

Does Reduction Entail identity?

1. One-Many reduction and the plan for the talk

- Reduction is often taken to hold between **a whole and its parts**:
 - a. A cell reduces to molecules.
 - b. A protein reduces to amino acids.
 - c. A water molecule reduces to hydrogen and oxygen atoms.
- **Reduction Entails Identity (REI)**: if A reduces to the Bs, then A is identical to the Bs.
- **My Argument**: REI entails two controversial metaphysical theses:
 1. **Mereological Essentialism (ME)**
 2. **Unrestricted Composition (UC)**
- **The upshot**: if ME and UC are false, then reduction cannot entail identity.

2. Reductionism and Composition as Identity

- **Composition As Identity (CAI)**: a whole is identical to its parts.
- If reductionism is true about all wholes, then REI entails CAI.

3. Reductionism and Mereological Essentialism

- Mereological Essentialism (ME): a whole has its parts essentially (or necessarily).
- Merricks (1999): CAI entails ME:
 1. Suppose that some things, the Bs, compose something A, and therefore (according to CAI), are identical to A.
 2. Since the Bs have the property of being identical to the Bs in every possible world in which they exist, and given the indiscernibility of identicals, it follows that A has the property of being identical to the Bs in every world in which they exist.
 3. So if CAI is true, there is no world in which A exists but it is not composed of the Bs.
 4. Therefore, if CAI is true, composites must be composed of the parts they actually have, and therefore, have their parts essentially.
- REI - *reducible objects* have their parts essentially.
- **ME is controversial for biology**: Organisms seem to constantly undergo mereological change (metabolism, growth and development, injury and repair etc). Not so is ME is true!
- **ME is controversial for the philosophy of biology**: in tension with the existence of organisms:

- **Physiological definition of the organism:** an organism is a metabolic whole whose parts maintain the whole *despite turnover of matter* (Godfrey-Smith, 2013, 25; O'Malley, 2021; Pradeu, 2010; Wilson & Sober, 1994, 606).
- **Response to my argument: adopt an ontology of temporal parts.**
- **But an ontology of temporal parts is equally controversial:**

4. Reductionism and Unrestricted Composition

- Unrestricted Composition (UC): for any things, there is something they compose.
- **Argument** – REI implies UC:
 1. Suppose A reduces to the Bs, and therefore, (according to REI) is identical to the Bs.
 2. Since the Bs have the property of being identical to the Bs in every possible world in which they exist, and given the indiscernibility of identicals, A has the property of being identical to the Bs in every world in which they exist.
 3. Take one of these worlds, w, where the Bs are arranged differently perhaps being radically scattered. Since the Bs have the property of being identical to A in every world in which they exist, the Bs have the property of being identical to A in w, and so presumably compose A in w.
 4. This holds no matter how the Bs are arranged - **the Bs automatically compose A simply by existing.**
 5. Presumably then, *any things* automatically compose something in virtue of existing.
 6. Therefore, composition is unrestricted.
- **UC is controversial:** Too many organisms!
- **Counting organisms in biology:**
 - Biologists need to count organisms, e.g when measuring the spread of a trait in a population.
 - But if UC is true, counting organisms will be impossible in practice.
- **Response** – The **Count-As-One View**: we should count these overlapping organisms **as if they are one organism** (Lewis, 1999).
- **Worries with the Count -As-One View**: organism-parts of organisms, e.g cells, microbes, foetuses (Dupré & O'Malley, 2009; Kingma, 2020; Pradeu, 2012). Should we count all these overlapping organisms as one organism? Surely not!

Response: Should count **majorly overlapping organisms** as if they are one organism. Why? Because the biological differences between majorly overlapping organisms are negligible, whilst they are significant between non-majorly overlapping organisms.

But what about the organism composed of all of my parts minus my hands, or limbs? Clear biological differences between these organisms. Should these organisms be counted as distinct organisms or as one?
- So if REI, is true, it is not clear how we should count organisms.

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