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Conjunction as Identity

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1. Motivations

1.1 Lewis on composition

David Lewis (1991: §§3.5–6) argues that composition shares the following four features with identity:

> *Uniqueness*. Composition is unique: no things have more than one fusion. (That is, if y and z each result from fusing xx, then $y = z$.)
> *Unrestrictedness*. Composition is unrestricted: for any things, there is 'automatically' the fusion of those things. Things need not satisfy any special condition to fuse.
> *Reflectance*. Fusions reflect their parts. As Lewis (1991: 85) puts it, if you describe some things fully—their properties and relations—you thereby fully describe their fusion. There are not two separate matters, concerning the things and concerning their fusion: the nature of the fusion is simply a matter of how the parts collectively are.
> *Innocence*. Composition seems to be 'ontologically innocent': once one is committed to the existence of some things, commitment to the existence of the fusion is no 'further' commitment. As Lewis (1991: 81) puts it, the fusion is 'nothing over and above' the things. An inventory of things which included both parts and whole would be redundant, since they correspond to the same 'portion of Reality'.[1]

Lewis cautiously concludes that composition is an especially intimate, identity-like relation between parts and whole.[2] More recently, metaphysicians have embraced *Composition as Grounding*: the idea that

1. To these identity-like features we might add: that composition is absolute rather than relative, that it is precise rather than vague, and that a single composition relation applies across objects (Sider 2007: 77-8). Conjunction seems to share analogous features.
2. See Bennett (2015) for discussion. She calls *Reflectance* 'Property Inheritance'; this terminology seems to favor *Composition as Grounding* over *Composition as Identity*.

wholes are grounded in, built from, or generated by their parts—or, in 'fact-grounding' terms, that the facts concerning the existence of the various parts ground the fact that the whole exists (e.g. Fine 2010, Cameron 2014, Bennett 2017). The grounding in question is an irreflexive, worldly relation: its relata are numerically distinct, and not merely in a representational or conceptual sense (cf. Correia 2010: §2). Nonetheless, it is intimate and identity-like: it is 'an internal relation operating within a given portion of reality' (Schaffer 2016: 76), so that there is a sense in which its relata are not 'metaphysically distinct'.

Composition as Grounding seems to explain *Reflectance*: whenever y is built from some xx, y's properties reflect how the xx collectively are. It may also fit a suitably loose reading of *Innocence*—at least, if grounded entities do not count against ontological parsimony (as Bennett (2017: §8.2.2) and Schaffer (2015) argue).[3] As for *Uniqueness* or *Unrestrictedness*, some building relations plausibly lack these features. For example, the relation between propositions (or states of affairs) and their worldly ingredients seems to violate *Uniqueness*: both *Ann loves Bob* and *Bob loves Ann* are built from Ann, Bob, and the loving relation. And set-formation seems to violate *Unrestrictedness*: some pluralities, such as the cardinal numbers, are 'too large' to build a set from. So *Composition as Grounding* does not seem to explain these features on its own: they are additional, special features of composition (by contrast with other building relations). They could of course be added into the view—perhaps as 'metaphysical laws' governing composition. The point is just that additions are needed.[4]

Lewis (1991: n.12) also considers 'a stronger, and stranger, version' of the idea that composition is identity-like: *Composition as Identity*.[5] On this view, prominently associated with Donald Baxter (1988a, 1988b), composition is not merely analogous to but is coextensive with (and perhaps even is) identity: the things 'are' their fusion, and the fusion 'is' the things.[6] As the scare-quotes indicate, this view resists grammatical expression in English, and it is unclear how it should be formulated. A common approach embraces a revisionary notion of 'many-one identity', but as explained in §2, I prefer to employ an ordinary notion of 'many-many identity'.[7] On this formulation, 'the fusion' in fact refers to many things: it is semantically plural despite being syntactically singular in English. Thus understood, *Composition as Identity* has some advantages over *Composition as Grounding*, as well as a conspicuous disadvantage.

One advantage is that it explains both *Uniqueness* and *Unrestrictedness* directly, in terms of the corresponding features of many-many identity: any plurality is uniquely and unrestrictedly identical to some plurality. This explanation of *Unrestrictedness* has been contentious, since some pluralities are not identical to any *single* thing (Sider 2007: 61, Cameron 2012). However, we should distinguish the claim that all things have a fusion from the stronger claim that all things have a fusion which is itself a single thing. The former is accommodated by *Composition as Identity* (interpreted in terms of many-many identity), and this arguably vindicates the core intuition of *Unrestrictedness*.

A further advantage is that *Composition as Identity* straightforwardly and whole-heartedly vindicates *Innocence*: if some xx are identical to their fusion y, then y is 'nothing over and above' them in more than the loose, quasi-metaphorical sense afforded by *Composition as Grounding*. An inventory listing 'only' xx would be literally complete: it would thereby 'also' have listed y. (Since y is many things, we should understand this as a matter of y being contained within the list, rather than being one of its entries.)

3. Fine (2010: 572) writes that the whole 'is nothing over and above its parts—or perhaps we should say, more cautiously, that it is nothing over and above its parts except insofar as it is one object rather than many.'
4. As Sider (2007: §4.2) notes, *Uniqueness* and *Unrestrictedness* are plausibly needed to vindicate *Innocence*; how could wholes be nothing over and above their parts if composition weren't unique and unrestricted?
5. The view is often called 'Strong Composition as Identity', to distinguish it from Lewis's view that composition is merely analogous to identity.
6. Baxter interpretation is complicated by his distinguishing different kinds of identity: see Yi 1999: n.13, Turner 2014.
7. Cotnoir (2008) develops an alternative formulation in terms of 'general identity', which holds both many-many and many-one.

The conspicuous disadvantage is that *Reflectance* morphs disconcertingly into indiscernibility: the whole not only reflects its parts' collective nature, but somehow shares their collective nature. It is not merely that by describing the parts one thereby describes the whole, but that they have the very same description. This is puzzling: on the face of it, for example, the parts are many, whereas their fusion is not. Proponents of *Composition as Identity* must somehow alleviate this puzzle.[8]

Composition as Identity has been discussed thoroughly in recent decades (e.g. Yi 1999, 2018, Sider 2007, Cotnoir 2008, Wallace 2011, Cameron 2012, Cotnoir & Baxter 2014, Bohn 2019). However, I know no discussion of the analogous view regarding conjunction—*Conjunction as Identity*—that the conjuncts 'are' their conjunction.[9] This is curious because conjunction seems similarly identity-like.[10] Consider:

> *Uniqueness*. Conjunction seems unique: no propositions have more than one conjunction. (That is, if r and s each result from conjoining p with q, then $r = s$.)[11]
>
> *Unrestrictedness*. Conjunction seems unrestricted: for any propositions, no matter how miscellaneous their subject-matters, there is 'automatically' their conjunction. (Indeed, this seems clearer for conjunction than composition: gerrymandered fusions like trout-turkeys are contentious, gerrymandered conjunctions like ⟨there are trout and there are turkeys⟩ are not. No 'Special Conjunction Question' arises.)
>
> *Reflectance*. Conjunctions seem to reflect their conjuncts: the nature of the conjunction is simply a matter of how its conjuncts collectively are. Most obviously, the conjunction's obtaining or not obtaining is a matter of its conjuncts obtaining or not obtaining. But also, perhaps more deeply, its subject matter reflects that of its conjuncts: if a conjunct concerns snow, so does the conjunction.
>
> *Innocence*. Conjunction seems 'innocent': given a commitment to some propositions, their conjunction is no further commitment. 'Commitment' may be understood ontologically here. But it may also be understood truth-conditionally (where this kind of innocence may be recognized by a nominalist who denies that propositions exist). A conjunction is therefore 'nothing over and above' its conjuncts both in what it takes for it to exist (supposing it does) and in what it takes for it to obtain. An inventory of truths which included both conjuncts and conjunction would be redundant, since they correspond to the same 'aspect of Reality'.[12]

The dialectic regarding conjunction parallels that described for composition above: the identity view may explain some of conjunction's identity-like features better than the grounding view, but it has a disadvantage when it comes to *Reflectance*. Of course, the two cases differ in various details, and some readers may regard the motivation for *Composition as Identity* as stronger. Nonetheless, the analogy is close enough that *Conjunction as Identity* warrants serious discussion.

According to *Conjunction as Grounding*, conjunctions are built from their conjuncts. Given a standard 'truth-conditional' construal, the obtaining of a true conjunction is grounded in its conjuncts' obtaining. Since the features described above apply equally to false conjunctions, this truth-conditional construal must be strengthened to fully capture them: the conjuncts 'non-factively' ground their conjunction (regardless of whether they obtain). Given a less familiar ontological reading, a conjunctive proposition's existence is grounded in its conjuncts' exis-

8. As Bennett (2015: 257) notes, Lewis's own characterization of *Reflectance* sometimes (misleadingly) suggests indiscernibility.
9. It is mentioned in passing by McSweeney (2020: 161) and Tahko (2021: 4784).
10. Disjunction might seem equally identity-like; I return to this issue in §5.
11. This is not entirely uncontentious: a 'structured' conception of propositions distinguishes ⟨Snow is white and grass is green⟩ from ⟨Grass is green and snow is white⟩. But I think there are good reasons to reject this extreme fine-grainedness.
12. As a referee points out, this might be less compelling for infinitary conjunction; perhaps it is a substantive question whether infinitely many conjuncts may be 'wrapped up' into one.

tence. On this ontological reading, the truth-conditional claim becomes a principle of property-inheritance, describing how the conjunction inherits its properties from its grounds.

Conjunction as Grounding seems to fit well with *Reflectance* and somewhat well with *Innocence*, but—for the same reasons described above—it does not on its own account for *Uniqueness* and *Unrestrictedness*. Since these features are not inherent to building relations, they do not follow automatically from the claim that conjunctions are built.[13] We could add them in as 'metaphysical laws' governing conjunction—the point is just that additions are needed.

By contrast, according to *Conjunction as Identity*, the relation between conjuncts and conjunction is simply identity. This view fits *Uniqueness*, *Unrestrictedness*, and (arguably) *Innocence* better than *Conjunction as Grounding*. It follows directly (no extra assumptions needed) that any propositions have exactly one conjunction, and that this conjunction is 'nothing over and above' its conjuncts.

A wrinkle regarding *Unrestrictedness*: it seems that conjunction is restricted to propositions, whereas identity applies to any entities whatsoever—so conjunction cannot simply *be* identity.[14] Even if conjunction applies to various types of entities—properties, relations, and perhaps even objects (cf. Fine 2017: §4)it is doubtful that there are 'cross-type' conjunctions, e.g. of an object with a property. For this reason, I think *Conjunction as Identity* is best construed in 'higher-order' terms: the relation which holds between a (propositional) conjunction and its conjuncts is propositional identity, where this relation is distinctive to the type of propositions (or, more accurately, the type of pluralities of propositions, as discussed below). If an absolutely general notion of identity (eluding expression in standard higher-order languages) is insisted upon, then it should be conceded that conjunction can only be identified with some restriction of this relation.

Overall, there is an abductive case for *Conjunction as Identity*: it provides an attractively simple explanation of three striking features of conjunction. But it has a conspicuous disadvantage when it comes to *Reflectance*: it entails that conjunctions (despite their apparent 'oneness') are somehow indiscernible from their conjuncts.

Given the analogy between *Conjunction as Identity* and *Composition as Identity*, we might make progress on the contentious case of composition by considering the neglected case of conjunction. But *Conjunction as Identity* is interesting and important in its own right: for example, it connects directly to propositional grain (§4.2) and logical atomism (§4.3). My aim is therefore to develop the view, and explore its ramifications. As with any radical view, if investigation does not ultimately reveal a compelling alternative, it may yet be fruitful precisely by showing why orthodoxy deserves its status.

1.2 *Ramsey on negation*

Frank Ramsey (1927) provided an intriguing—and, to my mind, persuasive—argument for the following principle:

(Involution) $\forall p\ p = \sim\sim p$.

('Any proposition just is its double-negation.')[15] Ramsey imagines a written language in which sentences are negated by turning them upside-down, so that negating a sentence twice leaves it unchanged. This suggests the following argument. Say that a function from propositions to propositions is 'self-cancelling' when applying it twice to a proposition *p* yields *p* (so *Involution* is the thesis that negation is self-cancelling). Let 'flipping' be the function expressed by turning a sentence upside-down in Ramsey's imagined language (so that, if a sentence S expresses a proposition *p*, turning *S* upside-down expresses the result of flipping *p*). Then:

13. There are plausibly building relations among propositions in particular which lack these features. For example, both *if p then q* and *if q then p* are built from *p* and *q*, and no quantificational proposition can be built from a proposition containing no objects to be 'abstracted' into variables.
14. Thanks to a referee for raising this point. In terms of the formulations described below, it threatens Relational CAI, but not Extensional CAI.

15. Wittgenstein (1922: §4.06) suggests a similar sentiment.

i) Flipping is self-cancelling.
ii) Flipping just is negation.
iii) Therefore, negation is self-cancelling.

The first premise is supposed to be true by construction—it is the following trivially true sentence of Ramsey's language:

$$\forall p\ p = p.$$

As for the second premise, Ramsey notes that his language 'is only inconvenient because we are not trained to perceive complicated symmetry about a horizontal axis'. Dorr (2016: 63) adds: 'it is hard to believe that the use of such a language would be any sort of a handicap from a metaphysical point of view'. These remarks suggest two ideas. First, the practical explanation for our use of a negation symbol debunks the conviction that it reflects any metaphysical insight. Second, denying premise (ii) entails that Ramsey's language is somehow unable to express negation—and, conversely, that flipping eludes English expression.

Of course, Ramsey's argument is contentious, and there is plenty to say about it (see e.g. De Rizzo forthcoming: §5). But I would like to suggest that, for those who find it compelling, a similar motivation can be given for *Conjunction as Identity*.

Say that a function from pairs of propositions to pluralities of propositions is 'redundant' when the result of applying it to two propositions yields those propositions, i.e. f(p, q) = p, q. *Conjunction as Identity* (construed as a thesis about binary conjunction; see §2) is the view that binary conjunction is redundant, i.e. p & q = p, q.[16] Now imagine a written language in which, instead of writing sentences in series, one after the other, sentences are superimposed, one on top of the other. The resulting superimposition is then concatenated with sentential operators in the usual way, so that it functions syntactically as a single sentence. Let combination be the function expressed by superimposing sentences in this language. This thought-experiment suggests the following argument for *Conjunction as Identity*:

i) Combination is redundant.
ii) Combination just is conjunction
iii) Therefore, conjunction is redundant.

The first premise is supposed to be true by construction—it is the following trivially true sentence of the imagined language (where S and | are variables ranging over propositions):[17]

$$\forall S\ \forall |\ \$ = \$$$

The second premise can be supported like Ramsey's. First, the conviction that English reflects an important metaphysical distinction with its use of sentences written in series for pluralities of propositions and conjunctive sentences for their conjunctions is debunked by the practical explanation for this separation of roles: superimposing sentences to play both roles at once quickly becomes messy! Second, denying that combination is conjunction entails that the imagined language somehow manages to express things which elude English expression. For example, English would be unable to negate combinations: '~$' would mean something different from '~(S & |)'.[18] To be sure, this argument is not as pristine as Ramsey's original, but it still carries force: rejecting it threatens to overestimate English's metaphysical perspicuity whilst underestimating its expressive power.

16. The following argument extends straightforwardly to plural conjunction.

17. Of course, stipulations about imaginary languages can fail. In this case, it might be thought that the ability to concatenate superimposed sentences with sentential operators undermines the stipulation that combination is what we express by writing sentences in series. But this would seem to be motivated by the question-begging prejudice that no sentence can express what many sentences express.

18. This assumes that '~' means negation in both languages, and that if '~p' means the same as '~q', then 'p' means the same as 'q'.

2. Formulations

2.1 Many-one identity

I've argued that *Conjunction as Identity* deserves exploration. But like *Composition as Identity*, it is unclear whether the view is even coherent, or how it should be formulated.

Following Baxter (1988b), *Composition as Identity* is commonly formulated by positing an identity relation which holds between many things and one thing: for any xx and any y, if the xx compose y then the xx are identical to y.[19] Similarly, we might formulate *Conjunction as Identity* in a language containing a singular propositional type and a plural propositional type, and a predicate expressing 'many-one' propositional identity connecting terms of each type. However, this leads to several difficulties.

First, any notion of identity should obey Leibniz's law: schematically, if x = y, then φ(x) if and only if φ(y). But this fails dramatically for 'many-one identity': whatever may truly be said of the conjunction (which belongs to the singular type), cannot even grammatically be said of the conjuncts (which belong to the plural type)—and vice versa. For example, 'It is not the case that snow is white and grass is white' is true, but 'It is not the case that (snow is white, grass is white)' is ungrammatical. A natural fix employs liberal notions which apply grammatically to both propositions (singular) and their pluralities. (Similarly, we will want to liberalize many-one identity itself, so that it obeys Reflexivity.) But then the distinction between the two types plays no role in the language's grammar, and the formulation in terms of many-one identity becomes a notational variant of the purely plural formulation proposed below.[20]

Second, *Conjunction as Identity* is supposed to explain *Unrestrictedness*. But as Sider (2007: 61) and Cameron (2012) observe in the case of composition, the explanation would need to rely on the unrestrictedness of many-one identity itself, i.e. that any propositions 'are' some proposition. This principle is unnatural: intuitively, only special pluralities of propositions—namely, single-membered pluralities—are identical to some proposition. If anything, the many-one formulation invites a reverse explanation: of the otherwise surprising unrestrictedness of many-one identity in terms of the unrestrictedness of conjunction!

Third, as Sider (2014) discusses, *Composition as Identity* leads to 'Collapse': the principle that something is one of some things just in case it is a part of their fusion. *Conjunction as Identity* yields the parallel view that a proposition is one of some propositions just in case it is a conjunctive part of their conjunction. But this violates attractive principles bridging the singular and plural types, such as the comprehension principle that, for any property of propositions X, there is a corresponding plurality of all and only the propositions satisfying X. For example, there will be no plurality of all and only the false propositions, since their conjunction has true propositions as conjunctive parts. Such results can be avoided by embracing 'logical nihilism', the view that no proposition is conjunctive (i.e. has proper conjunctive parts).[21] But the point of invoking many-one identity was to accommodate the assumption that conjunctions are single propositions. If it turns out that there are no conjunctive propositions, the claim that all such propositions are identical to their conjuncts is trivial!

2.2 The purely plural language

For these reasons, I prefer to formulate *Conjunction as Identity* in a purely plural language. This language has quantifiers and variables, "pp", "qq", etc., ranging over pluralities of propositions (including propositions themselves as single-membered pluralities), and a corresponding 'many-many' notion of plural propositional identity. (Henceforth, I use 'pluralities' to mean pluralities of propositions, unless otherwise noted.) But it has no singular type of propositions: no primitive singular quantification or identity (though, as discussed below, these

19. See, for instance, Sider 2007: §3, Wallace 2011: §3.1, Cameron 2012: §1.
20. Compare Sider 2007: 57.
21. Calosi (2016) and Yi (2018) argue that *Composition as Identity* entails mereological nihilism.

notions can be defined using plural notions). It also has plural logical operators which apply to pluralities to yield pluralities—for example, plural conjunction, denoted by "$\bigwedge$", applies to some propositions to form their conjunction. Using this notion, we can state *Conjunction as Identity* as follows:

(CAI) $\forall$pp $\bigwedge$pp = pp.

CAI says that conjoining some propositions just returns those propositions.[22]

We can also introduce binary conjunction, "&", which takes two pluralities and forms their conjunction, and a list-making device ",", allowing us to make lists of pluralities. For example, "pp & qq" denotes the propositions which result from conjoining pp with qq, and "pp, qq" denotes the propositions which are either among pp or among qq (this is a plural term, not a term belonging to some distinct 'pluplural' type). With these resources, we can express a binary version of *Conjunction as Identity*:

(Binary CAI) $\forall$pp $\forall$qq (pp & qq) = (pp, qq).

I will focus on CAI since it is strictly more general, assuming that pp & qq is $\bigwedge$(pp, qq).

CAI avoids the difficulties mentioned above for formulations using many-one identity. First, many-many identity obeys Leibniz's Law in full generality, with no ungrammatical instances. For example, we can introduce plural negation, "~", which applies to some propositions just in case they do not (all) obtain. Then it follows from CAI that:

$\forall$pp ~pp $\leftrightarrow$ ~$\bigwedge$pp.

This is perfectly grammatical, since "$\bigwedge$pp" is not consigned to a distinct singular type.

22. This treatment could be extended to universally quantified propositions, if they are identified with (possibly uncountable) conjunctions of their instances. This famously seems to require a fixed domain of individuals (Russell 1918).

Second, we can give a satisfying explanation of *Unrestrictedness*. Here it is important to avoid using '$\bigwedge$', which builds in *Unrestrictedness* (i.e. $\forall$pp $\exists$qq qq = $\bigwedge$pp is a logical truth). Instead, we should state the view using the relation, Conj, which holds between some propositions and their conjunction:

(Extensional CAI) $\forall$pp $\forall$qq ((pp = qq) $\leftrightarrow$ Conj (pp, qq)).

The point is then that *Unrestrictedness*, i.e. $\forall$pp $\exists$qq Conj (pp, qq), follows from Extensional CAI via the unrestrictedness of many-many identity, i.e. $\forall$pp $\exists$qq (pp = qq).

Once we have *Unrestrictedness* (and *Uniqueness*, which also follows from Extensional CAI), we can use Conj to define $\bigwedge$, and recover CAI from Extensional CAI. This suggests that Extensional CAI is explanatorily prior. And the following formulation, which entails Extensional CAI by Leibniz's Law, seems even more basic:

(Relational CAI) Conj = =

i.e. the relation which holds between conjuncts and conjunction just is identity. ("=" does double-duty: the rightmost instance denotes identity between pluralities, whereas the central instance denotes identity between relations between pluralities.) This is perhaps the most literal interpretation of *Conjunction as Identity*.[23]

Third, we can accept comprehension without trivializing CAI. The analogue of collapse in the purely plural language is:

(Collapse) $\forall$pp $\forall$qq ((pp $\subseteq$ qq) $\leftrightarrow$ (pp $\leq$ qq))

where "$\subseteq$" denotes the notion of one plurality being among another,

23. Using lambda-abstraction, we can also formulate:
(Operational CAI) $\bigwedge$ = λpp. pp
i.e. conjunction is (plural) obtaining. Operational CAI follows from CAI (and hence, from Relational CAI) given the following 'functionality' principle:
$\forall$X $\forall$Y (($\forall$pp (Xpp = Ypp)) $\rightarrow$ (X = Y)).
Conversely, Relational CAI follows from Operational CAI via the principle which Dorr (2016:52) calls 'immediate β-equivalence'.

and "$\leq$" denotes conjunctive parthood, defined as follows:

$pp \leq qq := \exists rr\ ((pp \subseteq rr)\ \&\ (qq = \bigwedge rr))$.

It is easy to see that Collapse follows from CAI by observing that CAI allows one to substitute 'rr' for '$\bigwedge$rr'in the above definition of conjunctive parthood.

To state principles connecting pluralities to propositions, we can introduce variables and quantifiers ranging over 'single' propositions into the purely plural language as follows:

$\text{One}(pp) := \forall qq\ (qq \subseteq pp) \rightarrow (qq = pp)$[24]
$\exists p\ Xp := \exists pp\ \text{One}(pp)\ \&\ Xpp$
$\forall p\ Xp := \forall pp\ \text{One}(pp) \rightarrow Xpp$
$pp \in qq := \text{One}(pp)\ \&\ pp \subseteq qq$

Collapse then yields (by substituting "$\leq$" for "$\subseteq$" in the definition of "One"):

(Logical Nihilism) $\forall p\ \forall qq\ ((qq \leq p) \rightarrow (qq = p))$.

("No propositions have proper conjunctive parts.") But this is an unsurprising consequence of CAI's claim that conjunctions are 'many': it just says that no conjunctive pluralities are single. This is consistent with some pluralities being conjunctive:

(Conjunctive Realism) $\exists pp\ \exists qq\ ((qq \leq pp)\ \&\ (qq \neq pp))$.

This captures the intended picture that there are conjunctions, but they are many rather than one.[25] It is also consistent with the following plausible principles:

(Comprehension) $(\exists p\ Xp) \rightarrow \exists pp\ \forall p\ (p \in pp \leftrightarrow Xp)$.
(Lists) $\forall pp\ \forall qq\ \forall r\ (r \in (pp, qq)) \leftrightarrow ((r \in pp) \vee (r \in qq))$.

Thus, expressing *Conjunction as Identity* in a purely plural language locates the surprise where it should be—in what (single) propositions there are—and not in extraneous facts regarding the relation between propositions and pluralities.

3. Objections

3.1 Leibniz's law

Familiar objections to *Composition as Identity* allege that it violates Leibniz's Law.[26] For example, the fusion cannot be identical to its parts because they are many and it is not (Lewis 1991: 87). More generally, the parts seem to have a range of 'set-like' properties which the whole lacks (Bohn 2019: §2). *Conjunction as Identity* faces similar objections: the conjuncts are many whereas the conjunction is not, the conjunction is conjunctive whereas the conjuncts are not, and so on. Such objections take the following schematic form:

i) $\phi(\bigwedge pp)$
ii) $\sim \phi(pp)$

24. I am employing plural quantifiers with no empty plurality in their domain.

25. It is unclear, given CAI, how to interpret the term 'proposition' as standardly used. On one hand, it might seem analytic that a proposition is One in the sense defined. On the other, it might seem analytic that conjoining some propositions yields a proposition. But given *Logical Nihilism*, these cannot both hold. Perhaps this makes the ordinary term indeterminate between what I am calling 'propositions' and what I am calling 'pluralities'. If so, then, in light of *Conjunctive Realism*, it is indeterminate whether CAI is consistent with there being conjunctive propositions in the ordinary sense. (This parallels the question of whether mereological nihilism should be stated using the ordinary English quantifier—see Sider 2013: §3. Arguably, since propositional quantification is less central to our ordinary linguistic practices, there is less meta-semantic pressure towards conservativism in the case of *Logical Nihilism*.)

26. See Wallace 2011 for discussion.

iii) Therefore, pp $\neq \bigwedge$pp

When both premises seem plausible, a natural defensive strategy posits equivocation: either 'predicational shift'—'ϕ' expresses different properties in the two premises—or 'referential shift'—'pp' and/or '$\bigwedge$pp' denote different entities in the premises and the conclusion.[27]

Consider:

i) $\bigwedge$pp is one proposition.
ii) pp are not one proposition.
iii) Therefore, pp $\neq \bigwedge$pp

Arguably, it is less important to accommodate our 'common sense' cardinality intuitions in the highly theoretical case of propositions than it is in the case of things. Nonetheless, the counter-intuitive insistence that $\bigwedge$pp in fact 'is' many (or that pp in fact 'are' one) is unconvincing without some account of the argument's appeal.

On one such account, it derives from conflating two senses of 'oneness': the first premise is only true in a 'linguistic' sense, whereas the second is only true in a 'metaphysical' sense. A plurality is metaphysically one if it is single-membered ('One', defined above). In this sense, the proponent of CAI will say, neither conjuncts nor conjunction are one: the conjunction p & q contains p. By contrast, some propositions are linguistically one if they may be expressed by a single sentence i.e. if they bear a certain semantic relation to certain linguistic entities. In this sense, the proponent of CAI will say, both conjuncts and conjunction are one: the conjunctive sentence 'p & q' expresses the propositions p, q. These two senses of oneness are easily conflated given the implicit assumption that a single sentence cannot express many propositions. But once this assumption is made explicit, it is doubtful that it can be maintained: what prevents us from introducing a binary sentential operator which does nothing, like the superimposition operation described in §1.2?

27. This terminology comes from Fine 2003: 209. Wallace 2011 and Bohn 2019 employ predicational shift in defense of *Composition as Identity*.

Another explanation of the objection's appeal posits referential shift. To illustrate, consider another objection:

i) Frank believes pp.
ii) Frank does not believe $\bigwedge$pp.
iii) Therefore, pp $\neq \bigwedge$pp.

A natural diagnosis of this kind of argument is that it conflates distinct objects of belief. Famously, objects of belief can be conceived of 'internally' or 'externally'. On the internal conception, they are 'Fregean propositions', which we can think of as sentence-like mental structures composed of concepts or 'modes of presentation'. On the external conception, they are states of affairs, where an obtaining state of affairs (or 'fact') is an aspect of reality itself, rather than a way of representing reality. If these states of affairs have constituents, they are worldly entities such as objects and properties, not mental entities like concepts.[28]

CAI—as I intend it—concerns states of affairs. It concerns the same sense of proposition in which, since Hesperus is Phosphorus, the proposition that Hesperus is rising just is the proposition that Phosphorus is rising, even though the sentences 'Hesperus is rising' and 'Phosphorus is rising' express different Fregean propositions, involving different concepts. Likewise, according to CAI, 'pp' and '$\bigwedge$pp' denote the same pluralities of states of affairs, despite (presumably) corresponding to different pluralities of Fregean propositions.

Thus, for the argument to target CAI, the conclusion must refer to states of affairs. But the proponent of CAI should hold that the premises are only true on a Fregean interpretation. It seems possible (perhaps even rational) to believe some Fregean propositions without believing their conjunction; indeed, we can imagine a hapless creature with no means of conjoining their beliefs. By contrast, the premises are contentious—and given CAI, cannot both be true—when interpreted as referring to states of affairs (just as no one can stand in the 'belief relation' to the state of affairs that Hesperus is rising but not the state

28. Except insofar as they concern concepts, of course!

of affairs that Phosphorus is rising).

Whilst I think the predicational shift strategy is natural in response to the cardinality objection, and the referential shift strategy natural in response to the belief objection, I don't mean to suggest that this is the only or even the best way to go. The premises of the cardinality objection might be interpreted as referring to Fregean propositions. Conversely, skeptics of Fregean propositions might posit predicational shift in the belief objection, involving distinct 'guise-sensitive' belief-properties: pp are believed by Frank under a guise associated with 'pp' (and so are ⋀pp), whereas ⋀pp are not believed by Frank under a guise associated with '⋀pp' (and neither are pp). The important point for my purposes is just that the proponent of CAI has some powerful resources for responding to objections from Leibniz's law.

I've been considering objections expressed in the plural language with which I formulated CAI. But English yields especially dramatic failures of substitutability, where it is hard to know what substituting one sentence for several sentences would even mean, and such substitutions (if they can be carried out) are liable to turn truth into ungrammatical nonsense. For example, it is unclear how to substitute the sentences 'snow is white' and 'grass is green' for their conjunction in the English sentence 'Possibly, snow is white and grass is green', but the result is poetic at best—perhaps: 'Possibly: snow is white, grass is green'.

Turning this into an argument against CAI requires the assumption that English grammar treats co-denoting expressions alike. Taken strictly, this is clearly false: 'I is writing' is ungrammatical, even though 'is writing' and 'am writing', and 'I' and 'the author of this paper', presumably co-denote. But more to the point, the assumption that no English expression denotes what several English expressions collectively denote is undermined by the apparent use of lists like 'Whitehead and Russell' as compound expressions.[29] So the objection seems to collapse into one based directly on the assumption that no English sentence expresses what several (non-synonymous) English sentences do. For this objection to succeed, we need some reason to accord the status of being a single English sentence the requisite metaphysical significance.

3.2 Relabeling

I've been considering the objection that there are worldly differences between the conjuncts and their conjunction. But it might also be objected from the opposite side that there is not even a representational difference between them, making their identification trivial. The worry is that terms denoting some conjuncts, of the form 'pp', and terms denoting their conjunction, of the form '⋀pp', are simply two different labels for a single concept, with no prospect of grasping one independently of the other. (And similarly, in the case of Binary CAI, for the terms 'pp, qq' and 'pp & qq'.) If so, CAI is no more informative or interesting than the claim that a proposition's negation is just its opposite, with no grip on the technical term 'opposite' beyond the proposed identity.

It might seem obvious that there is a representational difference between conjuncts and conjunction. But the objection is more serious than it may initially appear. First, the terms 'pp' and '⋀pp' might both be grasped from some common foundation, such as the ordinary notion of binary conjunction; perhaps we understand both 'p, q' and '⋀(p, q)' as obtaining just in case p obtains and q obtains, and we abstract from this case to reach a general understanding of 'pp' and (its needlessly complex notational variant) '⋀pp'. Second, since I am thinking of propositions in higher-order terms, not as a special kind of thing, we cannot automatically extend our understanding of pluralities of

29. As Brian Kierland pointed out to me, this might even suggest a positive argument for *Conjunction as Identity*: the list-forming function of conjunction when applied to noun phrases (and verb phrases, as in 'He hopped, skipped, and jumped') indicates that it also forms lists when applied to sentences, insofar as it has a uniform function across types.

things. Third, our capacity to understand what is expressed by many sentences written in series, many assertions made within a given conversational context, or many beliefs held simultaneously by a single (non-fragmented) subject may show that we grasp pluralities, but not that we grasp them independently of plural conjunction.

Nonetheless, the interest of CAI is defensible. Perhaps most powerfully, it is supported by the substantive connections to other issues to be discussed in §4. Whilst the view may ultimately be judged by its fruits, a few preliminary points are worth making.

First, one apparent motivation for the objection is the idea that pluralities behave in suspiciously conjunction-like ways. For example, operators like negation can be applied to them, suggesting that they must somehow be 'wrapped up' into one, just like conjunctions are. But this idea neglects the nature of operators like negation as they appear in the plural language. In applying plural operators, we do not 'wrap up' the propositions into one, any more than we wrap up Russell and Whitehead into one by saying that they wrote the *Principia*.

Second, without a representational difference between conjuncts and conjunction, *Conjunction as Grounding* would amount to the claim that the conjunction grounds itself. But, it might be thought, since *Conjunction as Grounding* need not be understood this way, we must have an independent grasp of grounds and grounded.[30]

Third, it might be argued that we learn ordinary conjunction via the following inference rule:

(Conjunction Introduction) p, q $\vdash$ p & q

and that we learn plural conjunction similarly:

(Plural Conjunction Introduction) pp $\vdash$ $\bigwedge$pp.

For these rules to be informative, we must independently understand the two sides of the turnstile. It's not clear how forceful this argument is, however, since the rules may be interpreted as concerning transitions between sentences (and/or belief-tokens). If so, they only require a grasp of pluralities of things.

Finally, we might invoke a plural version of Frege's test for differing senses (or cognitive significance).[31] According to this test, if someone who is fully competent with the pluralities of sentences SS and TT may rationally take different attitudes towards SS and TT, then SS and TT must have different (pluralities of) senses (or correspond to different pluralities of thoughts). But, as lottery cases illustrate, a rational subject may believe each of many sentences without believing their conjunction. Hence, applying the test, the conjuncts must differ representationally from their conjunction.[32, 33]

4. Connections

4.1 Composition

I began by noting parallel motivations for *Conjunction as Identity* and the more commonly discussed *Composition as Identity*: both conjunction and composition seem to share 'identity-like' features. But there may also be a stronger connection between the two theses.

30. It is difficult to see how the view could be understood without invoking pluralities: for example, Fine (2012: 50) argues that it cannot be understood in terms of a relation of partial grounding holding between the conjunction and each of the conjuncts.

31. Thanks to Verónica Gómez for suggesting this line of response, and for discussion.

32. This argument threatens to prove too much. If lottery cases show that one may rationally believe some propositions (in the relevant 'external' sense) without believing their conjunction, this provides a powerful Leibniz's law objection to CAI. I cannot properly address this issue here, but I think that we might take lottery cases to show that one may rationally *distributively* believe some propositions (i.e. believe each of them) without *collectively* believing them.

33. Another objection, which I don't have the space to properly discuss here, concerns the possibility of 'logical gunk': that is, conjunctions all of whose conjuncts have proper conjuncts. It might be thought that the possibility of such propositions follows from the possibility of mereological gunk (if, for example, the proposition that x exists conjoins the propositions that x's parts exist). But CAI precludes the possibility of logical gunk (assuming that all non-empty pluralities have some propositions as members). The dialectic here largely parallels that concerning the objection that mereological nihilism precludes the possibility of mereological gunk: see Sider 2013: §10.

One idea is that the conjunction of two propositions just is their fusion, making *Conjunction as Identity* a special case of *Composition as Identity*. It is not clear that any standard view of propositions vindicates this idea, however. First, they cannot be structured entities built up from their constituents—at least, not if conjunction is one such constituent. On this view, conjoining two non-conjunctive propositions would introduce a 'novel' constituent, whereas their fusion only contains constituents which are themselves constituted by the conjuncts' constituents. Perhaps, however, conjunction may itself be understood as a 'structuring relation': a way of arranging the constituents rather than a constituent itself. This suggests a radical picture on which conjunction and mereological composition, as usually understood, are the propositional and objectual manifestations of a much broader composition relation, which generalizes across types.[34]

Second, a proposition cannot be the set of possible worlds at which it is true: this renders conjunction as intersection, and the intersection of two sets is not their fusion. In any case, as explained below, CAI entails that propositions are more fine-grained than sets of worlds (so inverting the view, by making propositions the sets of worlds at which they are false, fares no better).

An approach to propositions which holds more promise for connecting conjunction to composition is that of 'truthmaker semantics' (e.g. Fine 2017). Truthmaker semantics uses fusion to interpret conjunction across categories—for individuals and properties, as well as the 'states' which 'verify' propositions. (Indeed, Fine (2017: 638) goes as far as suggesting that 'the ur-use of 'and' is essentially mereological rather than logical in character'.) The truthmaking in question is non-factive: a state may 'verify' a proposition without obtaining, and without the proposition being true—so 'states' are akin to states of affairs rather than facts or events. A conjunction is verified by any state which fuses verifiers for each conjunct, and a disjunction is verified by any state which verifies one of its disjuncts.

On the 'unilateral' version of the approach, propositions are sets of 'verifiers'.[35] This makes conjunctions pairwise fusions of their conjuncts. Given *Composition as Identity*, the pairwise fusion of two non-empty sets is their union—which, as Lewis (1991) argued, might be identified with their fusion.[36] However, this disastrously collapses conjunction into disjunction: the disjunction of two propositions is also their union! Suppose, for example, that p and q are each atomic propositions, made true by the states P and Q respectively. Then their conjunction has as its only verifier the fusion of P with Q Fu(P, Q), and so it is the set {Fu(P, Q)}. But then, by *Composition as Identity*, this is the set {P, Q}, which is the disjunction of p with q. So the idea that propositions are sets of verifiers cannot be used to argue that the conjunction of two propositions is their fusion.

However, the truthmaking approach can be used to argue from *Composition as Identity* to *Conjunction as Identity* more directly, without going via any contentious view of propositions as set-theoretic constructions. In line with the plural formulation of *Conjunction as Identity*, I employ 'plural truthmaking': the relation which holds between some propositions and the states which verify them (subsuming ordinary, singular truthmaking as a special case). I formalize the claim that states xx make pp true as 'xx ⇒ pp'. Let *Composition as Identity* be formulated in a purely plural language, analogously to CAI:

FAI: $\forall xx\ xx = Fu(xx)$

We can state principles of plural truthmaking in a language with terms for both pluralities of things and pluralities of propositions. The following are natural:

34. Following Armstrong's suggestion that the universal P is part of the conjunctive universal P & Q, Lewis (1991: 86) mentions the idea that P & Q is the fusion of the universals P and Q. This naturally extends to propositions, construed as 'zero-place' universals.

35. On the bilateral version, they are pairs of a set of verifiers and a set of falsifiers.

36. The pairwise fusion of sets X and Y is $\{Fu(x, y): x \in X, y \in Y\}$. Given *Composition as Identity*, this is $\{x, y : x \in X, y \in Y\}$ which is $\{z: z \in X \text{ or } z \in Y\}$ so long as X and Y are both non-empty.

(Truthmakers for Conjunction)
The truthmakers for conjunctions are fusions of truthmakers for the conjuncts.
$\forall xx\ \forall pp\ (xx \Rightarrow \bigwedge pp) \leftrightarrow (\exists yy\ (yy \Rightarrow pp)\ \&\ xx = \mathrm{Fu}(yy))$

(Extensionality)
No two pluralities of propositions have the same truthmakers.
$\forall pp\ \forall qq\ (\forall xx\ ((xx \Rightarrow pp) \leftrightarrow (xx \Rightarrow qq))) \rightarrow pp = qq$

Using these principles, we can argue from FAI to CAI.[37] By *Truthmakers for Conjunction* and FAI, some things make pp true if and only if they make $\bigwedge$pp true. So, by *Extensionality*, pp = $\bigwedge$pp.[38] (And *Extensionality* does not threaten to collapse conjunction into disjunction, given FAI: for example, P verifies $p \vee q$ but does not verify p & q.)

We can also use *Truthmakers for Conjunction* to argue in the reverse direction, from CAI to FAI, via the following natural principle:

(Truthmakers for Existence)
xx, and xx alone, make true the propositions that each of the xx exists.
$\forall xx\ \forall pp\ (\forall p\ ((p \in pp) \leftrightarrow (\exists x\ (x \in xx)\ \&\ (p = Ex))) \rightarrow \forall yy\ ((yy \Rightarrow pp) \leftrightarrow (yy = xx))$

(Here, 'Ex' denotes the proposition that x exists.) By *Truthmakers for Existence*, some things make true the propositions that they exist. So, by *Truthmakers for Conjunction* and CAI, their fusion makes true the propositions that they exist. So, by *Truthmakers for Existence*, their fusion must be them.[39]

Of course, the principles above are contentious, and I can't hope to address the complex issue of truthmaking here. But it is notable that, if these principles are correct, *Composition as Identity* and *Conjunction as Identity* are not merely analogous but stand and fall together.

4.2 Grain

Conjunction as Identity has consequences for the issue of propositional grain.[40] Most obviously, it entails that binary conjunctions inherit symmetries from those of pluralities, yielding:

(Commutativity) $\forall p\ \forall q\ (p\ \&\ q) = (q\ \&\ p)$.[41]
(Associativity) $\forall p\ \forall q\ \forall r\ (p\ \&\ (q\ \&\ r)) = ((p\ \&\ q)\ \&\ r)$.
(Idempotence) $\forall p\ (p\ \&\ p) = p$.[42]

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37. In light of the ambiguity discussed in n.53 below, I intend FAI to be interpreted as *Fragile Composition as Identity*. A parallel argument for *Disjunction as Identity* could be given from FAI interpreted as *Robust Composition as Identity*, using the principle that the truthmakers for disjunctions are robust fusions of truthmakers for the disjuncts.

38. More rigorously:

1. If xx $\Rightarrow$ pp, then Fu(xx) $\Rightarrow$ $\bigwedge$pp (by *Truthmakers for Conjunction*).
2. If Fu(xx) $\Rightarrow$ $\bigwedge$pp, then for some yy, yy $\Rightarrow$ pp and Fu(xx) = Fu(yy) (by *Truthmakers for Conjunction*).
3. If Fu(xx) = Fu(yy), then xx = yy (by FAI).
4. If Fu(xx) $\Rightarrow$ $\bigwedge$pp, then xx $\Rightarrow$ pp (from 2 and 3).
5. xx $\Rightarrow$ pp if and only if Fu(xx) $\Rightarrow$ $\bigwedge$pp (from 1 and 4).
6. xx $\Rightarrow$ pp if and only if xx $\Rightarrow$ $\bigwedge$pp (from 5, by FAI).
7. pp = $\bigwedge$pp (from 6, by *Extensionality*).

39. More rigorously:

1. For any pp, if pp are the propositions that xx exist, then xx $\Rightarrow$ pp (by *Truthmakers for Existence*)
2. For any pp, if pp are the propositions that xx exist, then Fu(xx) $\Rightarrow$ $\bigwedge$pp (from 1, by *Truthmakers for Conjunction*).
3. For any pp, if pp are the propositions that xx exist, then Fu(xx) $\Rightarrow$ pp (from 2, by CAI).
4. For any pp, if pp are the propositions that xx exist and yy $\Rightarrow$ pp, then yy = xx (by *Truthmakers for Existence*).
5. Fu(xx) = xx (from 3 and 4).

(The final step assumes that for any xx, there are the propositions that they exist, which follows from Comprehension.)

40. Standard theories of propositional grain are stated in a language which quantifies over single propositions, so it is not obvious how to translate them into the plural propositional language (see n.25). Interpreted as presupposing that conjunctions are single, they are inconsistent with CAI.

41. Commutativity is entailed merely by the idea that binary conjunction operates on pluralities, i.e. p & q = $\bigwedge$(p, q). This is not true for Associativity or Idempotence.

42. I find Commutativity, Associativity, and Idempotence very plausible. But the issue is non-trivial: Idempotence, for example, is inconsistent with Dorr's (2016: 75) 'Only Logical Circles' view.

These follow from parallel (arguably logical) truths about list-making, which are entailed by Lists together with the extensionality of pluralities.

This shows that *Conjunction as Identity* places a non-trivial limit on how fine-grained conjunctions can be. But it also places a non-trivial limit in the other direction. For example, it is inconsistent with each of the following:[43]

(Disjunction Absorption) ∀p ∀q p & (p ∨ q) = p.
(Tautology Absorption) ∀p (p & T) = p (where T is any tautology).
(Uniqueness of Contradiction) ∀p ∀q (p & ~p) = (q & ~q).
(Determinable Absorption) ∀F ∀G ∀x if F is a determinate of G, then Fx & Gx = Fx.

The first two principles conflict with Conjunctive Nihilism, since they entail that there are propositions with proper conjunctive parts (assuming that there are propositions p and q for which p ∨ q is a proposition distinct from p, and that some proposition is a tautology e.g. q ∨ ~q). Together with Binary CAI, Uniqueness of Contradiction entails:

∀p ∀q (p, ~p) = (q, ~q)

By Lists, assuming that there is some proposition whose negation is itself a proposition, this yields the implausibly coarse-grained Fregean view that there are only two propositions (The True and The False).[44] For example, assuming that ⟨~Snow is white⟩ is a proposition, we have:

∀p (p = Snow is white) ∨ (p = ~Snow is white).

Finally, Binary CAI and Determinable Absorption entail that Gx is properly contained in Fx, where F is a determinate of G. This is in tension with:

(Supplementation) ∀pp ∀qq ((qq pp) → ∃rr (rr pp) & (pp = (qq, rr))).

That is: if pp properly contain qq, then they also properly contain those propositions among pp which are not in qq. Supplementation is plausibly a logical truth.[45] But nothing seems to make up the difference between determinable and determinate—indeed, this is precisely what distinguishes them from genus and species (Rosen 2010:127, Correia & Skiles 2017:651).

I have shown that Binary CAI enforces an intermediate theory of grain. I leave to future work the question of whether any attractive view fits the bill (though see §5.2 for some further considerations).

Before moving on, it is worth noting that the connection to grain also suggests a potential advantage of *Conjunction as Identity* over *Conjunction as Grounding*: natural versions of the latter make conjunctions impossibly fine-grained.[46] By Cantorian reasoning, there can be no injection from pluralities of propositions to propositions. As Fritz (2021) observes, this precludes the principle that all pluralities *pp* have a conjunction ⋀*pp* which is immediately grounded in all and only their members. Fritz shows that a version of this inconsistency also arises from the principle that a binary conjunction *p* & *q* is immediately grounded in exactly *p* and *q*, when combined with other natural principles of immediate grounding. These results undermine the naïve picture that conjunctions are iteratively constructed from their 'immediate conjuncts', which seems to be an important part of the intuitive motivation for *Conjunction as Grounding*.

43. The first three may be motivated by Booleanism: the view that equivalent sentences of propositional logic express the same proposition. Determinable Absorption may be motivated by the idea that partial essence entails conjunctive parthood (Correia & Skiles 2017: 650), or the idea that metaphysical necessities are identical to logical truths (Dorr 2016: 69).

44. The assumption isn't entirely uncontentious—for example, ~p might be a disjunction of p's alternatives, and this disjunction may not be a single proposition. Even without the assumption, however, we get the implausibly coarse-grained result that any proposition distinct from ⟨Snow is white⟩ is among—and hence entailed by—the plurality ⟨~Snow is white⟩.

45. It is entailed by Comprehension, letting X be λp. p ∈ pp & p qq.

46. Thanks to a referee for suggesting this motivation.

This isn't clearly decisive, since there may be well-motivated variants of *Conjunction as Grounding* which allow distinct pluralities to generate the same conjunctions. (For example, it seems reasonably natural to posit that $\bigwedge(p, q, r)$ is 'immediately grounded' in both p & q together with r, and in p together with q & r.) Nonetheless, it is worth noting that CAI sidesteps the issue altogether: since conjunctions are themselves pluralities, there is no question of conjunction yielding an impossible injection.

4.3 Fundamentality

Is logical complexity a fundamental aspect of reality, or can it be metaphysically explained? In the familiar metaphor: did God use conjunction, or other logical notions, when creating the world?

On one approach, this question concerns a worldly relation of grounding between facts. The idea is that reality is hierarchically structured, with its fundamental aspects being the ungrounded facts at its foundation. God put this foundation in place, and it 'automatically' generated the rest. From this perspective, *Conjunction as Grounding* entails that conjunctive complexity is non-fundamental, in that all conjunctive facts are grounded. As noted at the outset, *Conjunction as Identity* departs from this standard view: assuming that grounding is irreflexive, a conjunction cannot be grounded in its conjuncts if it *is* its conjuncts.

However, *Conjunction as Identity* fits another version of the idea that conjunction is non-fundamental. On this approach, the fundamental truths constitute reality, whereas non-fundamental truths are merely true ways of representing reality. God only created the fundamental aspects because they are all there is to reality—the rest is 'just talk'. Instead of a worldly hierarchy, this approach envisages a representational hierarchy: 'non-perspicuous' truths reduce to 'perspicuous' truths, which better reflect reality's structure.[47]

Reduction seems to involve identification: a single fact, and two ways of representing it. For example, the truth that there is water might reduce to the truth that there are H_2O molecules, where both truths latch onto the same 'portion of Reality'. A natural idea, given *Conjunction as Identity*, is that conjunctive truths are not perspicuous, but reduce to their conjuncts. For example, the truth that snow is white and grass is green reduces via the identification:

Snow is white & Grass is green = Snow is white, Grass is green.

At first sight, such identifications seem explanatorily unimpressive: they merely exchange conjunctive complexity for the 'plural complexity' represented by list-making. I would like to suggest, however, that they should be viewed as 'many-one' reductions, analogous to many-one grounding relations between facts. A helpful way of understanding this idea is that the commas do not themselves represent some fundamental notion needed to state perspicuous reductions; rather, they indicate the way that the conjunction reduces. The complexity is thus not in reality itself, but in the relation between the truth and reality.[48]

This amounts to a liberalization of reduction. Whereas before would-be reducers had a single parameter to work with—*what* the truth in question reduces to—they now have an additional parameter—*how* the truth in question reduces. This raises difficult issues (which I cannot address here) of this method's legitimacy and scope. When can we metaphysically explain by positing complexity in a truth's relation

47. For similar uses of the term 'perspicuous', see e.g. Fine 2001:3, Sider 2013:252. One could think of this approach as a 'representational' version of grounding, where there is no worldly distinction between grounds and grounded (cf. Correia 2010, de Rizzo forthcoming). I discuss the notion of perspicuity, and the distinction between the 'generation' and 'reduction' approaches to metaphysical explanation, in Rubenstein 2024.

48. I owe this way of thinking about it to discussion with Verónica Gómez.

to reality, rather than in reality itself?[49] And can this method be extended beyond conjunction—perhaps even to all logical notions?[50]

5. Extensions

5.1 *Disjunction as Identity?*

My discussion has focused on conjunction. But it is unclear that *Conjunction as Identity* can be stabilized once other logical notions are taken into account. Setting aside the complexities raised by quantification, I'll consider negation and disjunction. As these operations apply to conjunctions, *Conjunction as Identity* requires that they be interpreted as applying to pluralities. But which pluralities do they output?

Once this question is brought into focus, a curious challenge emerges. I began by motivating *Conjunction as Identity* with the observation that conjunction has several identity-like features. But these might equally seem to be features of disjunction. As for *Uniqueness* and *Unrestrictedness*, there seems to be just as good reason as in the case of conjunction to think that all pluralities have exactly one disjunction. As for *Reflectance*, disjunctions seem to reflect their disjuncts just as conjunctions reflect their conjuncts: if you fully describe the disjuncts (their truth-values, their subject matters), you have thereby fully described the disjunction. As for *Innocence*, disjunctions seem to be nothing over and above their disjuncts, in much the same way as conjunctions are nothing over and above their conjuncts: a commitment to the truth and/or existence of some propositions entails a commitment to the truth and/or existence of their disjunction.[51] Why not, then, identify a plurality with its disjunction? Of course, since disjunction isn't conjunction, we cannot accept both *Disjunction as Identity* and *Conjunction as Identity*. But the choice between them might seem entirely arbitrary.

The question is whether anything breaks the symmetry between conjunction and disjunction. Intuitively, there is the following symmetry-breaker: a conjunction obtains just in case its conjuncts obtain, whereas a disjunction might obtain even when its disjuncts (taken as a collective) do not. We might put this in the form of an objection to *Disjunction as Identity* based on Leibniz's Law:

i) λpp. pp ($\bigvee$(Snow is white, Grass is white)
ii) $\sim \lambda$pp. pp (Snow is white, Grass is white)
iii) Therefore, (Snow is white, Grass is white) $\neq \bigvee$(Snow is white, Grass is white)

In response, however, proponents of *Disjunction as Identity* may posit predicational shift. In particular, we should distinguish 'universal' plural obtaining from 'existential' plural obtaining: some propositions obtain universally when every proposition among them (singularly) obtains, whereas they obtain existentially when some proposition among them (singularly) obtains.[52] Premise (i) is true when λpp. pp is interpreted as existential obtaining—but on this interpretation, (ii) is false. Conversely, (ii) is true when λpp. pp is interpreted universally—but, from the perspective of *Disjunction as Identity*, this makes (i) false. So the argument equivocates. Of course, universal and existential obtain-

49. At a minimum, liberalized reduction must satisfy a 'coherence' constraint: truths involving the complex representation relation must themselves reduce in the correspondingly liberal sense. But coherence alone is insufficient: it allows a maximally liberal approach which shifts all complexity into representation, so that every truth reduces to the same 'world-truth' in its own distinctive way.

50. As I explore with Verónica Gómez in 'Logical Atomism' (ms), truthmaker semantics may yield reductions in this liberal sense (though, for reasons which become clear in §5, the resulting view is not best thought of as a development of *Conjunction as Identity*). I take Jackson's (2024) 'fitting framework' to be another way of applying this approach to logical complexity.

51. An operation * obeys *Innocence* in the broad sense if *(pp) is nothing over and above some pattern of obtaining holding over pp. It may be analytic that all *logical* operations obey *Innocence* in this sense. By contrast, * obeys *Innocence* in the narrow sense if *(pp) is nothing over and above pp itself. It is in this sense that both conjunction and disjunction seem to obey *Innocence*, whereas other logical operations (such as 'not both') do not. (Thanks to John MacFarlane for prompting this clarification.)

52. As a referee points out, the distinction is familiar from multiple-conclusion sequent systems, where antecedents are interpreted universally and consequents are interpreted existentially.

ing coincide for single-membered pluralities—but proponents of *Disjunction as Identity* insist that $\bigvee$(Snow is white, Grass is white) is two-membered.

Once the distinction between existential and universal obtaining is recognized, *Disjunction as Identity* and *Conjunction as Identity* seem to be on a par. Just as the former view entails that $\bigvee$(Snow is white, Grass is white) does not obtain universally, the latter view entails that $\bigwedge$(Snow is white, Grass is white) obtains existentially. Where one view yields counter-intuitive verdicts about universal obtaining, the other yields counter-intuitive verdicts about existential obtaining.[53]

It is striking that, despite the intuitiveness of the asymmetry between the two views, there seems to be so little to say in its favor. What should we make of this parity? I think we should recognize that the plural language introduced in §2 is ambiguous. Corresponding to the two notions of plural obtaining are two conceptions of pluralities. 'Strong' pluralities are necessarily equivalent to conjunctions—they obey:

$$\forall pp\ \forall p\ ((p \in pp) \rightarrow \Box(pp \rightarrow p)).$$

'Weak' pluralities are necessarily equivalent to disjunctions—they obey:

$$\forall pp\ \forall p\ ((p \in pp) \rightarrow \Box(p \rightarrow pp)).$$

The variables in the plural language introduced above are to be interpreted as ranging over strong pluralities (so that 'λpp. pp' expresses universal obtaining). On this disambiguation, *Disjunction as Identity* is a non-starter, since 'pp' is not generally equivalent to '$\bigvee$pp'. Whilst this interpretation seems more natural, it's not clear that this reflects anything particularly 'deep' or non-arbitrary, as opposed to being merely conventional.

53. To further illustrate the analogy with composition, it is worth noting a parallel issue regarding *Composition as Identity*. Corresponding to conjunction and disjunction are two kinds of fusion: fragile fusions exist just in case all of their (actual) parts exist, whilst robust fusions exist just in case some of their (actual) parts exist. So the proponent of *Composition as Identity* faces a seemingly arbitrary choice between *Fragile Composition as Identity* and *Robust Composition as Identity*.

The upshot is that we should distinguish two versions of *Conjunction as Identity* and, correspondingly, two versions of *Disjunction as Identity*. There are the absurd views that conjunctions are weak pluralities, and that disjunctions are strong pluralities. And then there are the at least not obviously absurd views that conjunctions are strong pluralities, and that disjunctions are weak pluralities. Not only do these views have a chance of being true, but they are compatible: one concerns strong pluralities, and the other weak pluralities.

It is tempting, therefore, to avoid the arbitrary choice between *Conjunction as Identity* and *Disjunction as Identity* by embracing the idea that conjunctions are strong pluralities and disjunctions are weak pluralities. Presumably we can combine quantification over both kinds of pluralities in a single language: let pp_U stand for the strong propositions that pp, and pp_E stand for the weak propositions that pp. And presumably, we will then have 'hybrid' pluralities, such as $((p,q)_U, r)_E$. But now, the 'relabeling' objection (§3.2) returns with a vengeance: it is hard to resist the sense that pp_U and pp_E are notational variants of conjunctions and disjunctions respectively, so that '$((p,q)_U, r)_E$' is just a way of rewriting '(p & q) V r'.

For this reason, it seems that the proponent of *Conjunction as Identity* must somehow privilege strong pluralities over weak pluralities. It seems implausible to hold that only strong pluralities exist: what would stop us introducing an operator which applies to them to yield the corresponding weak pluralities? But perhaps the proponent of *Conjunction as Identity* may hold that weak pluralities are logical constructions which themselves reduce to strong pluralities. *Disjunction as Identity* may then be true with respect to these weak pluralities, but this would amount to an uninteresting identification between two logical constructions. *Conjunction as Identity* would be true with respect to strong pluralities: since these cannot be reduced, it would remain a non-trivial reduction of conjunctive complexity.[54]

This concedes a significant amount to the initial objection that the choice between *Disjunction as Identity* and *Conjunction as Identity* is arbitrary. It retains the point that the plural language must be disambiguated, and that versions of each thesis may be true. But it still involves privileging universal over existential obtaining as the primitive notion, which seems arbitrary in the absence of any obvious symmetry-breaker. Moreover, this concession is dialectically unfortunate insofar as one important motivation for the project of reducing the logical operations is precisely to avoid arbitrarily taking some of them to be fundamental.

5.2 *Disjunction and negation*

The proponent of *Conjunction as Identity* cannot maintain that disjunctions reduce to pluralities in the same way that conjunctions do. Instead, they must embrace an important (and perhaps arbitrary-looking) asymmetry between the two operations: whereas conjunctions reduce to their conjuncts, disjunctions are logical constructions. But what then are these constructions? How does the operation of disjunction—and, for that matter, negation—behave?

One natural approach is to take disjunction and/or negation as primitive operations which construct some new (non-atomic) propositions. I don't know if there's ultimately an attractive way of implementing this idea, but I can illustrate it using a simple model.

Suppose that there are only four atomic propositions: Fa, Ga, Fb, and Gb. F and G are mutually exclusive properties, so that there are four 'possible worlds': Fa, Fb; Fa, Gb; Ga, Fb; and Ga, Gb. There are then 16 (= 2^4) sets of possible worlds providing truth-conditions. Four of these truth-conditions are equivalent to atomics, and another six are equivalent to conjunctions of atomics: the four worlds, together with the tautology (thought of as the empty conjunction) and the contradiction (equivalent to various inconsistent conjunctions of atomics e.g. Fa, Ga). So the remaining six truth-conditions must be constructed using disjunction and/or negation.

These six truth-conditions may be construed as single but non-atomic propositions, yielding ten propositions—six disjunctions/negations and four atomics—and so 2^{10} pluralities altogether. As there are only 16 truth-conditions, many distinct pluralities are truth-conditionally equivalent. For example, (Fa, Fa ∨ Fb) is equivalent to Fa, and (Fa, Ga) is equivalent to (Fb, Gb).

As discussed in §4.2, *Conjunction as Identity* precludes the identification of truth-conditionally equivalent conjunctions. But it is consistent with treating negations and disjunctions this way. This requires choosing 'canonical forms' for each truth-condition, and treating both disjunction and negation as always 'flattening' their inputs into one of these canonical forms. For example, we might choose canonical forms as in Table 1. (In it, '0' denotes the empty plurality of propositions.)[55]

This approach is in some ways elegant: for example, it permits the reduction of negation to disjunction (or vice versa). But it also has some oddities. First, there is a deep asymmetry in its treatment of disjunction and conjunction. Conjunctions are 'structured', in that distinct (unordered) pairs of propositions yield distinct conjunctions, whereas disjunction is 'flat'—for example:

(Fa ∨ Fb) ∨ (Fa ∨ Fb) = Fa ∨ (Fa ∨ Fb) = Fa ∨ Fb
((Fa, Fb) ∨ (Ga, Gb)) ∨ ((Fa, Gb) ∨ (Ga, Fb)) = Fa ∨ Ga = Fb ∨ Gb

Second, combining structured conjunction with flat disjunctions and

54. In light of the discussion in §4.3, this may be better understood as the privileging of a 'conjunctive' form of many-one reduction over its corresponding disjunctive form.

55. To illustrate, the following identifications would hold:

0 = ~(Fa, Ga) = Fa ∨ Ga
Fa = ~Ga = (Fa, Fb) ∨ (Fa, Gb)
Fa ∨ Fb = (Fa ∨ Fb) ∨ (Fb, Gb) = ~(Ga, Gb)
Fa, Ga, Fb, Gb = (Fa, Ga) ∨ (Fb, Gb) = ~(Fa ∨ Ga)

Table 1

Tautology	Atomics	Worlds	Disjunctions	Contradiction
0	Fa	Fa, Fb	Fa ∨ Fb	Fa, Ga, Fb, Gb
	Ga	Fa, Gb	Fa ∨ Gb	
	Fb	Ga, Fb	Ga ∨ Fb	
	Gb	Ga, Gb	Ga ∨ Gb	
			(Fa, Fb) ∨ (Ga, Gb)	
			(Fa, Gb) ∨ (Ga, Fb)	

negations yields some surprising behavior for embedded conjunctions. For example, the following principles hold for propositions, but not pluralities in general:

(Plural Involution) ∀pp ~~pp = pp
(Disjunctive Idempotence) ∀pp pp ∨ pp = pp

Each is violated by pluralities which are distinct from but truth-conditionally equivalent to some canonical form, such as (Fa, Fa ∨ Fb) and (Fa, Ga).

Third, the view yields an operation—λp λq ~(~p ∨ ~q)—which is distinct from but truth-conditionally equivalent to conjunction. For example:

~(~Fa ∨ ~(Fa ∨ Fb)) = Fa ≠ (Fa, Fa ∨ Fb).

Finally, the approach involves apparent arbitrariness in the choice of canonical forms. In the cases of atomics, worlds, and disjunctions, the choices can perhaps be justified on grounds of simplicity: there may be meta-semantic bias towards smaller pluralities and simpler propositions. But the arbitrariness is especially striking in the case of the contradiction. For example, one naturally wants to distinguish ~(Fa ∨ Ga), which intuitively concerns only a, from ~(Fb ∨ Gb), which intuitively concerns only b.

I have only been outlining a toy model, and there may well be a more attractive implementation which avoids some of the odd features I highlighted. Nonetheless, it is worth briefly mentioning a very different approach: eliminate negative and/or disjunctive propositions altogether, so that there are only pluralities of atomics. This fits better with the logical atomist idea that there is no logical complexity in reality. Clearly, however, proponents of this approach would need to explain how negative and/or disjunctive sentences can be true without propositions for them to express. Moreover, they would need to account for the truth of conjunctions involving logically complex sentences, such as 'Fa & (Fa ∨ Gb)'. But whatever is said here may be in tension with *Conjunction as Identity*, for conjunction would seem to be treated differently when applied to atomics. Whatever conjunction does when applied to logically complex sentences, one might expect that it applies in the same way to sentences which happen to express propositions.[56]

When it comes to extending *Conjunction as Identity* to a more comprehensive view of logical complexity, then, I have only been able to sketch two broad approaches, both of which involve serious challenges. If the view is to be developed further, however, it is these challenges

56. For this reason, I prefer the 'eliminative atomist' view that I explore with Verónica Gómez (ms), on which there are no logically complex pluralities of propositions whatsoever. On this view, there is no sense in which pluralities are inherently conjunctive (or disjunctive).

which must be faced head on.[57]

References

Baxter, Donald L. M. (1988a). Identity in the loose and popular sense. *Mind* 97 (388): 575–582.

—- (1988b). Many-one identity. *Philosophical Papers* 17 (3): 193–216.

Bennett, Karen (2015). Perfectly understood, unproblematic, and certain. In Barry Loewer & Jonathan Schaffer (eds.), *A companion to David Lewis*. Chichester, West Sussex: Wiley-Blackwell. pp. 250–261.

—- (2017). *Making Things Up*. New York, NY: Oxford University Press.

Bohn, Einar Duenger (2019). Composition as identity: pushing forward. *Synthese* 198 (Suppl 18): 4595–4607.

Calosi, Claudio (2016). Composition is identity and mereological nihilism. *Philosophical Quarterly* 66 (263): 219–235.

Cameron, Ross P. (2012). Composition as Identity doesn't settle the special composition question. *Philosophy and Phenomenological Research* 84 (3): 531–554.

—- (2014). Parts generate the whole but they are not identical to it. In Aaron J. Cotnoir & Donald L. M. Baxter (eds.), *Composition as Identity*. Oxford: Oxford University Press. pp. 90–108.

Correia, Fabrice (2010). Grounding and truth-functions. *Logique Et Analyse* 53(211): 251–279.

Correia, Fabrice & Alexander Skiles (2019). Grounding, essence, and identity. *Philosophy and Phenomenological Research* 98 (3): 642–670.

Cotnoir, Aaron J. (2013). Composition as general identity. *Oxford Studies in Metaphysics* 8: 294–322.

Cotnoir, Aaron J. & Baxter, Donald L. M. (eds.) (2014). *Composition as Identity*. Oxford: Oxford University Press USA.

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De Rizzo, Julio (forthcoming). Simpler representational ground. *Erkenntnis*.

Dorr, Cian (2016). To be F is to be G. *Philosophical Perspectives* 30(1): 39–134.

Fine, Kit (2001). The question of realism. *Philosophers' Imprint* 1 (1): 1–30.

—- (2003). The non-identity of a material thing and its matter. *Mind* 112 (446): 195–234.

—- (2010). Towards a theory of part. *Journal of Philosophy* 107 (11): 559–589.

—- (2012). Guide to ground. In Fabrice Correia & Benjamin Schnieder (eds.) *Metaphysical Grounding: Understanding the Structure of Reality*. Cambridge: Cambridge University Press. pp.37–80.

—- (2017). A theory of truthmaker content I: conjunction, disjunction and negation. *Journal of Philosophical Logic* 46 (6): 625–674.

Fritz, Peter (2021). Ground and grain. *Philosophy and Phenomenological Research* 105 (2): 299–330.

Gómez, Verónica & Ezra Rubenstein (ms). Logical atomism.

Jackson, Alexander (2024). The fundamental facts can be logically simple. *Noûs* 58 (4): 997–1016.

Lewis, David (1991). *Parts of Classes*. Oxford: Blackwell.

McSweeney, Michaela Markham (2020). Debunking logical ground: distinguishing metaphysics from semantics. *Journal of the American Philosophical Association* 6(2): 156-170.

Ramsey, Frank P. (1927). Facts and propositions. *Aristotelian Society Supplementary Volume* 7 (1): 153–170.

Rosen, Gideon (2010). Metaphysical dependence: grounding and reduction. In Bob Hale & Aviv Hoffmann (eds.), *Modality: Metaphysics, Logic, and Epistemology*. Oxford: Oxford University Press. pp.109–136.

Rubenstein, Ezra (2024). Two approaches to metaphysical explanation. *Noûs* 58 (4): 1107–1136.

Russell, Bertrand (1918). The philosophy of logical atomism. In *Logic* *and Knowledge*, ed. R.C. Marsh (1956). London: Allen & Unwin. pp. 177–281.

Schaffer, Jonathan (2015). What not to multiply without necessity. *Australasian Journal of Philosophy* 93 (4): 644–664.

—- (2016). Grounding in the image of causation. *Philosophical Studies* 173 (1): 49–100.

Sider, Theodore (2007). Parthood. *Philosophical Review* 116 (1): 51–91.

—- (2013). Against parthood. *Oxford Studies in Metaphysics* 8: 237–293.

—- (2014). Consequences of collapse. In Aaron J. Cotnoir & Donald L. M. Baxter (eds.), *Composition as Identity*. Oxford: Oxford University Press. pp. 211–221.

Tahko, Tuomas E. (2021). A survey of logical realism. *Synthese* 198 (5): 4775–4790.

Turner, Jason (2014). Donald Baxter's Composition as Identity. In Aaron J. Cotnoir & Donald L. M. Baxter (eds.), *Composition as Identity*. Oxford: Oxford University Press. pp. 225–243.

Wallace, Meg (2011). Composition as Identity: Part 1. *Philosophy Compass* 6 (11): 804–816.

Wittgenstein, Ludwig (1922). *Tractatus Logico-Philosophicus*. London: Routledge & Kegan Paul.

Yi, Byeong-uk (1999). Is mereology ontologically innocent? *Philosophical Studies* 93 (2): 141–60.

—- (2018). Is composition identity? *Synthese* 198 (Suppl 18): 4467–4501.