Trope Theory, Resemblance, and Russell's Regress

Florian Boge
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Structure

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• Perfect resemblance defined
What are tropes?

- **Definition:** Tropes are the *particular properties* (property instances) of a given concrete entity (cf. Campbell 1990, 18). They are *abstract particulars*.
  - Relatons = polyadic tropes
  - Qualitons = monadic tropes (cf. Bacon 2008, 2)

- An entity is called *abstract* (in this context) iff. it is a *part* of some other entity, which can only be *separated in thought* (cf. Rojek 2008, 361).

- Particulars (individuals) = entities which only exist in one place at one time (interval)

  → Spacio-temproal location as an important *criterion* for individuality according to trope theory:

  “[O]ur abstract particulars are *particulars* because they have a local habitation, even if no name. They exist as individuals at unique place-times.” (Campbell 1990, 3)
What are tropes?

- Examples:
  - The particular shape of a given chair
  - Bill Clinton’s eloquence
  - ‘This redness’, in contrast to ‘redness’ in general

- Supposed to provide an alternative to realism about universals
  - Trope theory is a form of nominalism about universals
  - Needs to explain our use of general terms
  - Should be able to explain every day life’s entities such as things, their appearance, their relations etc.
Nominalism about universals

- Nominalism about universals = attempt to provide an explanation of general terms (i.e. terms for types, properties, relations etc.) without appeal to universals
- Universals = entities that are multiply exemplified i.e. exist in more than one place at the same time
- Different kinds of nominalism:
  - Predicate nominalism: different entities just fall under the same predicate (cf. Armstrong 1978,13)
    - highly unsatisfactory
  - Class nominalism: different entities are part of the same class; the predicate refers to the whole class
    - Faces some great difficulties, e.g. coextension problem (‘cordate’ and ‘renate’), aggregate problem (aggregate of soldiers = aggregate of armies)
  - Resemblance nominalism: different entities resemble each other and constitute resemblance classes (which are the denotation of a predicate)
    - Most promising, but also has to face the coextension problem (cf. Schurz 1995, 100)
Nominalism about universals

• Trope theory as a form of resemblance nominalism which ipso facto solves some of the problems of classical similarity nominalism:
  – No coextension problem; class of resembling F-tropes distinct (even disjunct) from the class of resembling G-tropes, even if all F- and G-tropes always occur in the same classical individuals
  – Makes it easier to define relative resemblance of classical individuals (resemblance w.r.t. one property instead of overall resemblance) and degrees of resemblance in virtue of perfectly resembling tropes (definition will be given later)
Bundle theory

• Classical individuals = *concrete entities* we encounter in everyday life, ‘things’

• How can trope theory account for those?

• One classical, intuitive approach: *substrata*, ‘bare particulars’, that *bear* tropes

  ↓ Difficulties:
  • ‘Ontological extra’ (dispensable)
  • Relation of ‘bearing’ must be second order trope that needs explanation: how can tropeless substratum have the property (trope) of being a bearer? (Cf. Simons 1994, 567)

• Alternative: *bundle theory*
  - Tropes (always - ?) appear in *bundles*
  - Tropes in a bundle are *compresent*

  ↓ Several tropes are compresent at a time (interval) iff. they *occupy the same space* at that time (interval) (cf. Russell 1948, 260)

  ↓ Can also be interpreted to introduce a *cognitive* dimension; several tropes are *percieved* as one complex
A refinement: nucleus theory

• **Problem:** how can bundle theory account for the distinction between *essential* and *accidental* properties (i.e. tropes)?

• **Solution:** There is a *nucleus* of tropes in every bundle, where any trope of the nucleus cannot exist without any of the other tropes (cf. Simons 1994, 567).

  ▸ One sided dependence of accidental tropes on the existence of the nucleus


• Alternative interpretation:
  
  – Some tropes are *essentially compresent: basic* tropes (tropes that constitute the basic physical entities).

  – The tropes of several nuclei can be *accidentally compresent* (constitute bigger entities together) and create *supervenient tropes*; introduce degrees of compresence.

  – Many *Relatons* may be defined in terms of compresence (degree of compresence, change in the degree of compresence…)

  ▸ Less anthropocentric
Similarity relations

- General properties are taken to be *resemblance classes* of tropes – what is resemblance?
  - Resemblance is a *similarity relation*.
  - Technical definition: A similarity relation is a symmetric and reflexive relation: $\forall x \forall y (Sxy \iff Syx) \land \forall x (Sxx)$ (cf. Bacon 2008, 4)
  - *Resemblance* as the nominalistic pendant to *qualitative identity* (having the same property)
  - *Perfect resemblance* is the highest degree of resemblance; it is, arguably, also transitive: $\forall x \forall y \forall z (Rxy \land Ryz \rightarrow Rxz)$
  - *Perfect resemblance*, thus, is an *equivalence relation*, which induces a *partition* on a given Domain D.
  - *Relative resemblance* of classical individuals can be modeled in terms of perfectly resembling basic tropes; a *measure* for resemblance in some respect can be defined.
  - *Compresence* can – logically – be taken to be a similarity relation (similarity w.r.t. spacio-temporal location).
A trope theoretical measure for relative resemblance

• Motivation:

„[A]n orangeness trope might be like the color of a given tomato, which in turn was like a bunch of redness tropes. The tomato’s color might be both an orangeness and a redness. Yet the orangeness trope might not be like any of the other redness tropes. I see no compelling reason to exclude such possibilities a priori.” (Bacon 1995, 15)

→ Argument for the non-transitivity of resemblance – plausible?

↓ Can be resolved by introducing degrees of similarity (resemblance); take resemblance in general to be fuzzy:

„[A] similarity relation, S, is a fuzzy relation which is reflexive, symmetric, and transitive. Thus, let x, y be elements of a set X and \( \mu_s(x, y) \) denote the grade of membership of the ordered pair (x, y) in S. Then S is a similarity relation in X if and only if, for all x, y, z in X, \( \mu_s(x, x) = 1 \) (reflexivity), \( \mu_s(x, y) = \mu_s(y, x) \) (symmetry), and \( \mu_s(x, z) \geq \bigvee_y (\mu_s(x, y) \land \mu_s(y, z)) \) (transitivity), where \( \bigvee \) and \( \land \) denote max and min, respectively.” (Zadeh 1971, 177)

• We need \( \bigvee \) because \( \mu \) is a real-valued function into the closed interval [0,1].
A trope theoretical measure for relative resemblance

If we assume that the tropes of classical individuals *supervene* on the basic tropes, we can define the following measure for (relative) resemblance:

Let \( x, y \) be variables for the elements of the set \( I \) of classical individuals and \( F \) any relation of relative resemblance on \( I \) (e.g. color resemblance). Further, let \( B \) be the set of basic tropes and \( t_i, t_j \), with \( i, j \in \mathbb{N} \), be variables for the elements of \( B \). Let \( T(x) \) be the set of basic tropes compresent in \( x \), i.e. \( \forall t_1, t_2 \in T(x): Kt_1t_2 \), where \( K \) is the relation of compresence on \( B \). Let \( N = |\{<t_i, t_j> \in B_F^2 : t_i \in T(x), t_j \in T(y)\}| \) where \( B_F \subset B \) is the set of basic \( F \)-tropes (the set of basic tropes on which the relata of \( F \) – e.g. color-tropes – supervene). Let \( P \) be the relation of perfect resemblance on \( B_F \). Then:

\[
\mu_F(x, y) = |\{<t_i, t_j> \in P: t_i \in T(x) \cap B_F \text{ and } t_j \in T(y) \cap B_F\}| / N
\]

- Relates the idea of degrees of resemblance to trope theory
- Reduces the need for a general definition of resemblance to the need for a definition of *perfect* resemblance
- Bears some explanatory value for the question of how degrees of resemblance come into existence
The resemblance regress

- Resemblance relations must either consist relatons (particular resemblances; 2nd order tropes) or the universal of resemblance must be accepted.

- Problem:
  - If we accept a universal at the basis of our ontology, trope theory does not give us a complete form of nominalism.
  - However, if we take resemblances themselves to be individuals, the regress problem arises:
    - Let \( r_1 \) be the particular resemblance between two tropes \( a \) and \( b \) and \( r_2 \) the particular resemblance between two tropes \( c \) and \( d \)
    - Now, for the \( r_1 \) and \( r_2 \) both to be resemblances, there must be another, higher order trope \( r_{1,2} \) which makes them both resemblances (since this is our criterion for membership in a resemblance class).
    - Let, in general, \( r_{i,j} \) be the resemblance between two resemblances \( r_i \) and \( r_j \)
    - For any two \( r_{i,j} \) and \( r_{k,n} \), we now need a \( r_{(i,j),(k,n)} \) for them to be resemblances – and so forth for any two higher order resemblances, ad infinitum.
Is it vicious?

• Some philosophers have argued, that there are ‘virtuous’ regresses, e.g.:
  – The truth regress (resulting from the substitution of the truth conditions of a true sentence into Tarskis T-scheme)
  – The regress of successor numbers, resulting from the axioms of peano arithmetic
    (cf. Nolan 2001, 523-524)
• The regress of resemblances could be such a regress (cf. Campbell 1990, 35 ff.)
  ➔ Campbell: more formality and less substance on every level – *what does that even mean?*
  ➔ Daly (1994, 256-257): applies to *any* regress.
  ➔ We need a better argument.
Some philosophers have argued that resemblance is an *internal relation* (cf. Armstrong 1989, pp. 43), i.e.:

- Given the existence two resembling entities (tropes) $a$ and $b$, they must resemble one another (they resemble one another in every possible world, in which they exist).

  $\rightarrow$ Tropes *necessitate* their resemblance

  $\rightarrow$ Resemblance *supervenes* on tropes

**Question:** Is resemblance ontologically *reducible* to the resembling entities? (cf. Armstrong 1989, 56)

  $\rightarrow$ **Problem:** If $r_{a,b}$ is the resemblance of $a$ and $b$ and it is ‘nothing besides $a$ and $b’$ then it should hold that $r_{a,b} = a$ and $r_{a,b} = b$. But then $a = b$. $\Rightarrow$ (cf. Schurz 1995, 102)
A cognitivist approach as a possible solution

• Prima facie it seems plausible to relativize resemblance to epistemic agents or cognitive systems.
  – Resemblance then becomes a three-place relation: $\forall x, y (R_{xy} \leftrightarrow \exists S R_{xy} S)$ where $S \in \$, $\$ = \{x \mid x \text{ is a cognitive system}\}$ and $R_{xy} S$ is the three-place predicate ‘$x$ resembles $y$ for $S$’.
  – Plausible modification: $\forall x, y (R_{xy} \leftrightarrow \exists M R_{xy} M_R)$ where $M_R \subseteq \$
    $\downarrow$ The resemblance of some $a$ and $b$ has to be understood as an associative impression that arises in (some set of) cognitive systems after percieving $a$ and $b$.

• Two follow-up problems:
  a. In virtue of what are $a$ and $b$ associated by the set of cognitive systems?
  b. The regress still holds: associations would have to be analyzed as ‘associations’ because we associate one association process with another one…
A cognitivist approach as a possible solution

• To a.:
  – It seems plausible to still conceive of resemblance as an internal relation in some sense.
  – But now that means that for every possible world in which cognitive systems satisfy some conditions (the same ones as they supposedly do in our world), they automatically associate certain entities.
  – Cognitive systems do so in virtue of the way a and b act on them.
    → A nominalistic theory of causality is needed for this approach.

• To b.:
  – If the regress actually occurred, that would mean an infinitely complex cognitive system, e.g. an infinitely complex brain (!) since associations could be interpreted as connections of stimulated neurons (cf. Bear, Connors, and Paradiso 2009, 372).
  – This seems implausible. No brain or other finite cognitive system would ever associate associations ad infinitum.
  – The regress hardly ever occurs because it is only a dispositional one, i.e.: if we were to reflect on the act of association, we would associate the particular acts of association with one another.
A cognitivist approach as a possible solution

- The regress always stops at some order of association and is (usually) replaced by an *inductive generalization* (‘and so forth’).
- It is plausible to assume that an inductive generalization is a different kind of *neuronal* (or other *material*) process.
- There is no *infinite* regress, just a dispositional finite regress; this may be seen as an argument for the virtuousness of the regress of resemblances.

**Investment:**

- A somewhat Kantian metaphysics
- A nominalistic theory of certain causal terms
Perfect resemblance defined

- Definition now has to involve:
  a. Relativization to (a) cognitive system(s)
  b. All possible worlds in which cognitive systems have the same perceptive and cognitive capabilities as they do in our world (no ‘transcendent means of identification’)
  c. Action of the tropes on the system(s) at some place and time

- We could take perfect resemblance to mean that there would be no difference in a cognitive system (e.g. the cognition-relevant parts of a brain), if the space-time coordinates of two perfectly resembling tropes were ‘swapped’.
Perfect resemblance defined

Let $W$ be the set of all possible worlds, $w_0 \in W$ our world (or some world that satisfies the same conditions for cognitive systems), $\Gamma \subseteq W = \{ w_n \in W \mid \text{all } S \in w_n \text{ satisfy the same conditions as all } S \in w_0 \}$, where $S \in \$$.

• Then our definition would have to look something like this:

Two tropes $a$ and $b$ perfectly resemble one another iff in every possible world $w_1 \in \Gamma$ which is identical to some $w_2 \in \Gamma$ up to some point in time, $t_2 \geq t_1$, except that in $w_1$ $a$ acts on some $S \in \$$ in $t_1$, $s_1$ and $b$ acts on (the same) $S$ in $t_2$, $s_2$, whereas in $w_2$ $b$ acts on $S$ in $t_1$, $s_1$ and $a$ acts on $S$ in $t_2$, $s_2$, the states of $S$ in $w_1$ and $w_2$ until, and immediately after $t_2$ are identical (where $s_1 \neq s_2$).
Perfect resemblance defined

This leaves us with the following questions:

1. How should ‘possible worlds’ be understood nominalistically?
2. What does ‘identical’ mean in this context?
3. What would a nominalistic theory of causality (and dispositions) look like?

Formalist approach to questions 1 and 2 (possible worlds as something like *sets of propositions*, identity as *numerical identity*); 3 is an open end
References


References


Thank you for your time and attention!