

# Towards an ontology of products\*

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# 1. Two claims

- (1) Types of products have the same ontological status as that of material stuffs, i.e. gold and water.
- (2) The relationship between types of products and their instances is logically similar to the relation of constitution which holds between, say, gold and a ring made of gold.

## 2. Two notions of “product”

- (1) Product<sub>1</sub>: a model or type (in a pretheoretical sense) that can have many particular objects as its instances.
- (2) Product<sub>2</sub>: a particular object falling under a sortal concept that is an instance of a product<sub>1</sub>.

## 2.1 Example

- The car driven by Sean Connery in *Goldfinger* is a product<sub>2</sub>. It is a particular object falling under the sortal concept *CAR*. It is an instance of a product<sub>1</sub>.
- The Aston Martin DB5 of which the car driven by Sean Connery in *Goldfinger* is an instance is a product<sub>1</sub>.

# 3. Conceptual concerns

- What kind of entities are products<sub>1</sub>?
- What is their relationship to products<sub>2</sub>?

# 3.1 Some proposals

- Set theoretic entities: membership
- Kinds: instantiation
- Patterns of properties: exemplification
- Mereological sums: parthood

## 3.2 Objections (non conclusive)

- Set theoretic entities, kinds and properties are abstract entities, but we speak of products<sub>1</sub> as of concrete entities.
- Set theoretic entities and mereological sums owe their identity to their members and parts, whereas products<sub>1</sub> do not owe their identity to products<sub>2</sub>.

# 4. The ontology of stuffs: P. Strawson

Feature-placing sentences:

“There is water in the basement”

- Feature-placing sentences do not imply quantification over instances of sortal concepts.
- Feature-placing sentences imply quantification over incidences of material stuffs.

## 4. Incidences/instances

- Whenever a feature-placing sentence is true, we are not able to find a logically equivalent sentence that implies quantification over particular objects falling under a sortal concept.
- It is impossible to find a sortal concept  $F$  such that any sentence of the form “there is water...” is logically equivalent to “there is a  $F$ ...”.

# 4. Pluralities

- A mass noun does not imply quantification over particular objects. A mass noun implies quantification over pluralities of objects.
- A plurality of objects is not a plural object, i.e. one entity of a special sort like a set, a mereological sum or an aggregate. A plurality of objects is not *one* but *many* objects.
- To say that there is water in the basement is certainly to assert the existence of something in the basement, upon which the truth value of the sentence depends, but not to assert the existence of *one* particular object falling under a sortal concept.

## 4. Plural first order logic

- Plural first order logic: beside singular terms and singular variables referring to and taking single particular objects as values, there are plural terms and plural variables referring collectively to and taking many objects as values at once.
- The predicate “ $\angle$ ” is introduced as a logical predicate standing for the relation of being one of a plurality of objects.
- Quantification over pluralities is not singular quantification over entities of a new sort – pluralities – but quantification of a new sort – plural quantification – over individuals.

# 4.1 Formalization

(a) There is water in the basement

(a')  $\exists xs(\forall y(y \in xs \rightarrow (\text{Water-element}(y) \wedge @the\_basement(y))))$

- To read: there is a plurality of objects  $xs$  such that for any object  $y$ ,  $y$  is one of them only if  $y$  is a water-element and is in the basement.

# 4.1 Formalization

(b) Water is widespread in G

(b')  $\exists xs(\forall(y \angle xs \rightarrow \text{Water-element}(y)) \wedge \text{Widespread\_in\_G}(xs))$

- To read: there is a plurality of objects  $xs$  such that for any object  $y$ ,  $y$  is one of them only if  $y$  is a water-element and  $xs$  are widespread in G.

# 4.1 Formalization

(c) Water is colorless

(c')  $\forall x(\exists ys((\forall z(z \angle ys \rightarrow \text{Water-element}(z)) \wedge \text{Cysx}) \rightarrow \text{Colorless}(x)))$

- To read: for any object  $x$ , if there is a plurality of objects  $ys$  such that for any object  $z$ ,  $z$  is one of them only if  $z$  is a water-element and  $ys$  constitute  $x$ , then  $x$  is colorless.

# 4.1 Formalization: constitution

The analysis of (c) requires a notion of constitution as a relation between pluralities of objects and particular objects. Constitution can be defined as follows:

$$Cxsy \equiv_{def} \forall z(z \angle xs \rightarrow z < y) \wedge \forall w(w < y \\ \rightarrow \exists o(o \angle xs \wedge O ow))$$

- To read: the objects  $xs$  constitute the object  $y$  if and only if for any object  $z$ ,  $z$  is one of the  $xs$  only if  $z$  is a proper part of  $y$  and for any object  $w$ , if  $w$  is a proper part of  $y$ , then there exists an object  $o$  such that  $o$  is one of the  $xs$  and  $o$  and  $w$  overlap.

# 4.1 Formalization

(d) The water in the bottle is frozen

(d')  $\exists xs(\forall(y \angle xs \leftrightarrow \text{Water-element}(y) \wedge @\text{the\_bottle}(y))) \wedge \forall z(\text{Cxs}z \rightarrow \text{Frozen}(z)))$

- To read: there is a plurality of objects  $xs$  such that for any object  $y$ ,  $y$  is one of them if and only if  $y$  is a water-element and is in the bottle, and for any object  $z$  if  $xs$  constitute  $z$  then  $z$  is frozen.

# 5. The ontology of products<sub>1</sub>

## Products<sub>1</sub>: analogy to stuffs

- The presence of incidences of material stuffs is not presence of instances of sortal concepts but of pluralities of stuff-elements. The existence of material stuffs consists in the existence of pluralities of stuff-elements.
- The existence of a product<sub>1</sub> does not imply the existence of particular objects, i.e. products<sub>2</sub> that are its instances, all falling under a unique sortal concept. The existence of a product<sub>1</sub> consists in the existence of pluralities of objects, more precisely pluralities of product<sub>1</sub>-elements.

# 5. Product<sub>1</sub>-A-element

Given a product<sub>1</sub> A, the notion of A-element can be defined as follows:

- For any  $x$ ,  $x$  is an A-element if and only if there exist a plurality of objects  $ys$  and  $x$  is one of them and  $ys$  are assemblable according to some procedure  $F$  to form an object of sort  $G$  with properties  $P_1 \dots P_n$ . (where for any object  $o$ ,  $o$  is an instance of product  $A$  if and only if it is a  $G$  and has the properties  $P_1 \dots P_n$ ).

# 5.1 Aston\_martinDB5-element

$Aston\_martinDB5\text{-element}(x) \equiv_{def} \exists y_s(x \angle y_s \wedge A M y_s)$

- (“AM” stands for the property of being assemblable according to some procedure  $F$  to form an object that is a car with properties  $P_1 \dots P_n$  – where  $P_1 \dots P_n$  are the properties that all and only the cars of the model Aston Martin DB5 exemplify).

## 5.2 Formalization

(b) The Aston Martin DB5 is a sports car

(b')  $\forall x(\exists ys(A Mys \wedge Cysx) \rightarrow Sports\_car(x))$

- To read: for any object  $x$  if there is a plurality of objects  $ys$  such that  $ys$  can be assembled according to some procedure  $F$  to form a car with the properties  $P_1 \dots P_n$  and  $ys$  constitute  $x$ , then  $x$  is a sports car.

## 5.2 Formalization

(c) John's car is an Aston Martin DB5

(c')  $\exists xs(A Mxs \wedge Cxs \text{John's\_car})$

- To read: there is a plurality of objects  $xs$  such that  $xs$  can be assembled according to some procedure  $F$  to form a car with properties  $P_1 \dots P_n$  and  $xs$  constitute John's car.

## 5.2 Formalization

(a) The Aston Martin DB5 is widespread in G

(a')  $\exists xss(\forall(ys \angle xss \rightarrow A Mys)$   
 $\wedge \text{Widespread\_in\_G}(xss))$

- To read: there is a superplurality of objects  $xss$  such that for any plurality of objects  $ys$ , if  $ys$  are among  $xss$ , then  $ys$  can be assembled according to some procedure  $F$  to form a car with the properties  $P_1 \dots P_n$  and  $xss$  are widespread in  $P$ .

# 6. Conclusions

- Products<sub>1</sub> have a pre-particular level of existence. They are concrete entities whose existence is prior to the existence of any instances of them and consists in the existence of products<sub>1</sub>-elements.
- The relationship between products<sub>1</sub> and products<sub>2</sub> is a relation of constitution.