



Identifiable Individuals And Reality

What Do We Describe And Why

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Identifiable Individuals

Initial Thoughts

This presentation is about to possibility of ontological individuation, and the consequences for epistemic individuation.

Ontological individuation: Phenomena that are by their nature sufficiently distinct from others so that they can be recognized by people independently.

Epistemic Individuation: References to arbitrary parts of reality by some reference systems that can unambiguously be shared with other people



Identifiable Individuals

Engineering Background

Background:

- CIDOC CRM (ISO21127), **a formal ontology** for global cultural-historical data integration, continuously being **extended**
- increasingly **taken up** in European funded **Research Infrastructures** and by **private clients** for globally aggregating large amounts of facts (e.g., British Museum, Getty Research Institute, Germanic National Museum)
- Applied to **empirical-descriptive sciences** (archaeology, anthropology, biodiversity, geology, epidemiology, political history...), in contrast to manufacturing!

The engineering problem

- Hundreds of experts **have to learn** the ontology, learn **why** a CRM concept is **a good match**, or **when** a **new** concept has to be added, and what makes **a good new concept** for information integration.
- How to teaching **philosophical** choices as practical guidelineshave we **understood** the choices?



Identifiable Individuals

Information Systems and Identifiable Items

An *information system* is a form of *communication system* in which *data* represent and are *processed* as a form of *social memory*. An information system can also be considered a semi-formal language which *supports human decision making* and *action* ([Wikipedia](#)).

Data in information systems can be represented as propositions ("records" etc.). Propositions about *reality* must ultimately relate to items (*particulars*) that *can be identified diachronically* and are *well-distinguished*.

(We regard reality as that which makes independent observations potentially comparable about their reference)

An information system can only be *maintained consistently*, if there is a *method* to decide for any referred item if it is *one thing*, if references *co-refer* to it, and if and when it *exists* or not (states of *ignorance* or areas of *indeterminacy* notwithstanding).

In short, its grounding to reality depend on identifiable individuals.



Identifiable Individuals

Can formal propositions describe the world?

N. Guarino 1998: “....We shall define a domain space as a structure $\langle D, W \rangle$, where D is a domain and W is a set of maximal states of affairs of such domain (also called *possible worlds*). For instance, D may be a set of blocks on a table and W can be the set of all possible spatial arrangements of these blocks....”

“ D ” is a set of identifiable items. “ W ” corresponds to possible propositions about these items. N. Guarino (and current computer science) restrict formal ontologies (FO) to such domains, and regards FO as means of objective communication.

Should that mean that there is a potential isomorphism between FO and reality?

Can reality be decomposed into “building blocks (=identifiable individuals)”?

But no immutable atoms of the world have ever been found.



Identifiable Individuals

Can formal propositions describe the world?

Questions:

- a) Can we **confirm** empirically these identifiable individuals in reality?
- b) Are there** (at all?) categories of things in reality that exactly fulfil the conditions of identifiable individuals and is their being individuals **naturally** & **uniquely** given?
- c) Is there an isomorphism to reality, i.e., can reality be **completely** decomposed into identifiable individuals and their relations and interactions?
- d) If not b), are there things in reality that **approximate** the conditions **sufficiently** for a particular discourse?
- e) If not c), **which part** do identifiable individuals cover of reality and how can we talk about other phenomena of reality?
- f) If, e.g., height(martin,175cm), height(martin,176cm), is that inconsistent with reality? (see Leibniz criterion).

We claim that nothing of this holds so simply, but yet it “works” - WHY at all?



Identifiable Individuals

Correspond propositions to the world?

Wittgenstein, Tractatus:

2.161 “There must be **something identical** in a **picture** and **what it depicts**, to enable the one to be a picture of the other at all.”

2.171 “**A picture can depict any reality** whose form it has. A spatial picture can depict anything spatial, a coloured one anything coloured, etc.”

2.11 “A **picture** presents a **situation** in logical space, the **existence** and non-existence of states of affairs.”

2.19 “**Logical pictures can depict the world.**”

2.06 “The existence and non-existence of states of affairs **is reality**. (We call the existence of states of affairs a positive fact, and their non-existence a negative fact.)”

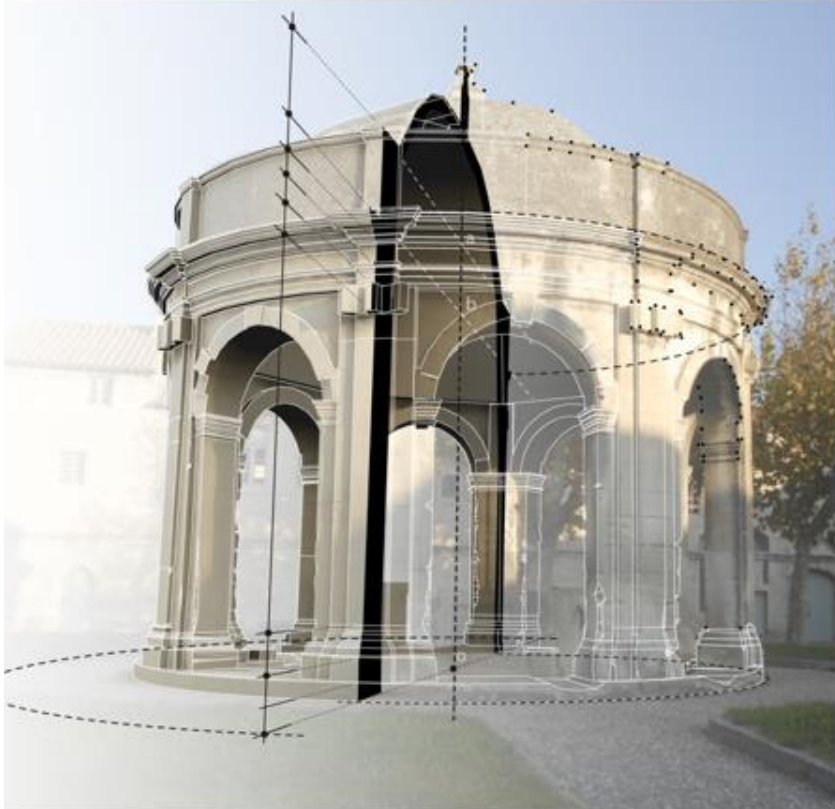
2.063 “The sum-total of reality is the world.”

Does he mean that reality, or a part of it, is **isomorphic to logical statements** ?

7 “**What we cannot speak about we must pass over in silence.**”

Photomodélisation | Génération d'un nuage de points 3D

Recovering the individual *plan* from the *measured reality* (point cloud), by *hypotheses* about the geometric “grammar” (regular planes, angles, etc.), versus representing irregularities and deterioration?





Identifiable Individuals

Can propositions describe the world?

European thinking has a tradition of seeking the *building blocks* of reality as identifiable objects. An idea to predict and possibly control the universe:

But Demokrit's "*atoms*" were never found!

- "Elementary" particles are **not eternally persistent**.
- They **transform** into each other.
- They have **no individual identity**. They intermix.

Even if they existed, they would be *completely useless*, because computing their complexity would require a machine much *larger than the universe*.

So, atoms are **too small** for describing particular worlds.

*Are there identifiable individuals of **useful size**?*

Following **David Wiggins**, identifiable individuals **exist only** with respect to **a class**.

Let's then take a tour through the world by classes!



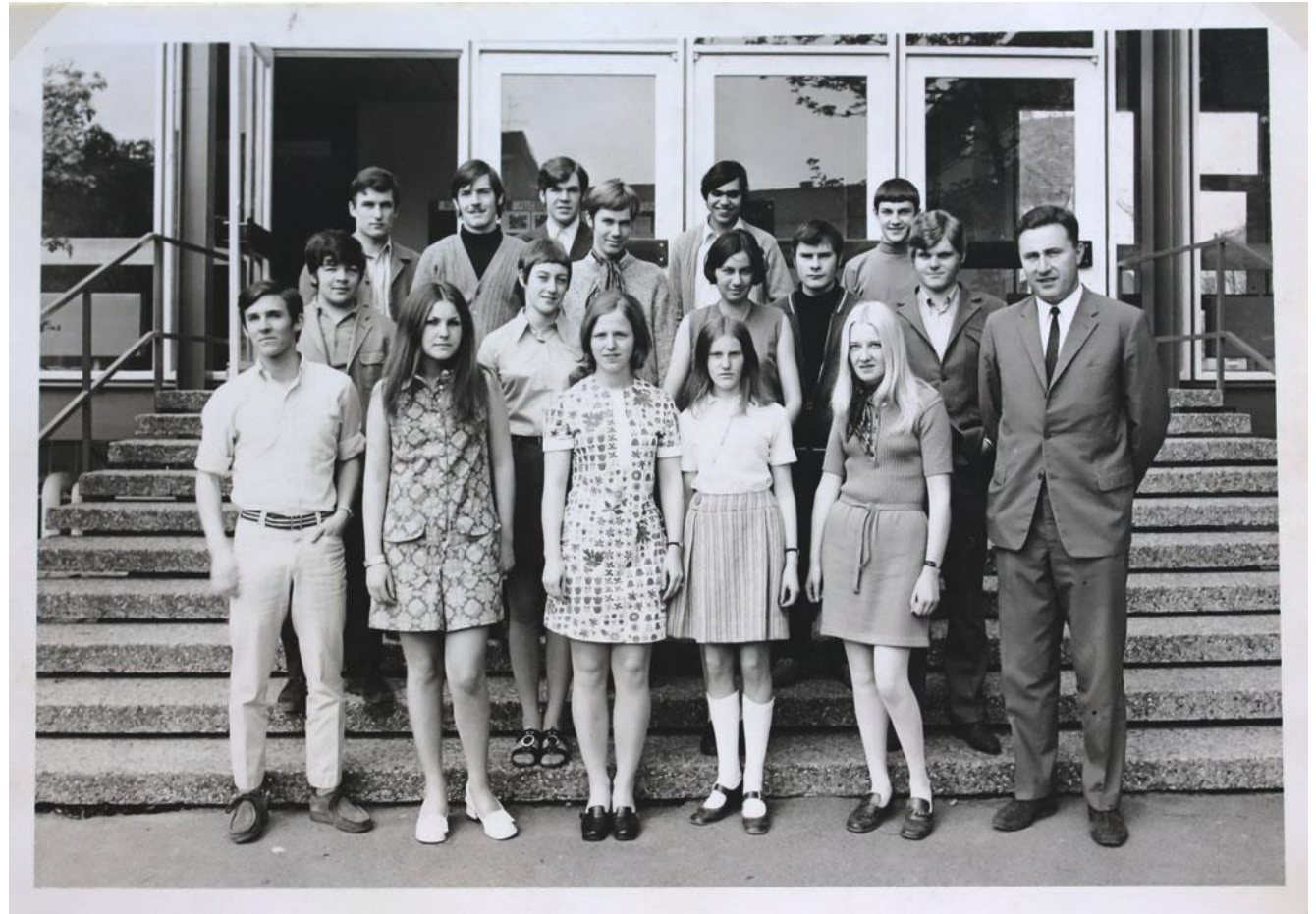
Identifiable Individuals

Are these identifiable individuals?

Sure!

*Identity based on individual **life**, discreteness, ability to act **willingly**.*

Conjugated twins??





Identifiable Individuals

Are there identifiable individuals?

Of course,

*Each leaf belongs to a living tree,
with an individual **identity**,
well-defined begin and end of
life...*

*(but some trees may form **larger**
individuals!)*





Identifiable Individuals

Is this one tree or two?

The dead wood of the **one trunk** connects above ground now **two** separate sap systems, **two living beings**.

Both views are justified, purposeful and **objective**.

...on the same matter!!





Identifiable Individuals

Are these identifiable individuals?

Products:

Identity based on **purpose**,
utility and continuity of **form**.

They are “made for”,
“used for”,
become “useless”,
(“**beyond repair**”)





Identifiable Individuals

Are these identifiable individuals?

Each house has his owner.

*But, houses **share walls**, are **transformed, extended, merged, cut,***

***No** monuments authority **has found** a good method to assign individual identifiers to buildings!*

*... we resort to **geometric areas and distances** related to **identifiable individuals** of reference.*

=“epistemic individuation”





Identifiable Individuals

Are there identifiable individuals?

The trees, yes.

*The sea? yes, it's **one thing** that covers 80% of the planet...*

And what about the coast?





Identifiable Individuals

Are there identifiable individuals?

It's just bedrock, **one thing** down to Australia.

Still(!) you can go to this part and verify my close-up.

There is stability of form and **slow change**, similar but **never identical**, no natural boundaries

But it's **individuality** is that of **my photo!**

...or we approximate it by **geometric distance** to **identifiable individuals**.

=**"epistemic individuation"**





Identifiable Individuals

Are there identifiable individuals?

...and then the beach!

Here are a lot of individuals (*material coherence*), but **when** they have become it, and when they still will be, we have **no natural concept** for (“fiat in time”).

And they are **too many**, in general **irrelevant**.

Too many to compute a behavior.

But what means “the beach has changed?”





Identifiable Individuals

Are there identifiable individuals?

*This may change completely the concept of **what kind of** entity the pebbles are, their **duration of existence**...*

But left on the beach, they will become normal pebbles eventually.

Note that the same matter can be different objects for some time.

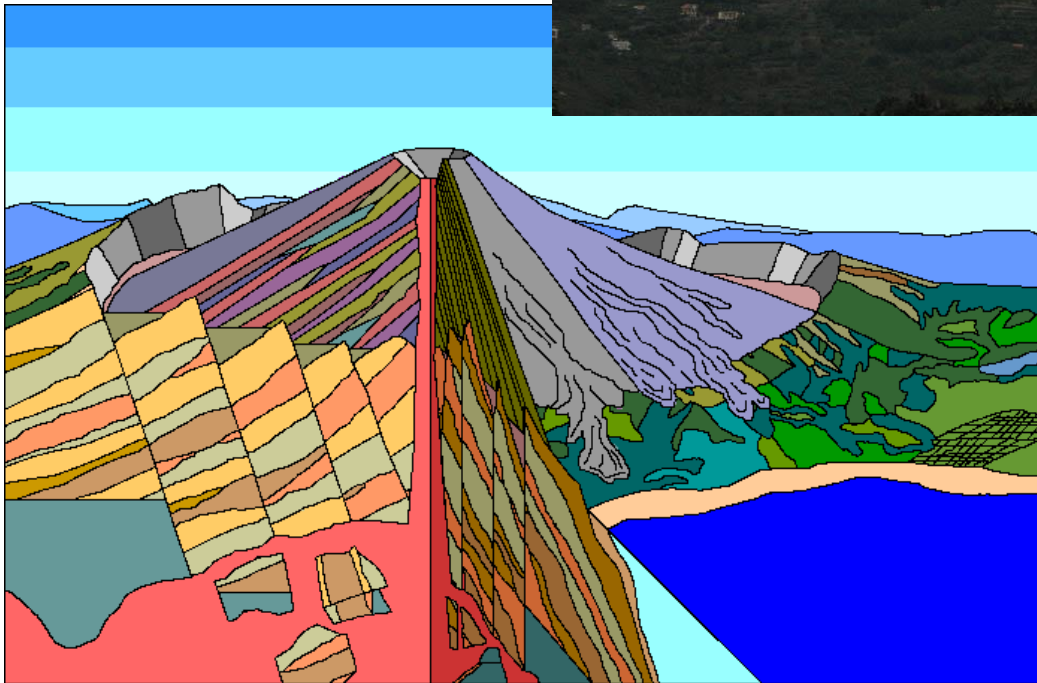




Identifiable Individuals

Overlapping Identifiable Individuals

“Same mountain” as **two**
(or more) identifiable individuals
with **different extents**,
and conditions of **existence** .





Identifiable Individuals

Are these identifiable individuals?

How many clouds do you see?

*Fuzzy concentration, **no stability of form,***

*and yet, **predictable** patterns!*

Situations dominated by patterns,

*...but no identifiable individuals, and **no interest** in the individual!*

(This nearly ideal photo of “individual clouds” demonstrates the limits of individuality in nature)





Identifiable Individuals

Are these identifiable individuals?

How many clouds do you see here?

*and yet, **predictable** patterns!*

*..or two UFOs?
(stable for hours)*

*The “**lens clouds**” exhibit
individuality for a short time.*

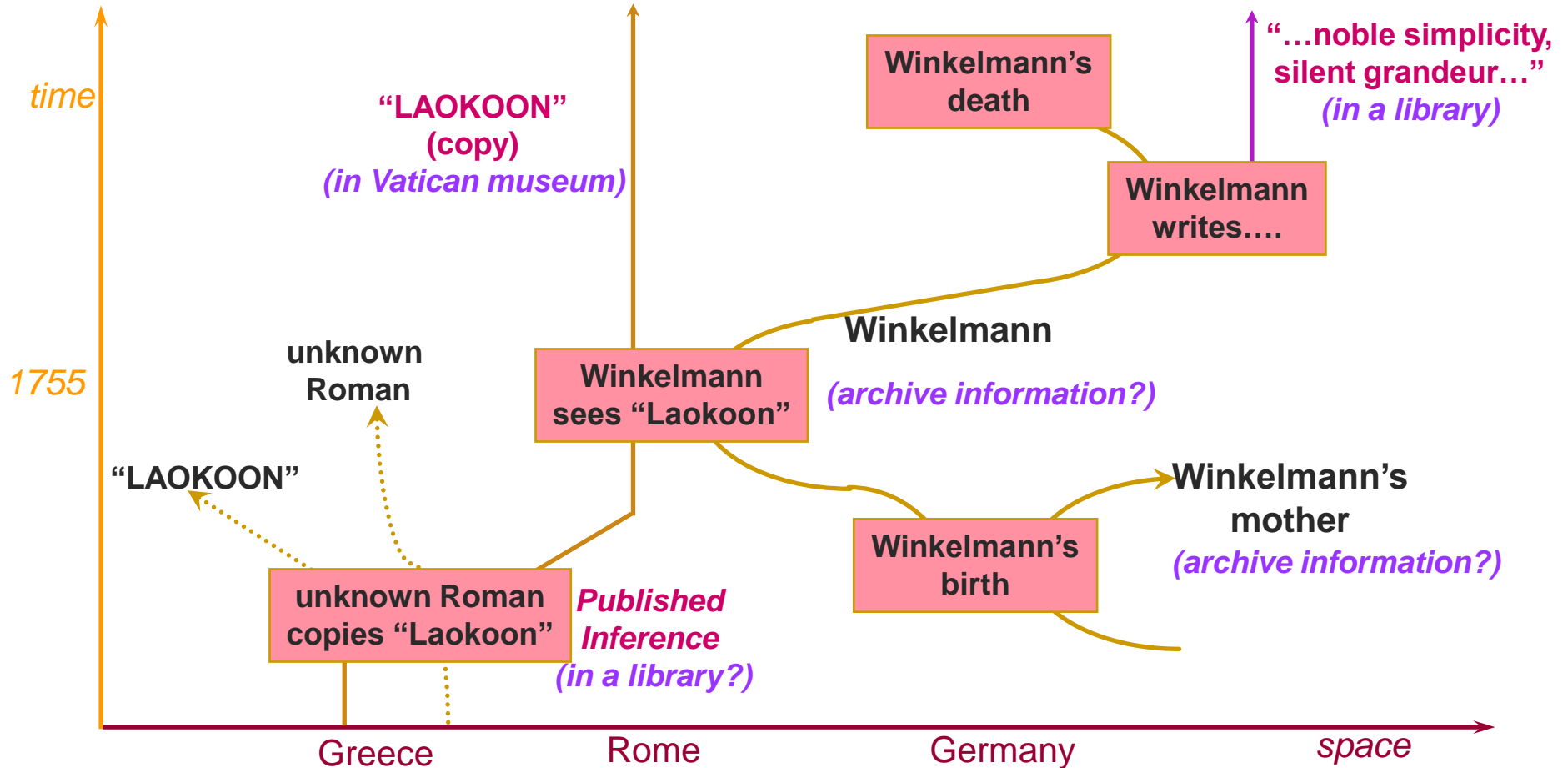




Identifiable Individuals

Going to Events:

“events” close the gaps between the individuals





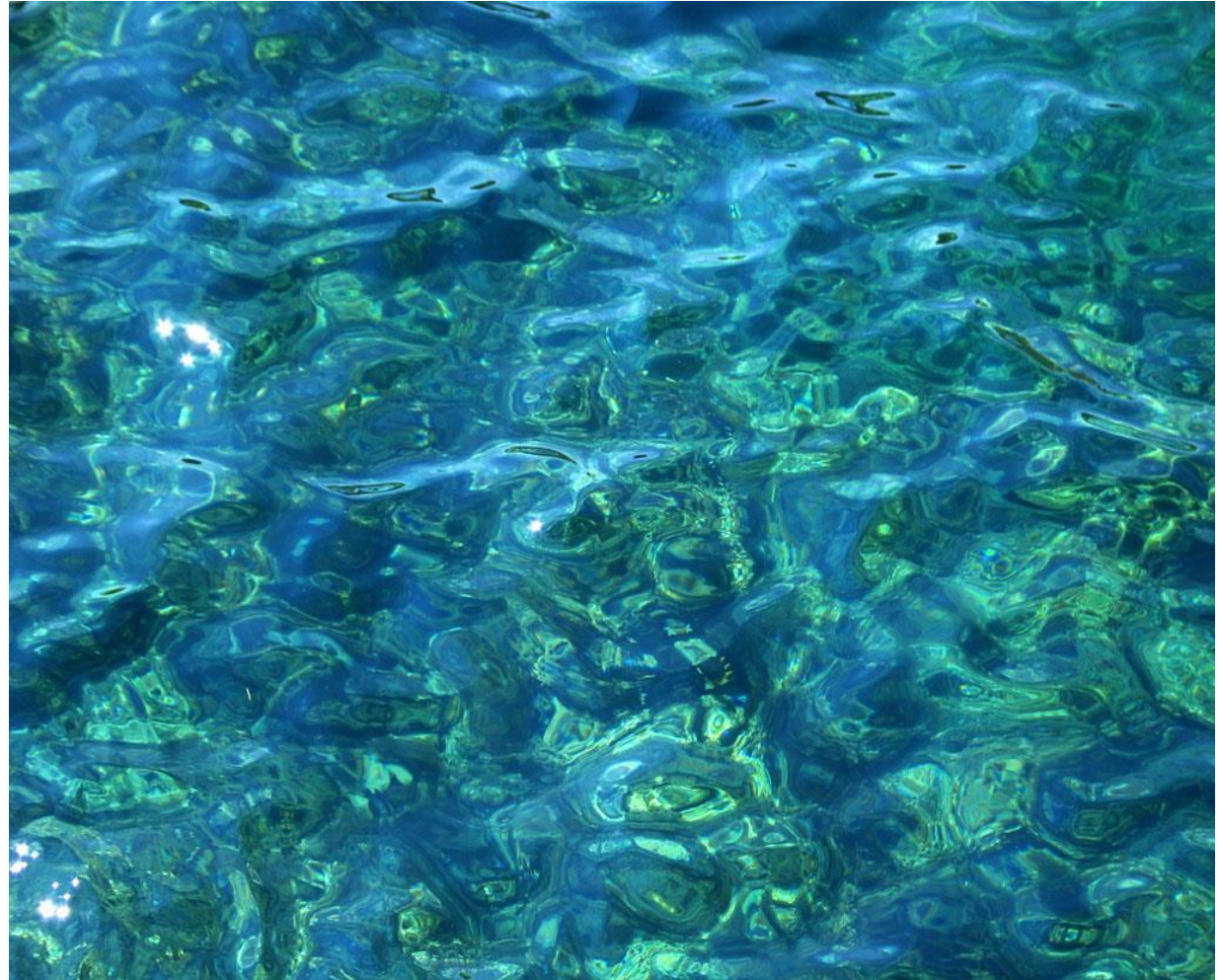
Identifiable Individuals

Are there unambiguous properties ?

What is the color of the sea -
blue?

The color of the forest - green?

Properties also comprise
value-ranges and variations





Identifiable Individuals

What describe propositions of the world?

Reality: *is all material interactions and their constituents in the sense of physics plus the yet unknown ones – that occur uniquely in the present and form the past – making observations potentially comparable (including mental processes)*

Only **a very small part of reality** can be described as useful entities with particular, natural, individual identity connected by predicates (facts). The granularity and complexity of reality **exceed any capacity** of knowing and describing.

All Individuals and predicates (relationships) can be seen only as “**containers**” and **value intervals** encapsulating (constraining) **fuzziness, roughness, individual variation**, all details of **no interest**, describing phenomena of **relative stability in time**

Events “close the gaps” between **determinate existences or states**. They are containers of processes. They are equally **fuzzy in spacetime**.

Functionality determines the useful kinds of “areas of encapsulation”. Precise ontological distinctions therefore depend on functionality.

We claim:

The class & predicate definitions are **NOT** arbitrary or subjective, they are **functional**.



Identifiable Individuals

Why do we describe with propositions?

Tut Ankh Amun: Died in 1323BC. He is in Cairo. Does he rule in Cairo? A Computer Tomography could clarify his deadly wound. Did the Egyptians have CT?

Possible definitions of a human being:

- *Conception to clinical death*
- *Conception to dissolution of body*
- *Birth to clinical death*
- *Initiation event to 3 days after death*

The **total of matter** of my body at 22/5/2016 16:31 pm **is not me**, but may help forensics!

A Bottle: When does **a bottle** with an urine sample **stop to exist**, and when a bottle of **sample urine**? (six different urine samples Armstrong provided during the 1999 Tour tested positive for the performance-enhancing drug EPO when examined in 2004 by a French lab fine-tuning EPO testing.) Therefore, we should not ask, “What is a bottle?” But “**what do you do with these bottles?**”.

The surprise:

Different classes often define **materially overlapping individuals**, rather than complementary building blocks.



Identifiable Individuals

Why do we describe with propositions?

Individual identities function as common fix points of reference to reality in our communications for things that are sufficiently stable and confined.

The class & predicate definitions are **NOT arbitrary or subjective**. They are not personal, not even disciplinary or “domain specific”. **Anybody can understand** them.

They are **effective** for particular reasoning systems. They allow for **verifiable conclusions and predictions**. Relationships between complementary classes form **patterns for reasoning**. The “**behaviour**” of reality and **goals of discourse** constrain which definitions are functional.

Reality imposes **limitations** on precision and validity of individual identities, which we “encapsulate” in outer or inner **bounds** in order to make **true statements**.

The **propositional form itself** constrains **what can be said** about reality.

There is **no isomorphism** between such propositions and reality, but relations of (likelihood of) **compatibility with observation**. This must change our understanding of ontology and reasoning with facts.

Other methods of reducing the complexity of reality are continuous models and pattern recognition. They are in general not commensurable with individual identities



Identifiable Individuals

Individuals in Information Systems

Information systems instantiating **formal ontologies** or equivalent schemata **rely on relating to identifiable individuals**.

Identifiable individuals must be **instances of class concepts** that carry the respective conditions how to identify them. We call these **identity criteria**.

The **intension** of a concept of individuals is then a sort of **recipe to determine instances** of the concept in reality.

A **class concept of things of reality** should be **useful** for something; it must have a function in a discourse, pursuit and/or survival, beyond merely grouping some things or phenomena.

If a concentration of phenomena **qualifies as instance** of a concept of individuals, **we expect a potential/behavior** of the instance implied by the concept.

The **function** of the concept of individuals is the **ability to conclude from intension to potential**.

A concept is “**good**”, when it **constrains well potential properties** of interest to a **subset** of reality.



Identifiable Individuals

What makes up the Intension?

We propose an “anatomy of intension” :

1. *substance: What kind of stuff is it made of?*
2. *classification: how to recognize something as an instance of the concept?*
3. *identity criteria: Is it one or two? Is it still the same?*
4. *unity: How to decide if something is part of its extent (Guarino et al.)*
5. *existence: How does it come into existence, how does it end*

Note:

Do not to confuse identity criteria with *identification criteria* or with *classification*

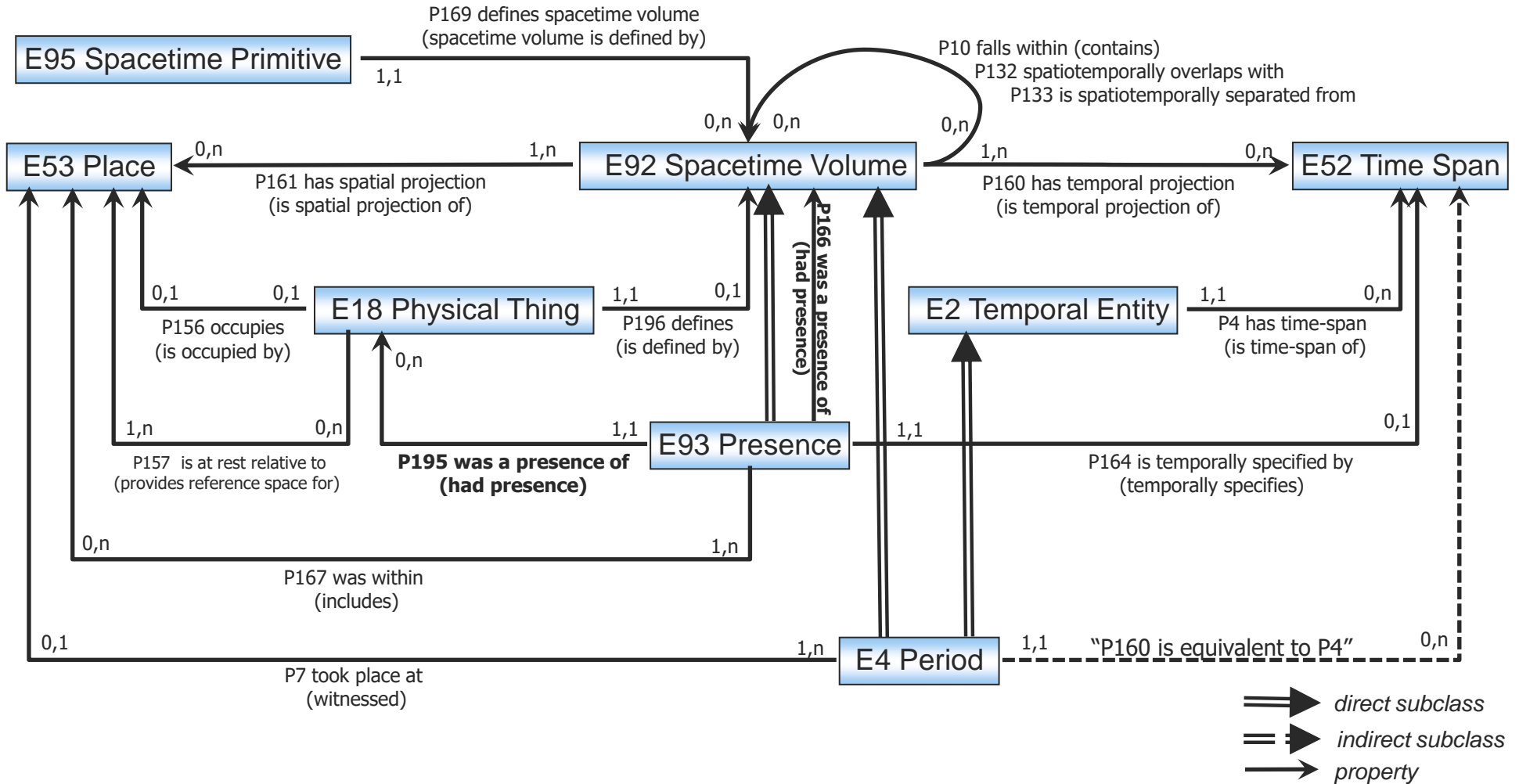
Do not confuse *description* with the described

Do not confuse *mental representation* with the represented



Identifiable Individuals

Application: Spacetime Disambiguation



CRMgeo for Gazetteers

Application:

Spatiotemporal Disambiguation of Geographical Features

1. *Gazetteers identify Phenomena of ontological existence*
2. *Phenomena have a natural (“phenomenal”) extent in spacetime, a “Spacetime Volume”.*
3. *This extent is unambiguous, if they are defined as **identifiable individuals**.*
 - *„Rome“ is not an identifiable individual, but*
 - *the administrative area of „City of Rome“ is one, adequately including continuity between changing political systems.*
 - *the settled area of Rome is one, adequately defining density etc. and continuity over time.*
4. *Using the Spacetime Volume as reference for a place, we need **a time of reference**.*
5. *Phenomena can be enclosed spatiotemporally by Declarative Spacetime Volumes. These approximations **are different from** the actual phenomenal (and often fuzzy, rough, etc.) extent, they are **epistemic individuations!***
6. *Giving a time of reference, an approximation of the place can be computed from the narrowest **known projection** of the declarative approximation.*

Place Phenomenon Types for Disambiguation

Studying Alexandria Gazetteer place types, we propose that the following 8 categories are sufficient for providing the identity criteria necessary for the disambiguation of most of gazetteer contents.

- A. Areas characterized by **surface coverage** (vegetation, glaciers)/ by geological **formation** (continent, mountain)/ by **water** coverage or flow/ by building **construction**.*
- B. Areas characterized by **residence** of a cultural Group (city, tribe, language),*
- C. By **geopolitical** claim (state, protection zone)*
- D. By **consideration** (maps, areas of interest, probably irrelevant).*
- E....ongoing /past : Applies to every category.*

*A-D define the **identity of the trait** that allows for **the unique spread of the phenomenon in space-time**.*

*E: If „past“, a **maximal extent** exists. If „ongoing“, a maximal extent of the **last known state** exists..*



Identifiable Individuals

Conclusions

All phenomena, signals and the mechanisms of perception belong to reality.

*Describing the world as propositions relating identifiable individuals (“factual knowledge”) is an approximation of an **ever changing reality**, limited to kinds of phenomena of **relative stability** and **confinement**.*

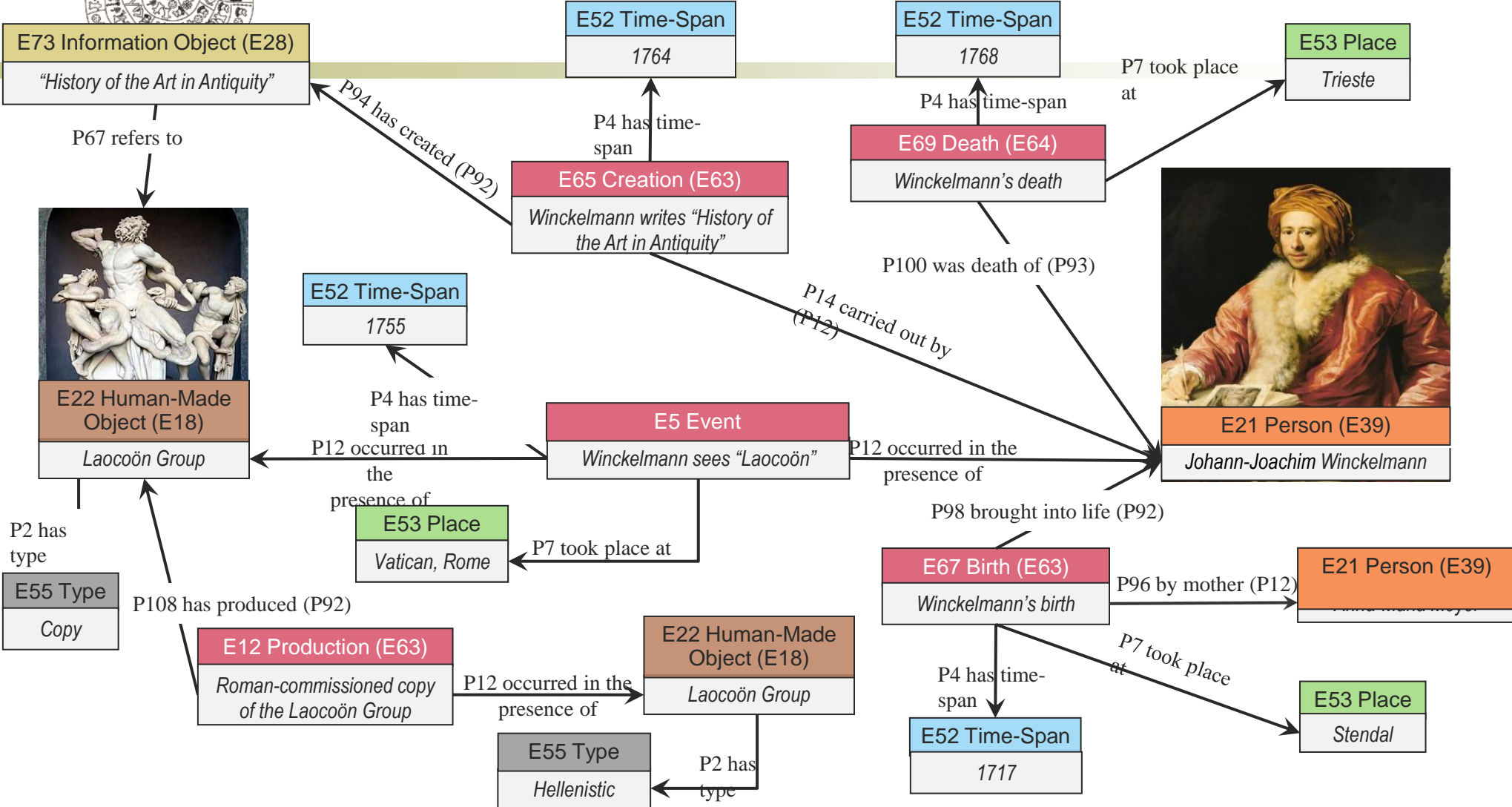
*Individual identities **function** as common **fix points of reference to reality** in our **communications** for things that are **sufficiently stable and confined**, (and fluent phenomena in relative position to them).*

*The **function of classes** is to conclude from **intensional** properties on **potential** properties.*

*By sufficiently **wide bounds**, statements **become comparable and true**, but there are in general **no exact identity conditions** between referents and reality*

***Logical reasoning** on KR quickly **fails**. KR needs to be evaluated on a basis of **compatibility** with assumed **laws** of reality, **likelihoods** and **plausibility**.*

Identifiable Individuals





Identifiable Individuals

Correspond propositions to the world?

Kant, Immanuel (2011-03-16). Kritik der reinen Vernunft (Erste Fassung 1781) (German Edition) (Kindle Locations 1165-1179): „Erscheinungen sind die einzigen Gegenstände, die uns unmittelbar gegeben werden können, und das, was sich darin unmittelbar auf den Gegenstand bezieht, heißt Anschauung. Nun sind aber diese Erscheinungen nicht Dinge an sich selbst, sondern selbst nur Vorstellungen, die wiederum ihren Gegenstand haben, der also von uns nicht mehr angeschaut werden kann, und daher der nichtempirische, d.i. transzendente Gegenstand = X genannt werden mag. Der reine Begriff von diesem **transzendentalen Gegenstande**, (der wirklich bei allen unsern Erkenntnissen **immer einerlei = X** ist,) ist das, was in allen unseren empirischen Begriffen überhaupt Beziehung auf einen **Gegenstand, d.i. objektive Realität** verschaffen kann.

“The only objects that can be given to us directly are appearances; and the aspect of an appearance that relates immediately to the object is called ‘intuition’. But these appearances are not things in themselves; they are only representations, which in turn have their object—an object that can’t itself be intuited by us, and can therefore be called ‘the non-empirical, i.e. transcendental, object = x. The pure concept of the **transcendental object** (which in all of our cognition is **really one and the same = X**) is that which in all of our empirical concepts in general can provide relation to **an object, i.e., objective reality**”

The *transcendental objects as objective reality*?