look at the predication-based objections to rabbit-part-division that Evans suggests and Fodor develops ((A) and (B) on 4, above).

#### 3.1 Tense and aspect within stage theory

Worm, stage and dot theory each include temporal operators in terms of which tenses can be defined. Evans’ concerns about the ability of the stage-view to deal with tensed attributions can thus be answered in the most satisfying way: by appealing to a general treatment of tense. For example, the past tense ‘there was a rabbit running along’ becomes:

$$(\exists t)(t \text{ is past} \wedge \text{At } t(\exists x)(x \text{ is a rabbit} \wedge x \text{ is running along}))^{32}$$

The more general concern, however, may still be a good one. Evans highlights the need for a systematic account of tenses in English. Though *tenses* (strictly construed) can be handled, it is not so clear that other forms of temporal relativization will be. It is not clear at first glance whether the stage view can handle temporal *aspect*.<sup>33</sup> More particularly, as currently formulated, stage theory allows relativization to *instants* in time only. However, this may be inadequate to provide semantics for natural language. Dowty (1979, ch.4.) claims that to handle, for example, the English progressive (‘John was crossing the road’) we need to appeal to relativization to *intervals*.<sup>34</sup>

In fact, we can make a case for relativization to intervals more directly. Consider ‘John read *War and Peace* yesterday’ (McCawley, 1980, p.345). For this to be true, it is not enough that there be a time instant yesterday at which John was reading the book (for that is compatible with him not finishing it), nor that be a time instant yesterday at which John finished reading the book (since that would be consistent with his having only read the final page yesterday). Various more complex analyses might be tried, but, having considered several such analyses, McCawley writes:

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<sup>32</sup>Essentially, the flaw in Evans’ original argument lies in failing to distinguish what Sider (1996a) calls *de re* and *de dicto* temporal predications:  $\exists x \text{WASF}x$  vs.  $\text{WAS}\exists xFx$ . This is effectively the objection to Evans offered in Wright (1997) and Richard (1997).

<sup>33</sup>Josh Parsons mentioned this puzzle to me as a known problem for the Sider/Hawley stage theory of persistence. However, I have not been able to locate a reference within the literature on stage theory.

<sup>34</sup>. The basic idea is that ‘John is crossing the road’ is true relative to a time  $T$  if there is a interval  $T'$  including  $T$  relative to which ‘John crossed the road’ holds. This needs modification, though, to deal with the so-called ‘imperfective paradox’: ‘John was crossing the road’ can be true in situations where he never finished crossing (e.g. because he was run over). See Dowty (op cit) for discussion.

I would like to propose that not only points in time but also intervals figure in the logical structures of sentences and that examples such as [those above] all involve time intervals. [‘John read *War and Peace* yesterday’] will then not say that there is a past time at which John read *War and Peace* but that there is a past time interval such that he read it on that interval.

(McCawley, 1980, p.345)<sup>35</sup>

Let us suppose that the analysis of tense and aspect involves irreducible interval-relativization, as McCawley and Dowty urge. To begin with, one might think that no new problem arises for stage theory. Division over rabbit stages seems in good order, since we can simply re-interpret the stage semantics of p.8 above, so that the temporal indices range over intervals rather than instants. Formally, everything else remains the same—for example, the extension assigned to a predicate at an interval will be a set of instantaneous temporal parts. The thought will be that relative to the interval during which John read *War and Peace* (say, 1am to 11pm) each John-stage within the interval will fall under “reads *War and Peace*”, whereas relative to a time when he only got through half of it, no John-stage will fall under that predicate.<sup>36</sup>

We have to tread carefully though. On the stage-view, all that *falling under a predicate relative to a time* comes to is *falling under a predicate* (the effect of the final clause of the semantic theory is exactly to drop the relativization.) McCawley’s distinction between ‘a past time at which John read *War and Peace*’ and ‘a past interval such that John read *War and Peace* on that interval’ simply have no place within the stage-theoretic framework. (In the worm theoretic account, by contrast, we could generate such a distinction by distinguishing between *temporal stages* of John and *temporally extended segments* of John being in the extension of a predicate).

In my view this *does* show that the stage framework as formulated stands in need of supplementation. We need, as in the worm case, to distinguish between *s*-predicates (such as ‘being a rabbit’) and *c*-predicates (such as ‘reading *War and Peace*’). The final clause of the analysis can remain the same for *s*-predicates. But for *c*-predicates, we need to retain relativizations to times (both instants and intervals):

- “*n* is *F*” is true relative to  $\langle w, T \rangle$  on *I* iff
  - (i) *F* is a *s*-predicate and  $|\text{“n”}|^I \in |\text{“F”}|^I$ ; or
  - (ii) *F* is a *c*-predicate and  $|\text{“n”}|^I \in |\text{“F”}|^I$  relative to *T*.<sup>37</sup>

<sup>35</sup>See also Dowty (1979, ch.3.).

<sup>36</sup>Related predicates, such as the progressive ‘is reading *War and Peace*’ will hold of John-stages at instants during that day, given an appropriate treatment of the progressive (Dowty, 1979, ch.4.).

<sup>37</sup>For the Quinean, who is primarily interested in what *sortals* divide their reference over, this seems fine. But can one interested in stage theory as an account of persistence exploit this maneuver? The traditional worry over allowing the truth-conditions of atomic predications to be relativized to a time is that it amounts to thinking of certain properties that objects have as really *relations to times*. The worry is that this does not do justice to the sense in which certain properties are intrinsic or *non-relational*. The traditional formulations of stage and worm theory, with their time-relativization-free truth conditions for atomic predications, remove this worry.

Of course, the present proposal does not relativize ‘Mopsy is a rabbit’ to times, so for all that has been said, ‘being a rabbit’ might still be intrinsic or non-relational (see however, Sider (2001b)). But there does appear to be a threat that *redness* or *squareness* will be represented as time-relativized.

I do not think that one should be worried about this, however. To begin with, since these predicates do not express ‘activities’ of the kind that give rise to worries about progressive tense, we may not need to exploit the richness of relativization to intervals. We could just count them as *s*-predicates (to do so would we would have to drop the intuitive gloss, helpful in the worm case, that *s*-predicate means something like ‘sortal predicate’). But

Since the issues over progressive tenses, etc, that motivated the move to introduce interval-relativization don't arise for s-predicates such as 'is a rabbit', I take it that this setting is adequate.

### 3.2 Counting rabbits

Objections to stage-division do not come exclusively from the literature on Quine. One particular 'internal' criticism of the stage theory of persistence seems especially pertinent to our purposes. This is the accusation that stage theory delivers intuitively bad results when counting entities over an extended period.<sup>38</sup> The intuitive objection is that, since the reference of 'rabbit' is divided over infinitely many instantaneous rabbit stages, it will say that there are infinitely many rabbits in the hutch during a period in which common sense tells us that there is only one.

A standard Quinean response to such moves would be to re-interpret the 'apparatus of individuation': to declare that under the stage-hypothesis, we do not count by identity but by some *ersatz* relation.<sup>39</sup> That is, instead of characterizing the extension of 'is identical to' through numerical identity, we characterize it using the counterpart-hood relation. Writing '*I*' for short, we let '*xIy*' be true relative  $\langle w, T \rangle$  iff  $C^t(x, y)$  holds. Under this interpretation, we will not get errors of counting, since if (intuitively) Mopsy alone is in the hutch during Tuesday, all the rabbits in the hutch during that period are *I*-related.

Sider (1996a) declares it a virtue of stage theory that one does *not* have to do this, but can stick with the interpretation of the 'is' of identity as *strict, numerical identity*. However, he does think that re-interpretation is needed to get sensible results when, for example, counting the number of rabbits in a hutch over an extended period of time.<sup>40</sup>

For the Quinean, however, counting by *I* seems entirely unproblematic. Moreover, it is not obvious that we are *re-interpreting* identity using *I*. After all, *I* only relates things that are, will be or were numerically identical.<sup>41</sup> I conclude that the Quinean, at least, has no worries about counting.<sup>42</sup>

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even if we did count them as *c*-predicates, just because the *predicate* has relativized truth-conditions, it does not mean it *expresses a temporally relativized property*. Call *c*-predicates where the same stages are in the extension of a predicate *relative to every temporal interval* "stable predicates". 'Red' and 'Square' would seem on this view to be stable predicates. And I do not see any reason to think that *stable* predicates cannot express intrinsic properties, despite the extra flexibility built into their truth-conditions.

<sup>38</sup>See in particular Sider (1996a), who despite defending stage theory is particularly concerned about this point.

<sup>39</sup>See Field (1974) for an example of this Quinean approach. Sider (1996a) endorses re-interpretation of identity for particular 'counting' contexts.

<sup>40</sup>It is not obvious that counting by = itself will straightforwardly deliver bad results, once we factor in the tense and aspect within counting statements. However, I do think that, particularly taking into account the interval quantification just mentioned, it faces severe problems. In particular, we need to check that a proposal handles the following case correctly: Flopsy is in a hutch during the early part of Tuesday; then taken out and destroyed. Mopsy is created, occupies the hutch during the late part of Tuesday, and then is destroyed. On Wednesday, there should be a reading of 'there were two rabbits in the hutch during Tuesday' which is true. The challenge for one who wishes to 'count by =' is to show how the formulation of counting that handles this case correctly can also deliver the intuitively correct results when the reference of 'rabbit' is divided over stages.

<sup>41</sup>In particular, this is not the 'counting by rabbit-worms' that Sider (1996a) appeals to. In the famous case, 'the Statue=the Clay' will be true, for example, in virtue of their present stages being identical (and so counterparts), whereas they may well be distinct worms. A better description would be 'counting by ersatz identity', since we can regard counterpart-hood as the stage theorist's substitute for diachronic identity.

<sup>42</sup>This analysis also deliver interesting results in so-called 'fission' cases (Sider, 1996b; Lewis, 1976). If Mopsy undergoes fission, splitting amoeba-like to become Mopsy1 and Mopsy2, then Mopsy1 and Mopsy2 will witness the truth of 'there are at least two rabbits in the hutch during Tuesday' (there are two rabbits—a Mopsy-1-stage and a Mopsy-2-stage who are not *I*-related). The interesting result, however, is that we may get 'there is exactly one rabbit in the hutch during Tuesday' coming out true as well. The point is that there is a rabbit within that hour

### 3.3 Predication and compounding

We have considered and rejected the Evansian accusation that stage theory does not deliver an adequate account of tense; and have pointed to a version of stage-semantics which avoids any trouble with counting entities over an extended period. The final style of objection to be considered focus, in the first instance, on alleged bad results of compound predications.

The source of these worries are the Evans and Fodor objections (A) and (B) (given on page 4ff. above.). Let us quickly update those concerns to the current setting. The natural proposal for the dot-semantics is to let anything which is (intuitively) an atomic part of an  $F$  fall under ' $F$ '. Given this, *prima facie* problems with compound predications arise: we will have objects that fall under 'Rabbit' and 'White' and 'Ear' when faced with a rabbit with a white ear—just take any simple part of the ear. So there is at least a *prima facie* case that such a situation witnesses the truth of 'there is a white rabbit present': to which no ordinary user of English would assent.

Rather than tackle the problem directly, I want to outline a range of parallel cases within the worm and stage frameworks, and describe how advocates of those positions are likely to react to the challenges. I will then look at how the analogous responses would work within the dot semantics.

#### Inconstancy within stage and worm theory

Consider stage theory, as developed by Sider (1996a). The proposal is to let any stage of something that is intuitively an  $F$  fall under the extension of ' $F$ '. The temporal counterpart relation is something that unites person-stages of a single person: Sider takes it to be a matter of psychological connectedness. In the case of other kinds of objects, different kinds of temporal 'unity' relations would be needed. Our worries will arise when two objects which *share a stage* nevertheless call for extensionally distinct counterpart relations.

Let us illustrate this with a famous case. Consider a lump of clay that has existed for millions of years, and which was formed into a statue 35 years ago. Many wish to maintain that the statue *came into existence* when the clay was formed into the shape of a statue—it is an object in its own right, not merely a temporary property of the lump of clay.

From the stage theorist's perspective, this presents a dilemma. Does the temporal counterpart relation relate the present statue/clay stage to a stage of the piece of clay before it was formed into a statue? Suppose it does: then the statue pre-existed its sculpting, in virtue of having a temporal counterpart before that event. Suppose it does not: then the piece of clay has no counterparts before the sculpting, so came into existence at that point also.

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(a pre-fission stage of Mopsy) which is  $I$ -related to every rabbit in the hutch within the day. There are two familiar ways of handling 'there is exactly one  $F$ ' within first-order logic:

there is at least one  $F$  and it is not the case that there are at least two  $F$ s

there is at least one  $F$  and every other  $F$  is identical to it

On the former reading the Mopsy-fission scenario will not make-true 'there is exactly one rabbit in the hutch'. But on the latter reading, the Mopsy-fission will make-true *both* 'there is exactly one rabbit in the hutch' and 'there are exactly two rabbits in the hutch'. Many will take these results to show that in this context, the first order analysis of numerically definite quantification should be endorsed. Personally, though, I find the consequences of the second analysis quite appealing—an apt reflection of the confusing nature of counting in fission cases.

Two final remarks. The proof that the two readings of 'there is exactly one  $F$ ' are equivalent relies on the Euclidean property of the identity relation: and it is exactly this that fails when numerical identity is replaced by the *ersatz* identity  $I$ . Thanks to NN for this point. A similar treatment of fission cases will arise within worm theory, if the name-positions flanking the identity sign are treated as  $c$ -predicates (cf. p.6, above.). Thanks to MM for suggesting this.

Sider's analysis of the statue/clay case is to admit *two* temporal counterpart relations: statue-counterparthood and lump-of-clay-counterparthood. The latter relates the statue/clay stage to entities pre-existing the sculpting event; the former does not. Which relation is designated by our relation  $C^t$  is a matter for *context* to decide. When we ask about the creation of the statue, the former is invoked; when we ask about the pre-existence of the clay, the latter is invoked.

What we have described thus far is sufficient to deal with questions phrased in terms of quantification (existence) and temporal operators. Using such devices we can ask about whether the statue existed 36 years ago, and get one answer; and we can ask about whether the clay existed 36 years ago and get a different answer. This is compatible with maintaining that the statue and the clay are identical.

What I now want to highlight is that this does *not* solve all the problems that we need to ask. For there are predicates that depend on the distribution of properties over the course of an object's history. Such 'historical' predicates include, paradigmatically 'is exactly 35 years old' and 'is millions of years old'. Again, a dilemma emerges: is it true to say "there is a million year old statue present"? Presumably not, given that the lump of clay was formed into a statue only 35 years ago. Nevertheless, since the lump of clay stage is identical to the statue stage, if one is within the extension of "millions of years old" the other must be too. We *do* want "there is a lump of clay present that is millions of years old" to come out as true: so we are pressured towards admitting the former sentence as true. Given that exactly similar remarks could be made in favour of placing the stage inside the extension of "is exactly 35 years old" we are in danger of declaring true "there is something that is both exactly 35 years old and is millions of years old".

One option here is to appeal to *paraphrase* so as to reduce the problem to one already solved. The basic idea is to map

n is (at least) 35 years old

to

Throughout the past 35 years, n has existed.

As before, inconstancy of the counterpart relation directly impacts here, given the way that temporal operators are defined.

The fundamental objection in the context of finding a possible *semantic analysis* of our language, is that the free use of paraphrase to turn predicates into operators looks illegitimate. If we are asking for a semantics for a language with a fixed syntax, we need some other device: for we want an interpretation of the *predicate* 'is 35 years old'. Pointing to an operator that systematically corresponds to it is not to deliver this.<sup>43</sup> The resolution is close to hand, however. What we must maintain is that not only the counterpart relation, but a range of related predicates are inconstant or indexical. 'Historical' predicates such as 'is exactly 35 years old' are paradigmatic examples of this class. Indeed, the two indexicals are related in a natural way: 'is exactly 35 years old' will hold of a stage at  $t$  iff the sum of the temporal counterparts of that stage existing earlier than  $t$  measures 35 years. Notice that we *use* the counterpart relation in specifying the property. Hence any indexicality characteristic of the counterpart relation will infect the extension of the predicate.<sup>44</sup> We get:

The statue is the clay

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<sup>43</sup>What we would need to make a principled case is some independently motivated transformation or generative component in the semantics that would derive the surface predicate from underlying operators. Cf. Lewis (1970) and Dowty (1979, ch.1.).

<sup>44</sup>Compare the 'indexical' response to Evans suggested by Wright (1997, p.410).

The statue is exactly 35 years old

The clay is millions of years old.

To explain the difference, we point to changes in context: the latter two invoke different counterpart relations (statue-counterparthood and clay counterparthood respectively) which in turn changes the extension of the relevant predicates.

### The residual question

Our resolution of the puzzles over inconstant predication make heavy use of contextually varying counterpart relations. This leaves a residual worry. For simplicity, I set up the semantics within a single context, and assumed that this context would determine a unique counterpart relation. It is natural to think, however, that different counterpart relations *can* be invoked by different parts of the same sentence. Thus (naming the statue ‘Goliath’ and the clay ‘Lump’) it is natural to think the following should come out true.

Goliath is exactly 35-years old and Lump is millions of years old (\*)

For this to be the case, we need to allow *different* counterpart relations to operate in the two conjuncts. Two worries then emerge: How are we to think of this case? What prevents us from existentially generalizing to get the problems back once again?

On the first point, we should first note that we have independent reason to think that context-change within a sentence can take place. Consider the utterance “Now is not... now” Since the second utterance of ‘now’ takes place at a later time than the first, there is a natural reading of the sentence on which it expresses a truth. On the other hand, relative to any single context, it expresses a contradiction. I suggest the following view of how token utterances get assigned truth-conditions by a semantics. First, each expression in the utterance has its own context. The first component to semantic theory (what Kaplan (1989) calls ‘character’) will assign to each component a content, depending on its own unique context. Indexical terms such as ‘I’ and ‘now’ are assigned a referent, indexical predicates are assigned an extension, and so on. Once this is fixed, the second component of semantic theory kicks in. This tells us how the referents and extensions assigned to the various expressions combine to determine the overall truth-conditions for the sentence. The various semantic theories that we give above are each candidates for this second component. Which extension the predicates have, or what precise relation the primitive terms of the theory express, may indeed vary depending on the context at hand, even within the same sentence.<sup>45</sup>

The second worry seems to me the most serious challenge. What prevents the worrying existential generalization:

There is something that is both exactly 35 years old and is millions of years old?

We have been given no reason to think that context cannot change in ways that render true an utterance of such a sentence. The case is particularly pressing given our verdict that the witnessing statement (\*), above, is unproblematic.

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<sup>45</sup>For more examples of how context change within a sentence can be significant, see Lewis (1979). The account of belief reports in Stalnaker (1999) also requires context change. It seems to me that the need to distinguish *contextual determination* of content, involving a variety of contexts, from the calculation of truth-conditions of a given utterance, once content of its parts have been fixed, undermines Lewis (1980)’s suggestion that we could do semantics entirely in terms of a single binary functions from index and context to truth-values. It gives a principled reason for discerning a significant level of ‘content’ within the overall ‘semantic value’.

There are two responses. The *way of resistance* is to find some principled constraint on change of context which prevents the generalization from coming out true. It is hard to see a non *ad hoc* route for this. Better, then, is the *way of concession*. This is to accept that there is no principled reason that a context cannot be found with respect to which the existential generalization is true; but to insist that such contexts do not normally arise, so that *standardly* the existentially generalized sentence expresses something false. One would then hope to *explain away* intuitions that the statement is false, on the grounds of its typical (though not inevitable) falsity.

I advise the stage theorist to take the way of concession. One should try to explain intuitive resistance to the bare existential by noting that for it to be true, context would need to invoke statue-counterparthood for the first part of the sentence, and clay-counterparthood in the second. However, there are no prompts for such change in the sentence. If we do add such prompts, we get something that sounds (to my ears at least) acceptable:

there is something that is exactly 35 years old (*qua* statue) and millions of years old (*qua* lump of clay).

### **Analogues in the worm case**

I have explored the way that Sider handles statue/clay cases within stage theory. The key was to diagnose inconstancy in the counterpart relation, and to extend this to relevant ‘inconstant’ predication. I now want to briefly sketch the analogous case within worm theory, before turning to the Evans/Fodor objections to Quinean inscrutability.

Worm theory, as we have set it up, puts fusions of temporal stages of *F*s into the extension of ‘*F*’, when *F* is a s-predicate, and puts *G*-ing stages into the extension of ‘*G*’, when *G* is a c-predicate. It straightforwardly handles the whole variety of cases we have hitherto considered.<sup>46</sup> Nevertheless, analogous phenomena *do* arise, given modal counterpart theory. It is not unreasonable to hold that the statue is *essentially* a statue. Equally, it is not unreasonable to hold that the lump of clay is *essentially* made of clay, but might never have been made into a statue.<sup>47</sup> On the other hand, if we consider a case where the statue and the clay were created and destroyed at the same time, on the worm-view the statue and the clay will be the same space-time worm.

Lewis (1986, §4.5) explicitly admits this kind of case, by making allowance for inconstant modal counterpart relations.<sup>48</sup> Lewis’s thought is that in some contexts, a shapeless lump of clay can be similar enough to the statue-clay worm (e.g. regarding history) to count as its counterpart; but in other contexts, the relevant standards of similarity are such that only statues can be counterparts, even if they are made of bronze or steel. We can retrace the steps described earlier for the stage case: pointing to possible paraphrase in terms of modal operators to which the modal counterpart relations are directly relevant (e.g. ‘Necessarily, it is a statue’); and then looking at an interpretation of the predicate ‘is essentially a statue’ specified in terms of counterpart relations, so that it would inherit the indexicality of the latter.

Again, there would be problematic existential generalizations:

there is something that is both essentially a statue; and is essentially made of clay,  
but might never have been a statue

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<sup>46</sup>This has the rather disarming implication that, strictly speaking, nothing is both white and a rabbit. Of course, the semantics of predicates are set up in such a way that ‘everything that is a white rabbit is a rabbit’ will come out true.

<sup>47</sup>Kripke (1980, ch.2)

<sup>48</sup>Indeed, this is the model that Sider follows in developing the stage view.

Again, we try to allay worries by noting how odd the context-change involved would have to be to render this true; and also, perhaps, the acceptability of versions where contextual prompts such as *qua statue* are introduced.

### The Evans and Fodor cases revisited

Having explored modal and temporal inconstancy in the worm and stage cases, I will now argue that Evans/Fodor objections are just the surfacing of the same phenomenon within the dot-semantics. Consider first Evans' challenge: of what objects does 'white' hold? The underlying problem here is that whether or not a rabbit is white depends on the overall distribution of whiteness in its fur. Like the historical predicates that were problematic for stage theory, 'spatialized' predicates will pose challenges for dot theory.

The solution is to characterize the extension of predicates informally via the contextually salient counterpart relation:

'is white' applies to *a* iff the fusion of *a* and its positional-counterparts have a white outer surface.

When 'rabbit-counterparthood' is salient, all atomic parts of a single rabbit are counterparts of each other. In the presence of a white rabbit, the condition will be met by any part of a white rabbit. It is not met by any part of a black rabbit with a white ear. It is not met even if there is an atomic part *A* (part of the ear of the rabbit) which falls under 'rabbit' and which is itself intrinsically white in colour.

Each such sortal will have to deliver its own counterpart relation. For example, there will be ear-counterparthood, under which *x* and *y* will be counterparts iff they are both parts of the same rabbit ear. In the scenario sketched above, the same object *A* which did not fall under 'white' under the rabbit-counterparthood relation, will fall under 'white' under ear-counterparthood.

I hope it is clear that the above is just the analogue of the treatment of inconstant predicates in the modal and stage settings: though now almost every predicate is inconstant. We can expect an analogue of the odd existential generalizations found earlier. In the current setting these generalizations are something like:

There is something that is both white all over and mostly black

For *A*, above, is white all over *qua* part of a white-all-over ear; and mostly black, *qua* part of a mostly black rabbit. Again, our initial discomfort might be explicable given the changes of context that must occur to render the odd-sounding sentence true; and might be disarmed if we find the '*qua*' glosses moderately acceptable.

The situation is interestingly different with the Fodor cases, where we concentrate on sortal predicates:

There is something that is both a rabbit and an ear

The analogue of these kind of statement for the worm and stage setting is: 'there is something that is both a statue and a lump of clay'. Such statements were unproblematic in those contexts. Hence, there is little temptation to regard *these* as inconstant predicates.

Perhaps the best line here would be to maintain that sortal predicates, as well as adjectives such as 'white', are 'positionally' inconstant, though modally and temporally constant. We would then give characterizations of the extension of sortals such as:

‘*x* is a rabbit’ is satisfied by *A* iff the fusion of *A* and its positional-counterparts makes up a rabbit.

Under the ear-counterpart relation, the extension of this predicate will be empty; under the rabbit-counterpart relation, all the atomic undetached rabbit parts will fall within it. Of course, this doesn’t mean that there are any ordinary contexts in which ‘there are no rabbits’ would be true: for such sentences *ipso facto* make salient rabbit-counterparthood. The view does allow us to regard the Fodorian sentence above as the direct analogue of the ‘historical predicate’ or ‘modal predicate’ cases familiar from stage and worm views: just as in those cases, the diagnosis will be that the sentence can only express a truth if there is a context-change occurring in the middle of it.

However, why can’t the context shift in the middle of a sentence? In the temporal case, it seemed legitimate to allow the kind of contextual shifts necessary to render true: ‘there is something that is both a 35 year old statue and a million-year-old lump of clay’. Presumably, that is because the use of the phrase ‘lump of clay’ in the second conjunct shifts the context to one where lump-of-clay counterparthood is salient. If that is the case, why can’t context shift from rabbit-counterparthood to ear-counterparthood midway through Fodor’s existential generalization, rendering it true? This is the outstanding challenge to the approach just described.

Suppose we reject the response to Fodor just sketched. Then one who endorses the dot semantics as a legitimate way to interpret English sentences will have to have a healthy propensity to bite bullets. Suppose we tug on a rabbit’s ear, and say: “this is a white ear; but it is also a mostly black rabbit”. In context, the statement seems fine. We would probably regard it as a pun<sup>49</sup>—but for the dot theorist, it would express the sober truth.

Let us take stock. We have been considering three different ways in which our proposed semantic theories, embedding different divisions of reference, might fail to match up with the patterns of assent and dissent in ordinary language use. We looked at the stage theoretic treatment of tense and counting, and found nothing to worry the Quinean. We then looked at issues of compounding, and located the concerns of Evans and Fodor within the general phenomenon of (modally, temporally or positionally) inconstant predication. Evans’s objection to Quinean undetached rabbit-parts can be seen as exactly analogous to the concerns about modal and temporal predications that are resolved by appealing to inconstant counterpart relations. The Fodorian existential generalization, though superficially similar to Evans’ concerns, is now revealed as a distinctly more worrying case.

The Fodor sentence seems a serious problem for the dot-inscrutabilist—it certainly seems unfaithful to ordinary patterns of assent and dissent. Progress has nevertheless been made: we have seen how Evans’ worries can be dealt with in ways exactly analogous to corresponding problems for stage and worm theories. We have also seen exactly why the Fodorian generalizations arise: cases where one sortal applies to parts of things falling under another will generate parallel existential generalizations and identities on all three accounts. Only in the dot case do they seem intuitively repugnant. What I take this to show is that the Fodorian phenomena are not symptoms of a wider malaise for dot-theory—they are the most problematic features of a generally successful account. Perhaps more importantly, we have seen that we will not be able to find corresponding problems with the stage view: the analogous sentences (e.g. ‘there is something that is both a lump of clay and a statue’) are unproblematic.

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<sup>49</sup>That is, one would assume that the anaphoric reference cannot be taken seriously—we would ordinarily assume that we need ‘this’ and ‘it’ referring to different entities for the sentence to come out true.

## 4 Conclusion

We have set out three semantic fragments that embed rival divisions of reference. This affords us a principled position from which to assess Quine's contention that the division of reference is inscrutable. Objections, both ones based on those extant in the literature and some new to that debate, can now be put forward and assessed. The sort of maneuvers already familiar from the debate on modal and temporal operators (in particular, inconstancy in counterpart relations) turn out to have great relevance in propounding the Quinean position. One objection in particular turns out to be especially robust (the Fodorian objections to division of reference over undetached parts); and our perspective allows to see this as a local manifestation of a more general phenomenon.

What of the case for division inscrutability itself? At least in the case of stage and worm inscrutability, I take it that we have got proposals that seem to predict the same patterns of assent and dissent in all but *recherche* contexts; dot theory clearly returns more unexpected results in non-*recherche* cases, though it does a good job most of the time. So the *prima facie* case for division inscrutability—at least on stages/worms—looks strong.

One cannot escape this challenge simply by endorsing a more expansive metaphysics that incorporates, say, *enduring* objects that one wishes to identify with ordinary persisting things, unless one in addition *disbelieves* in the existence of the relevant *perduring* entities. For so long as one still has worms, stages and dots within one's ontology then one will be able to formulate the three theories.<sup>50</sup> The challenge will be: in virtue of what do our words pick out the enduring entities, rather than the worms, stages and dots mentioned above?

If one wants to rebut the Quinean case for inscrutability at this point, one either needs to bring up new examples of sentences the above accounts misclassify, or one has to elaborate the constraints on successful interpretation over and above charity—say, constraints of causality, simplicity, or eligibility—and make the case that somehow one or the other of these interpretations violates these constraints. Whichever route you take, the debate can now be structured around an explicit formulation of the Quinean challenge.

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<sup>50</sup>The worms, stages and dots might be mere 'portions of stuff' in Ned Markosian's sense, or might be regarded as mere '(parts of) the history of a rabbit'. However, so long as they are around to be talked about, the interpretations here described may be constructed.

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