Patrick Suppes' <u>Main</u> Contributions to the Philosophy of Language

Stanford University, March 11, 2012

Five main areas of work:

1. Psychology of Language, especially children's acquisition of language
2. Work of a formal linguistic kind, including work on variable.free semantics
3. Language and robots
4. Language and the brain, especially the last twenty years

   Colleen Crangle, Marcos Perreau-Guimares
5. Meaning   Much new last ten years

Meaning

”Three kinds of Meaning” (2007):

(i) Meaning given by formal definition

Unproblematic, but gives rise to logical issues (e.g. indefinability)

(ii) Dictionary meaning

Most words have a large variety of meanings

(iii) Meaning as associations

(iii) Meaning as associations

Lots of associations

Quine: dictionary → encyclopedia

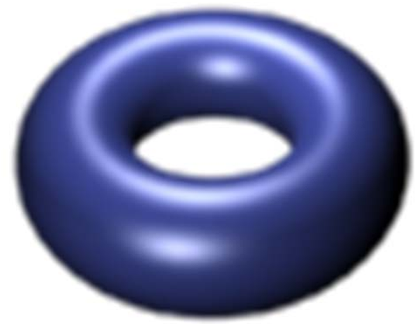
Husserl's *noema* versus Frege's *Sinn*.

Sediments from past experience.

Interests, situation and many other factors

Example: one-holedness

Cup, glass, donut (torus)



Cup, glass, donut (torus)

Congruence

- Sameness of meaning like **congruence** in geometry.
- Felix Klein 1872, Erlanger program: Invariance under transformations
- Carnap: intensional isomorphism
- Pat: Two utterances are **belief congruent** for a person iff one can substitute the one for the other in all belief statements of the person, salva veritate. (Benson Mates.1950)

Charity: Coherent beliefs

One's beliefs should be consistent with one another, at least they should not be obviously inconsistent. No person knows all logical consequences of his/her beliefs.

Jaakko Hintikka, *Knowledge and Belief* (1964):

Surface tautology

Wes Holliday, *"Fallibilism and the Limits of Closure."*

Mental images

Pat. Use of mental images:

Visual, auditory, haptic, tactile

Hume: ”The imagination has the command over all its ideas, and can join, and mix, and vary them in all the ways possible. It may conceive objects with all the circumstances of place and time. It may set them in a manner, before our eyes in their true colors, just as they might have existed.” (*Treatise*, p. 629)

Non-cognitive meaning

- Many associations relate to emotions and other **non-cognitive** features. They too are part of the meaning of expressions.

  (Same in Husserl)

”Rhythm and Meaning in Poetry”

Midwest Studies in Philosophy, 2009

Rhythm in poetry, music and dance.

An example (1943, Pacific, meteorologist):

Tyger! Tyger! burning bright
In the forests of the night.

Rhythm important for performing well in sports.

Biological phenomena exhibit rhythm.

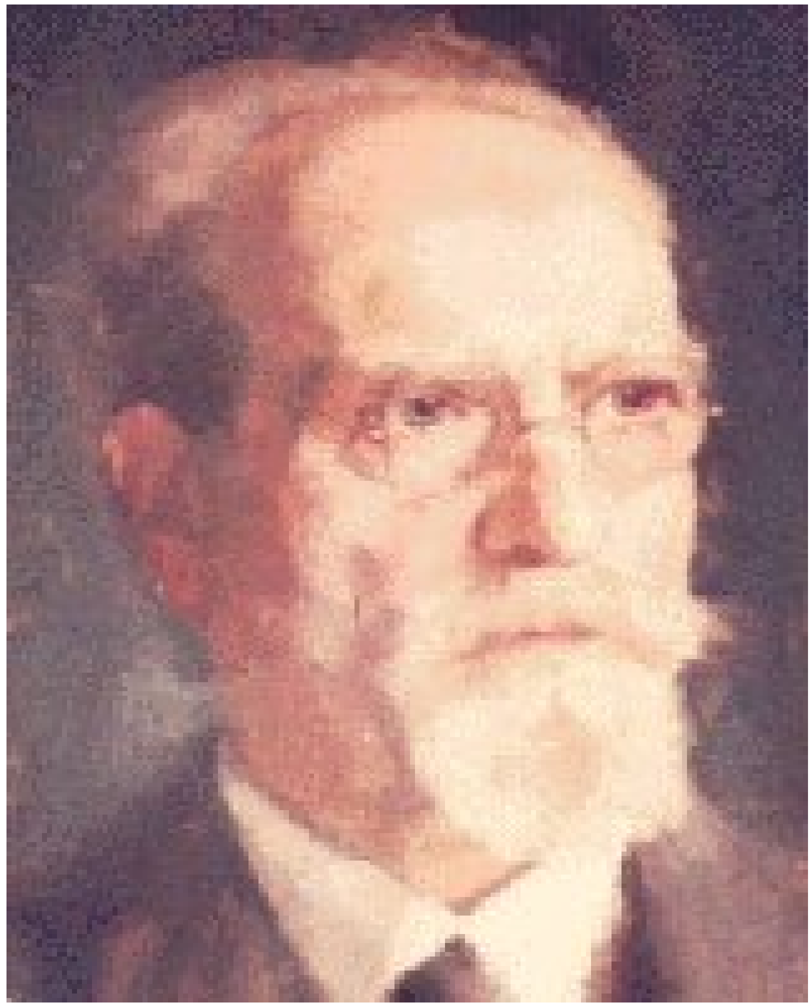
Brain: electromagnetic oscillators

HAPPY

BIRTHDAY!

Edmund Husserl

1859-1938



Kurt Gödel

1906-1978

Outline of the lecture:

1. Background: Gödel and Husserl
2. Husserl: Perception and intuition
3. Gödel: Application of Phenomenology on the two main questions in the Philosophy of Mathematics:

First:

Are there non-material objects?

Husserl and Gödel: a kind of Idealism

Second:

If so, how can we know about them?

1. Background:
Gödel and Husserl

A puzzling passage

That something besides the sensations actually is immediately given follows (independently of mathematics) from the fact that even our ideas referring to physical objects contain constituents qualitatively different from sensations or mere combinations of sensations, e.g., the idea of object itself ... . Evidently, the 'given' underlying mathematics is closely related to the abstract elements contained in our empirical ideas. It by no means follows, however, that the data of this second kind, because they cannot be associated with actions of certain things upon our sense organs, are something purely subjective, as Kant asserted. Rather they, too, may represent an aspect of objective reality, but, as opposed to the sensations, their presence may be due to another kind of relationship between ourselves and reality.

Gödel, 'What is Cantor's continuum problem?', **Supplement**, pp. 271-272

Charles Parsons finds this passage 'quite obscure'

"Mathematical Intuition", *Proceedings of the Aristotelian Society N.S.,* 80 (1979-80), p. 146.

Reference to Husserl

What does Gödel have in mind here?

My proposal: We have to read the passage in view of Gödel's close study of Husserl, which, I will argue, prompted him to add the supplement in the first place. Some evidence for this is given in a sentence that was originally between the last two sentences in the quotation, but which was omitted by Gödel in the published version:

"Perhaps a further development of phenomenology will, some day, make it possible to decide questions regarding the soundness of primitive terms and their axioms in a completely convincing manner."

(*Nachlass* series 4, folder 101, item 040311)

Gödel’s study of Husserl 1959-

Why did Gödel omit this sentence in the published version?

For two reasons, I believe:

(1) Due to his caution in expressing his philosophical views in publication? He always felt that he had to think more about them (Carnap, American Philosophical Society, Gibbs Lecture) (Feferman "Conviction and Caution" (1984)

(2) Inappropriate, there was no room for a presentation or discussion of Husserl or phenomenology in the article nor in the added Supplement.

Yet, I will argue: Gödel’s study of Husserl led to the addition of the supplement when “What is Cantor's continuum problem?” was to be reprinted in Benacerraf and Putnam, *Philosophy of Mathematics: Selected Readings* in 1964.

Works by Husserl owned by Gödel

- ***Logische Untersuchungen.*** Husserliana edition 1968.
  Gödel began his study of Husserl in **1959**.
- ***Ideen***, Book 1. Husserliana edition, 1950.
- ***Cartesianische Meditationen*** und ***Pariser Vorträge.*** Husserliana edition 1963
- ***Die Krisis der europäischen Wissenschaften und die transzendentale Phänomenologie***. Husserliana edition 1962.

All of these books are heavily annotated by Gödel, with the exception of *Logical Investigations*. In the latter were found, however, several pages of Gödel's shorthand notes, referring to page numbers in the text, indicating that Gödel probably had based his study of that text on a borrowed copy. The work was out of print for many years before the 1968 edition was published. The notes indicate that the text Gödel had used was the second edition, which first appeared in 1913-1921 and was reprinted in 1922, 1928 and 1968.

Gödel on Kant and Husserl

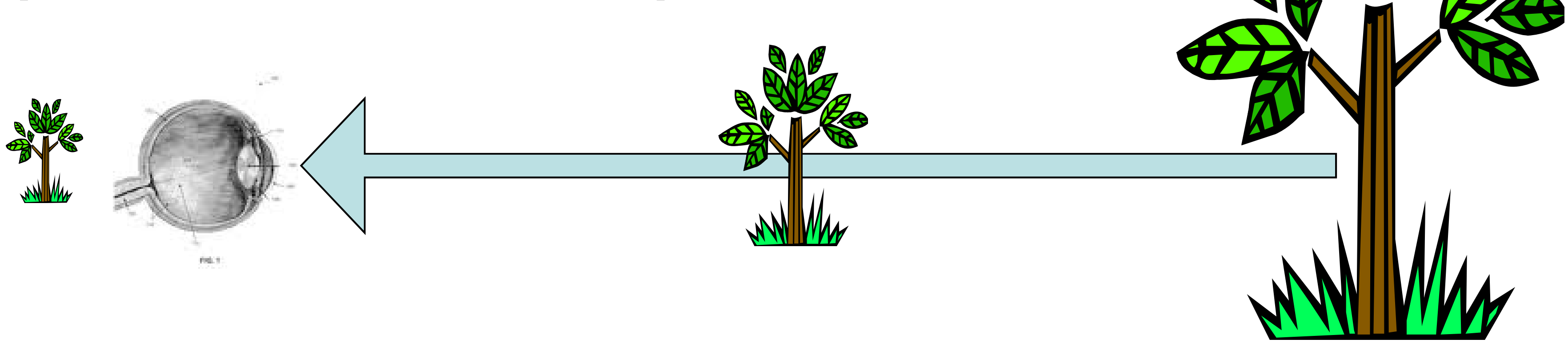
... just because of the lack of clarity and the literal incorrectness of many of Kant's formulations, quite divergent directions have developed out of Kant's thought -- none of which, however, really did justice to the core of Kant's thought. This requirement seems to me to be met for the first time by phenomenology, which, entirely as intended by Kant, avoids both the death-defying leaps of idealism into a new metaphysics as well as the positivistic rejection of all metaphysics. But now, if the misunderstood Kant has already led to so much that is interesting in philosophy, and also indirectly in science, how much more can we expect it from Kant understood correctly?

"The modern development of the foundations of mathematics in the light of philosophy." Unpublished manuscript from late 1961 or shortly thereafter, probably for a lecture that Gödel was invited to give as a newly elected member of the American Philosophical Society, but never gave. Solomon Feferman, ed., *Kurt Gödel: Collected Works*, Vol. III, Oxford: Oxford University Press, 1995, p. 387, pp. 9-10 of the manuscript.

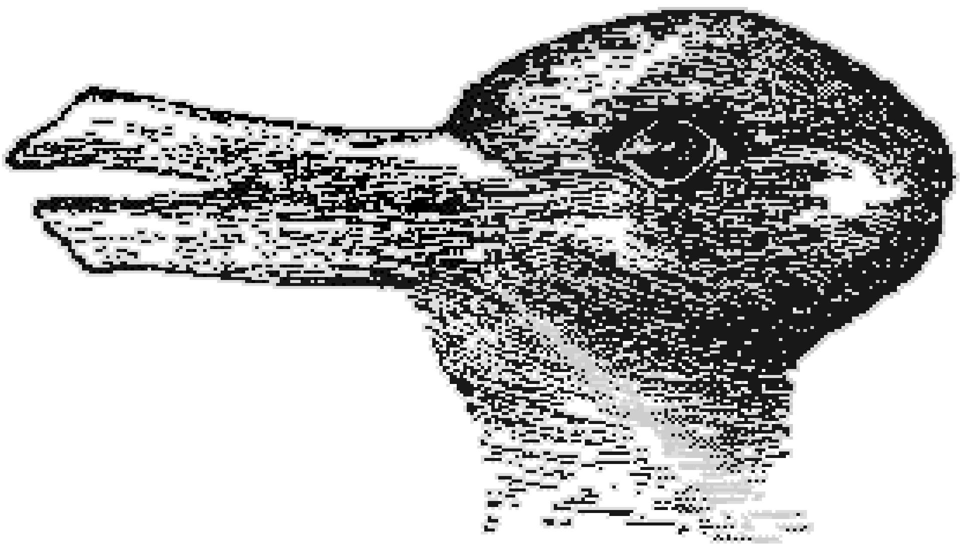
2. Husserl: Perception and Intuition (*Anschauung*)

Traditional view on perception

The physical object **brings about** **changes in the sense organ and we perceive the object. For example, Aristotle: “What has the power of sensation is potentially like what the perceived object is actually” (*De Anima* II 5, 418a 3–6). The sense organ ”receives the sensible form of the thing without the matter …in the way a piece of wax takes on the impress of a signet-ring without the iron or gold” (*De Anima* II 12,424a18f.).**



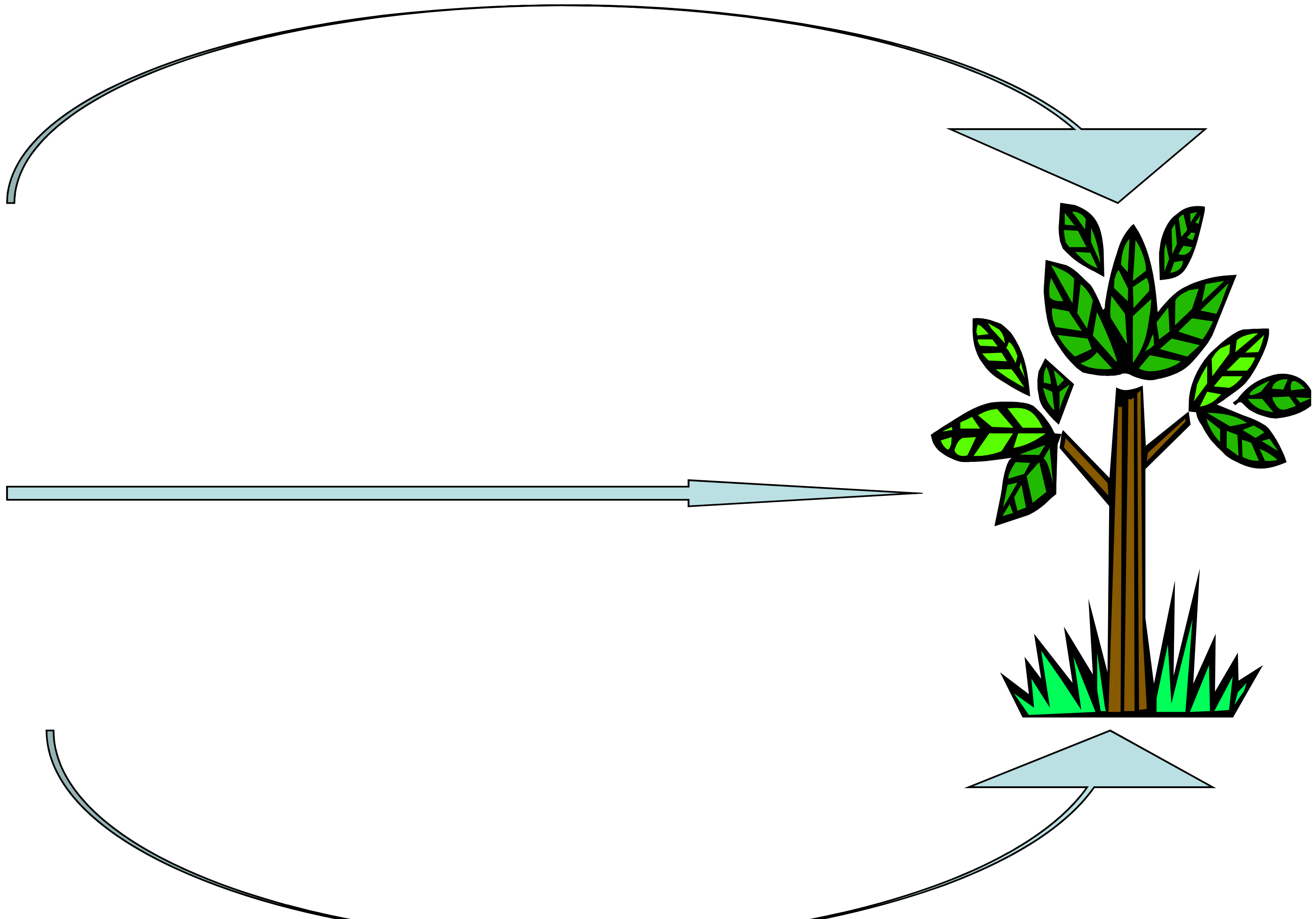
Duck / Rabbit



Wittgenstein: ”Etwas als etwas sehen”

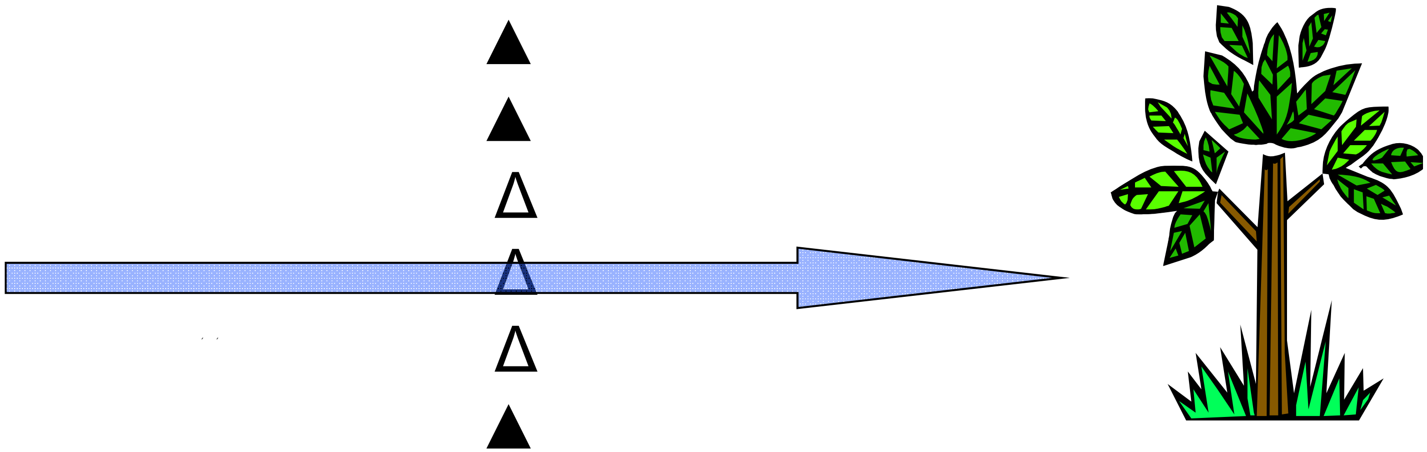
”Anticipations”

Features of object, also other sides, past, present and future (more on this later)



Sensory experience and perception

Perception is constrained by sensory experience

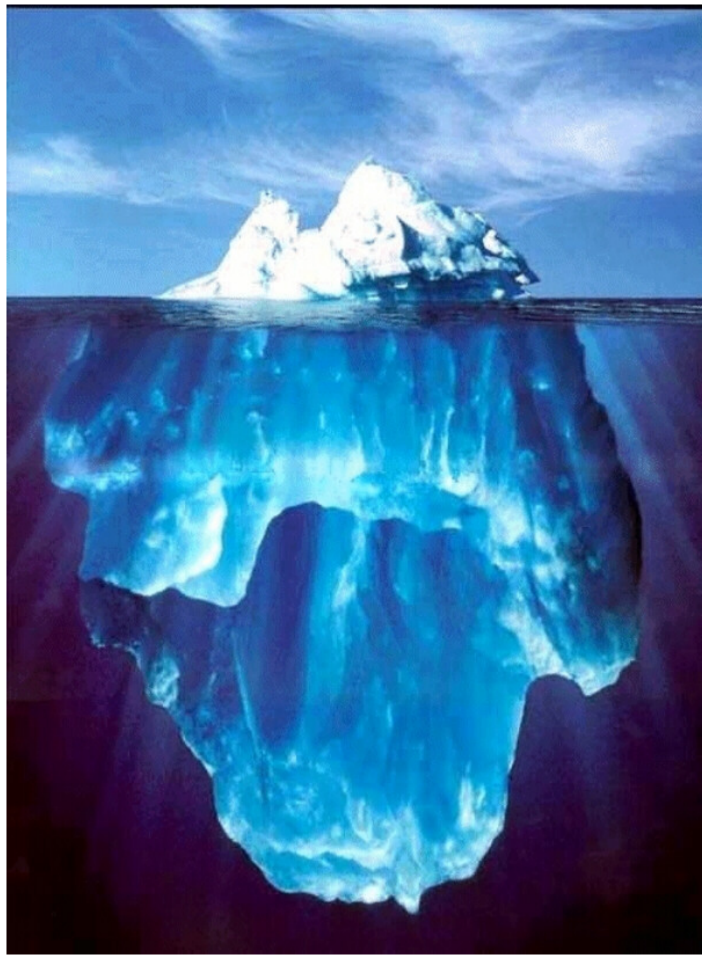


Δ Structure of anticipation compatible with the **sensory experiences**

▲ Structure of anticipation incompatible with the **sensory experience**

(Sartre: Coefficient of adversity)

Iceberg



More on structuring

”Expectations”: Structuring: Habitualities, Sedimentation (Niederschläge), Induction. Not analytic/synthetic. ”A *priori”*

Time: Past, present, future

”Protention and Retention”

Heidegger: ”Extasen der Zeitlichkeit”

New experiences can change our structuring of the past (Policeman example)

Practical usefulness

Values

Bodily settings or „anticipations“ (Merleau-Ponty)

0-point in space (seeing, hearing, acting) John Perry

The other, intersubjectivity

- **The other**
- **Einfühlung**
- **Intersubjectivity**
- **Ethics**

Constitution of the Objektive world

(Against relativism)

Direct experience

Sense data – objects

Movements – actions

Bodies – persons

”Behaviorism”

Eidos (Wesen, essence)

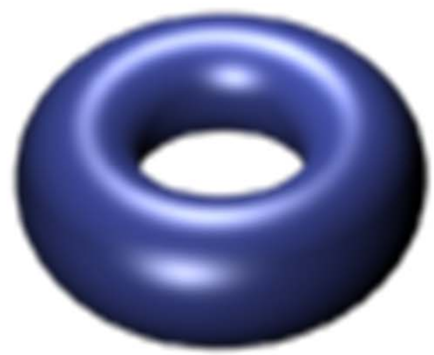
=

General features

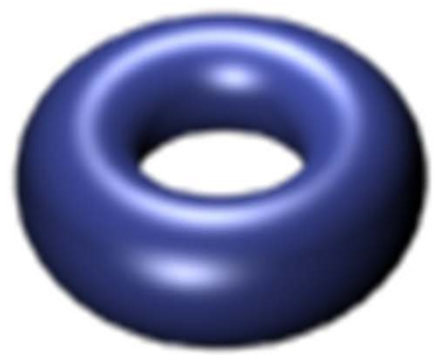
(not individual essences)

Triangularity

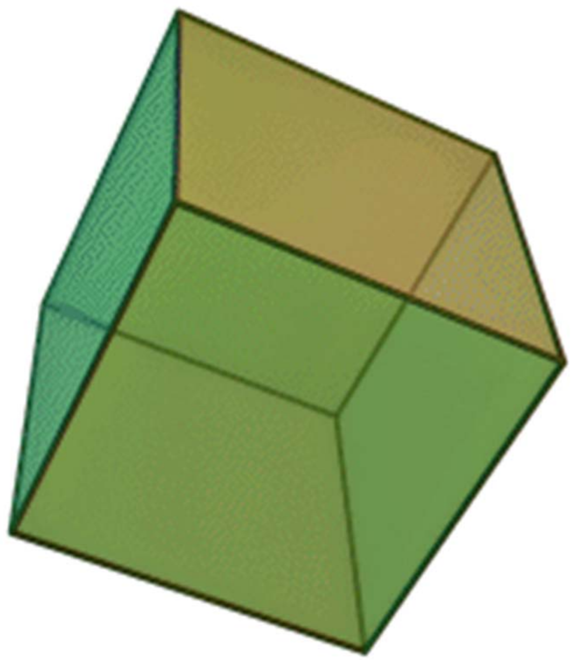
Cup, glass, donut (torus)



Cup, glass, donut (torus)



Moving cube



Are these knots the same?

?

↔

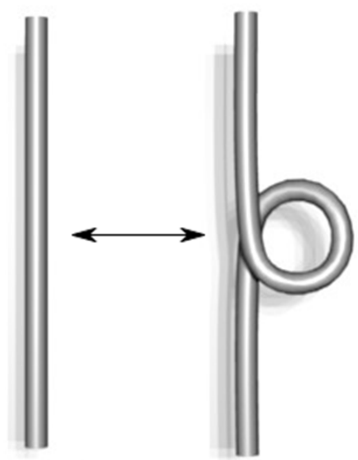
Theory of Knots

The three kinds of movements ("Reidemeister Movements")

Typ I

verdrillen

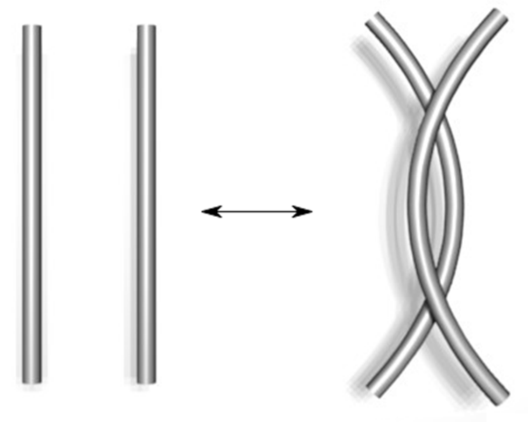
entdrillen



Typ II

über oder

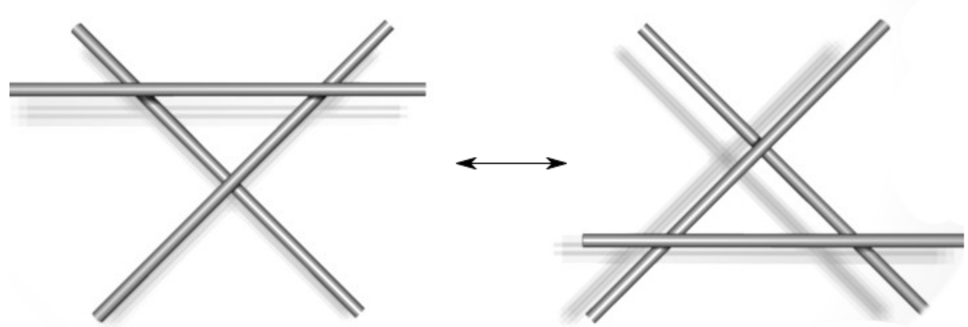
unter



Typ III

nach der anderen

Seite einer Kreuzung



Kurt Reidemeister (1893-1971)showed in 1927 that two knot diagrams gezeigt, dass zwei Knots are the same when and only when the one can be changed into the other through a finite series of what we now call Reidemeister Movements.

One kind of eidos: Concepts

Examples:

Continuity.   Bolzano, Weierstrass

DIFFERENT FROM

Continuum hypothesis

Gödel 1938, Cohen 1963

Various kinds of continuity

(Feferman‘s Structuralism)

Mechanical computability 1936

Turing (1912-54) Gödel’s favorite example

Intuition

intuition

- **perception** — **physical thing**
  - **e.g.: duck/rabbit, cup**
- **essential insight** — **essence (eidos)**
  - **e.g.: one-holedness, two-holedness, three-holedness**
  - **triangularity**

Thank you!

Quine on reification

Quine in interview with Giovanna Borradori in 1994:
"I recognize that Husserl and I, in very different ways, addressed some of the same things."

Twentieth-Century Logic," *Dialogue*, p. 64

As Donald Campbell puts it, reification of bodies is innate in man and the other higher animals. I agree, subject to a qualifying adjective: *perceptual* reification (1983). I reserve '*full* reification' and '*full* reference' for the sophisticated stage where the identity of a body from one time to another can be queried and affirmed or conjectured or denied independently of exact resemblance. [Distinct bodies may look alike, and an identical object may change its aspect.] Such [discriminations and] identifications depend on our elaborate theory of space, time and of unobserved trajectories of bodies between observations.

Quine 1995, "Reactions," page 6 of the manuscript. The italics are Quine's. Later printed, with small changes, in Paolo Leonardi and Narco Santambrogio, eds., *On Quine*, Cambridge: Cambridge University Press, 1995, p. 350.

Identity versus similarity

	identical	distinct (non-identical)
similar		
different		

3. Gödel: Application of Phenomenology on the two main questions in the Philosophy of Mathematics: The existence and knowability of mathematical objects

Platonism

It seems to me that the assumption of such objects is quite as legitimate as the assumption of physical bodies and there is quite as much reason to believe in their existence. They are in the same sense necessary to obtain a satisfactory system of mathematics as physical bodies are necessary for a satisfactory theory of our sense perceptions and in both cases it is impossible to interpret the propositions one wants to assert about these entities as propositions about the "data", i.e. in the latter case the actually occurring sense perceptions.

Gödel, "Russell's mathematical logic", in Paul Arthur Schilpp, ed.,: *The Philosophy of Bertrand Russell* (The Library of Living Philosophers), OpenCourt, La Salle, Ill., 1944, p. 137, reprinted in Benacerraf and Putnam 1964 and in Feferman 1990. My emphasis.

Inductive methods in mathematics

If mathematics describes an objective world just like physics, there is no reason why inductive methods should not be applied in mathematics just the same as in physics. The fact is that in mathematics we still have the same attitude today that in former times one had toward all science, namely we try to derive everything by cogent proofs from the definitions (that is, in ontological terminology, from the essences of things). Perhaps this method, if it claims monopoly, is as wrong in mathematics as it is in physics.

Gödel's Gibbs lecture to American Mathematical Society: "Some Basic Theorems on the Foundations of Mathematics and their Implications" (Dec 1951), Kurt Gödel, *Collected Works, Vol. III. Unpublished essays and lectures*. Oxford University Press, Oxford, 1995 (S. Feferman et al. editors), p 313.

Mathematical objects and physical bodies

the question of the objective existence of the objects of mathematical intuition (which, incidentally, is an *exact replica* of the question of the objective existence of the outer world)...

.

Gödel, "What is Cantor's continuum problem?" Supplement added for the reprint in Benacerraf and Putnam, *Philosophy of Mathematics: Selected Readings,* 1964, p. 272. My emphasis.

Mathematics: discovery, not invention

Intuition 1

The similarity between mathematical *intuition* and a *physical sense* is very striking. It is arbitrary to consider "this is red" as an immediate datum, but not so to consider the proposition expressing modus ponens or complete induction (or perhaps some simpler proposition from which this latter follows). For the difference, as far as is relevant here, consists solely in the fact that in the first case a relationship between a concept and a particular object is perceived, while in the second case it is a relationship between concepts.

"Is mathematics syntax of language?" Unfinished essay (1953) for the Carnap volume in Schilpp, *Library of Living Philosophers,* manuscript, pp. 6-7, Solomon Feferman et. al. (eds.): *Collected Works of Kurt Gödel*, Vol. III, Oxford University Press, Oxford, 1994, p. 359.

Intuition 2

But despite their remoteness from sense experience, we do have something like a *perception* of the objects of set theory, as is seen from the fact that the axioms force themselves upon us as being true. I don't see any reason why we should have less confidence in this kind of perception, i.e., in mathematical *intuition*, than in sense perception, which induces us to build up physical theories and to expect that future sense perceptions will agree with them.

Gödel, "What is Cantor's continuum problem?", Supplement added for the reprint in Benacerraf and Putnam, *Philosophy of Mathematics: Selected Readings,* 1964, p. 271.

Intuition 3

It should be noted that mathematical intuition need not be conceived of as a faculty giving immediate knowledge of the objects concerned.

"What is Cantor's Continuum Problem" (1964), Collected Works, Vol. III, p. 271.

[The explication of the content of the general concept of set] may involve a very great (perhaps even an infinite) number of actually realizable independent rational perceptions.

"Is Mathematics Syntax of Language?" (Version III), footnote 43.)

[The] "direct perceptibility of mathematical objects" is one of the reasons for asserting their existence.

(*Ibid*., footnote 45.)

Note: Direct, but not immediate.

German: unvermittelt (direkt),

aber nicht unmittelbar (umgehend, sofort)

Constraints

... the activity of the mathematician shows very little of the freedom a creator should enjoy. Even if, for example, the axioms about integers were a free invention, still it must be admitted that the mathematician, after he has imagined the first few properties of his objects, is at an end with his creative ability, and he is not in a position also to create the validity of his theorems at will. If anything like creation exists at all in mathematics, then what any theorem does is exactly to restrict the freedom of creation. That, however, which restricts it must evidently exist independently of the creation.

Gibbs lecture, originally unpublished. Now in Solomon Feferman et. al. (eds.): *Collected Works of Kurt Gödel*, Vol. III, Oxford University Press, Oxford, 1994, p. 314.

Gödel on evidence

1. Elementary consequences

it can be proved that these axioms also have consequences far outside the domain of very great transfinite numbers, which is their immediate subject matter: each of them, under the assumption of its consistency, can be shown to increase the number of decidable propositions even in the field of Diophantine equations.

Gödel, "What is Cantor's Continuum Problem," 1964, p. 264

2. *“Success”*

a probable decision about its truth is possible also in another way, namely, inductively by studying its “success.” Success here means fruitfulness in consequences, in particular in *verifiable* consequences, i.e. consequences demonstrable without the new axiom, whose proofs with the help of the new axiom, however, are considerably simpler and easier to discover, and make it possible to contract into one proof many different proofs. The axioms for the system of real numbers, rejected by the intuitionists, have in this sense been verified to some extent... .

Gödel, “What is Cantor's Continuum Problem,” 1964, p. 265

Examples of Success

Gödel mentions Non-standard analysis

- **Commentary to Abraham Robinson, 1973. "there are good reasons to believe that nonstandard analysis, in some version or other, will be the analysis of the future."**
- **Since this commentary is somewhat technical, I will not go into this now.**

Another example: Functional analysis

- **Riesz-Nagy, *Leçons d'analyse fonctionelle (1952)*.**

Béla Nagy 29/7-1913 – 21/12 1998, Frigtessel Riesz

3. Clarification

it may be conjectured that the continuum problem cannot be solved on the basis of the axioms set up so far, but, on the other hand, may be solvable with the help of some new axiom which would state or imply something about the definability of sets.

Gödel, "What is Cantor's Continuum Problem",
Main text, written 1947, Page 266 in the Benacerraf and Putnam 1964 reprint.

(Gödel: consistency 1938, Paul Cohen: independence 1963)

4. Systematicity

it turns out that in the systematic establishment [*Aufstellen*] of the axioms of mathematics, new axioms, which do not follow by formal logic from those previously established, again and again become evident. It is not at all excluded by the negative results mentioned earlier [incompleteness] that nevertheless every clearly posed mathematical yes-or-no question is solvable in this way. For it is just this becoming evident of more and more new axioms on the basis of the meaning of the primitive notions that a machine cannot imitate.

Gödel 1961, page 9 of manuscript
("The modern development of the foundations of mathematics in the light of philosophy," which starts with the praise of Husserl.)

Related problems and applications

The examples I have given came from

Set theory, Aritmetic, Topology and

Functional analysis.

Here a couple of examples from Proof theory:

When is a proof informative?

When do we have two proofs, when only

variants of the same proof?

Dana Scott, Paul Cohen:

Independence of the continuum hypothesis

George Boolos: JSL

Other fields, outside mathematics, where structure matters:

Music: The difference between originality and plagiarism

in music. (Lawrence Ferrara, chair NYU Dept. of Music)

Searle on Construction of Social Reality

[T]here are portions of the real world, objective facts in the world, that are only facts by human agreement. In a sense there are things that exist only because we believe them to exist. ... things like money, property, governments, and marriages. Yet many facts regarding these things are 'objective' facts in the sense that they are not a matter of [our] preferences, evaluations, or moral attitudes.

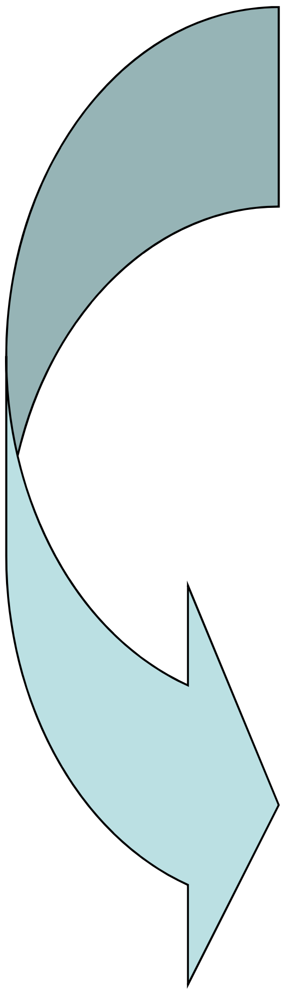
J.R. Searle, *The Construction of Social Reality*,
Free Press, New York., p. 1

Feferman: He might well have added board games to the list of things that exist only because we believe them to exist, and facts such as that in the game of chess, it is not possible to force a checkmate with a king and two knights against a lone king.

Feferman, "Conceptions of the Continuum," Forthcoming. p. 21

Husserl on eidetic reduction

The eidetic reduction

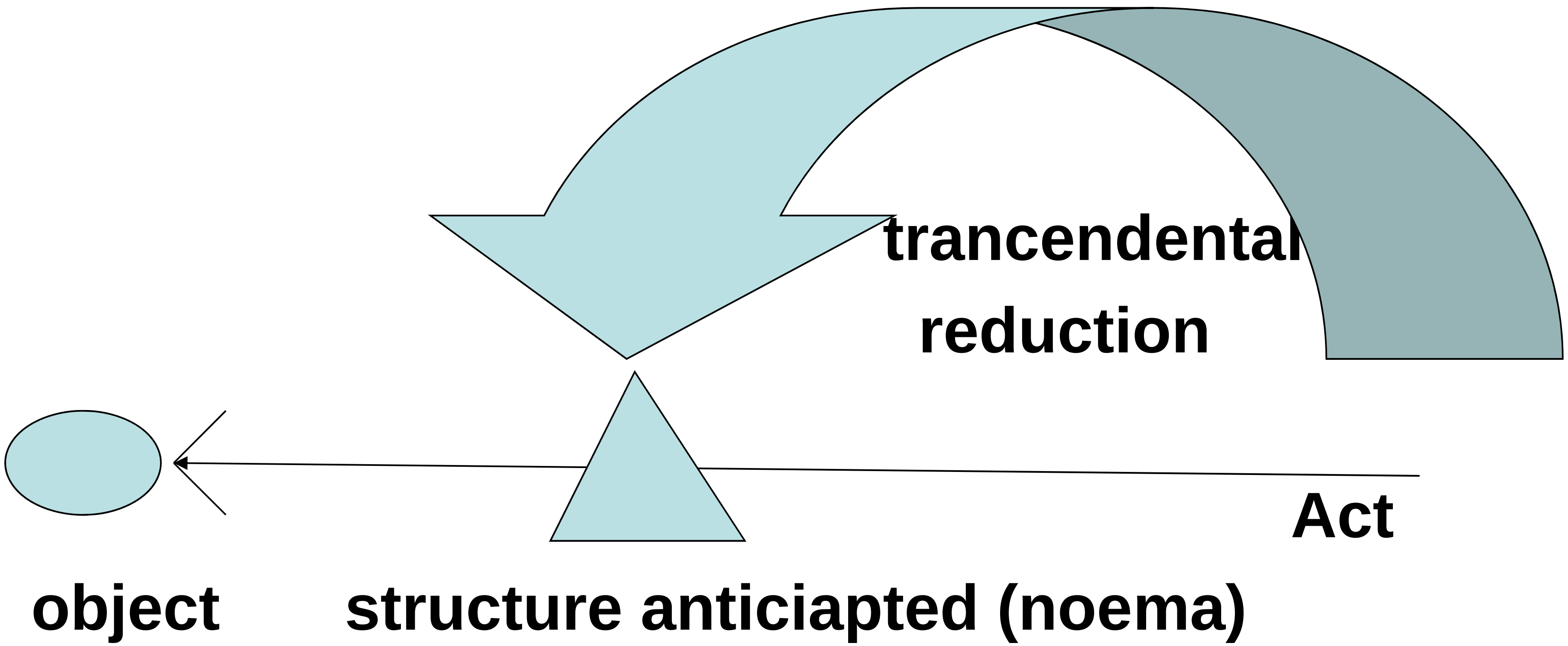


physical thing

general property of a thing
e.g. triangularity, one-holedness, redness

Method of variation (Bolzano)

The transcendental reduction



The two reductions and the four fields of knowledge

transcendental reduction →

	object	**noema**
eide- tic reduc- tion ↓	**physical thing** ***natural science***	***metaphysics***
	eidos ***mathematics***	***phenomenology***

Husserl
on
evidence

Evidence does not require adequacy

As 'evident', then, we designate *consciousness of any kind which is characterized relative to its object as giving this object itself*, without asking whether this self-giving is adequate or not. By this, we deviate from the customary use of the term 'evidence', which as a rule is employed in cases which, rigorously described, are those of adequate givenness, on the one hand, and of apodictic insight, on the other.

(*Erfahrung und Urteil*, § 4, p. 12 = Churchill and Ameriks translation, p. 20. I have translated the German word 'evident' with 'evident' rather than with 'self-evident', as Churchill and Ameriks do. See also *Ideas*, §§ 137-138)

Evidence as self-giving

Evidence is the self-giving of an object in our experience, that is, the object is experienced as being "itself there," and not merely as imagined, conjectured, etc.

To speak of evidence, of evident givenness, then, here signifies nothing other than *self-givenness*, the way in which an object can be characterized relative to consciousness as "itself there," "there in the flesh" – in contrast to its mere presentification (Vergegenwärtigung), the empty, merely indicative idea of it. For example, an object of external perception is given with evidence, as "it itself," precisely in the *actual* perception, in contrast to the simple presentification of it in memory, imagination, etc.

Experience and Judgment, § 4, pp. 11-12
= Churchill and Ameriks translation, pp. 19-20
(The first page references are to the German edition of *Erfahrung und Urteil* at Claassen Verlag, Hamburg, 1964)

»

Solomon Feferman
and
Hermann Weyl
on the continuum

What is the continuum?

On the face of it, there are several distinct forms of the continuum as a mathematical concept: in geometry, as a straight? line, in analysis as the real number system (characterized in one of several ways), and in set theory as the power set of the natural numbers and, alternatively, as the set of all infinite sequences of zeros and ones. Since it is common to refer to *the* continuum, in what sense are these all instances of the same concept? When one speaks of the continuum in current set-theoretical terms it is implicitly understood that one is paying attention only to the cardinal number that these sets have in common. Besides ignoring the differences in structure involved, that requires, to begin with, recasting geometry in analytic terms. More centrally, it presumes acceptance of the overall set-theoretical framework.

Solomon Feferman, ”Conceptions of the Continuum,” Forthcoming. p. 1

Weyl on the continuum

To the criticism that the intuition of the continuum in no way contains those logical principals on which we must rely for the exact definition of the concept "real number," we respond that the conceptual world of mathematics is so foreign to what the intuitive continuum presents to us that the demand for coincidence between the two must be dismissed as absurd. Nevertheless, those abstract schemata which supply us with mathematics must also underlie the exact science of domains of objects in which continua play a role.

Weyl, H. (1918), *Das Kontinuum. Kritische Untersuchungen über die Grundlagen der Analysis*, Veit, Leipzig, p 108