## Introduction

**Two types of 'sameness':** Qualitative similarity *vs.* numerical identity.

- Two ginger bread men made by the same cookie cutter are qualitatively similar in several respects, e.g., they have the same shape, the same weight, the same colour, smell, and so on. But these are *two* numerically distinct entities.
- Superman and Clark Kent are numerically identical, i.e., they are one and the same entity. If you want to count the number of entities in the room, you should only count Superman and Clark Kent once: Louis Lane makes a mistake when she counts them as two.
- Numerical identity is the relation that each thing has to itself and nothing else. It is transitive, reflexive, and symmetrical.

## Four Puzzles

It appears that objects persist through time, i.e., that an object O1 at t1 can be numerically identical to an object O2 at t2. The piece of paper you have in your hand now, for instance, seems to be numerically identical to the piece of paper I handed you a few moments ago. That earlier piece of paper persisted as it changed hands. There are four classic puzzles about this phenomenon. Each poses a problem for the intuitive claim that objects persist through time and change.

1. The Ship of Theseus.
2. Tibbles and Tib (also called The Puzzle of Dion and Theon).
3. The Statue and the Clay (also called The Puzzle of Lumpl and Goliath).
4. The Debtor's Paradox (also called the Paradox of Increase).

## Diagnosis of these puzzles

Each puzzles assumes five incompatible assumptions:[1]

**The Existence Assumption:** There is an F and there are parts that compose an F, e.g., there is a statue and there are parts that compose the statue.

**Essentialist Assumption:** For any group of parts, if those parts compose an F, then the same parts compose some object *a* such that *a* is essentially composed of those parts, e.g., if some bits of clay compose a statue, then there exists something, *a lump*, that is essentially composed of those bits of clay.

[1] From 'Material Constitution: A Reader', by Michael Rea, Intro.

- If *a* is essentially composed of some parts, then those parts compose *a* at every time that *a* exists, e.g., the bits of clay that essentially compose a lump, compose that lump throughout its existence.

**Principle of Alternative Combinatorial Possibilities (PACP):** For any group of parts, if those parts compose an F, then those parts compose some object *b* such that *b* is not essentially composed of those parts.

- If *b* is not essentially composed of some parts, then *b* can be composed of those parts at some times but not at others, e.g., if my lego house is not essentially composed of some red bricks, then the red bricks could make up the house at one time, but not another.

**The Identity Assumption:** For any objects x and y, if x and y share all the same parts at the same time, then x is identical with y.

- If Superman and Clark Kent have exactly the same parts, then Superman and Clark Kent are numerically identical.
- The Identity Assumption entails that no two material objects can occupy the exact same region of space, a principle which has been endorsed from philosophers as early as Aristotle.

**The Necessity Assumption:** For any objects x and y, if x is identical with y, then it is necessary that x is identical with y.

- If it is necessary that x is identical with y, then x is identical with y at every moment that y exists, e.g., if Superman and Clark Kent are identical today, then they are numerically identical at every moment that they exist.

## Why are these assumptions incompatible?

Our Strategy: We assign the names '*a*' and '*b*' to arbitrary objects. We assume that *a* and *b* are composed of the same parts. We then show that under some of these assumptions, *a* and *b* are identical, but under other assumptions *a* and *b* are not identical. Rea explains:

> The problem is that for any composite object *a* we can (generally) identify an object *b* that constitutes it and *b* is essentially related to its parts in a way that *a* is not. [However] the Identity Assumption tells us that *a* is identical with *b*, the Necessity Assumption tells us that *a* and *b* could not have been distinct; hence, *a* and *b* are not essentially related to their parts in different ways. (Rea, pxxviii.)

NB: When we speak of the parts that compose an object, we mean all the parts of that object. We are not speaking about partial composition.

**Application to Lumpl/Goliath**

1. By the existence assumption, there exists a statue and there exists parts of that statue (the *p*s).
2. By the essentialist assumption, since the *p*s compose the statue, then there exists an object *a* such that the parts of *a* essentially compose a statue.
3. Assume that *a* is Goliath.
4. By PACP, since the *p*s compose the statue, then there exists an object *b* such that the parts of *b* do not essentially compose a statue.
5. Assume that *b* is Lumpl.
6. By the identity assumption, Goliath and Lumpl are identical.
7. By the necessity assumption, Goliath and Lumpl are not identical.
8. Therefore, Goliath and Lumpl are and are not identical.

**An abstract version of the argument**

1. By the existence assumption, there exists an F and there exists parts (*p*s) that compose this object.
2. By the essentialist assumption, since the *p*s compose something, then there exists an *a* that is essentially composed of the *p*s.
3. By PACP, since the *p*s compose something, then there exists a *b* that is not essentially composed of the *p*s.
4. *a* and *b* are identical. Proof:
    i. By the identity assumption, if *a* and *b* have the same parts, then *a* and *b* are identical.
    ii. By the essentialist assumption and PACP, *a* and *b* have the same parts.
    iii. *a* and *b* are identical (from i&ii).
5. *a* and *b* are not identical. Proof:
    i. By the necessity assumption, if *a* and *b* are identical then at every time that *a* and *b* exist, *a* and *b* must have the same relationship to the same *p*s.
    ii. By the essentialist assumption, *a* is essentially composed of the *p*s.
    iii. By PACP, *b* is not essentially composed of the *p*s.
    iv. *a* and *b* do not have the same relationship to the same *p*s (from ii&iii).
    v. *a* and *b* are not numerically identical (from i&iv).

## Responses

These five assumptions cannot all be true together. At least one assumption must be false. If we can identify which assumption or assumptions are false, then we can identify how to solve the puzzles.