computability
in the light of the Master Argument

the Master Argument

Towards Rehabilitating Opinion as Probable Knowledge of Contingent Things. Aristotle.

„When an Aristotle, an Epicurus, a Carneades or a Plato challenge one or another of the Master Argument's implicit logical premises, they do so in the name of a certain conception of physics and a determinate principle of causality." (p.133)

Cleanthes and Chrysippus, in contesting the argument's first and second premises respectively, were not acting solely as logicians. They also presuppose:

1) a *physical image of the world* and consequently a
2) certain *representation of causality*.

Cleanthes: numerically identical eternal recurrence
the sympathy of connection where there was room left for spontaneity

Chrysippus: confatalia
the constantly renewed order of palingenesis

chance: having their final cause outside of themselves; fortune: effects of chance that can be chosen
fall of the atoms through empty space, causing chance inclinations within determinism (confatalia)
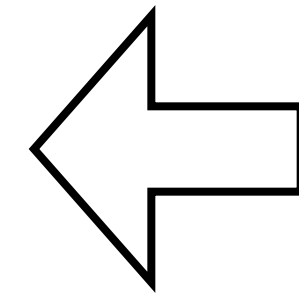*Personified Will behind Fate (which unifies the spiritual movement) (God)*
Personified Tempers and Emotions (as allegorical Gods and mythical figures)

Chance and *fortune*
the *clinamen*
the *specificity of deliberate cause*
and the *specificity of spiritual movement*
.... are all brought in for freedom's sake.

Aristotle postulated *future contingents*

Against Diodorus' definition of the possible as that which must by necessity realize itself in the present or in the future

Aristotle *holds on to the principles of logics* (excludded middle and non-contradiction)

logics depends upon principles that do not operate within a reality, they process the assumptions for reality, i.e. assumptions about space, time, movement, unity, termination, etc. .

He did not want to *reform logics*, he reformed the conditions (*meta*-physics) on which the logical principles (which must account for the phyical order or reality) must *operate.*

future contingents depend upon opinion, and their *truth-value* is probabilistic

this is at least the direction in which the problems with his theory of future contingents might be resolved.

By this, he can *relativize* the principle of bivalence (two-value logic)– yet not by making it fuzzy, smooth, or extend it to more than three values.

> all of these (except the relativization!!) have been popular approaches in the 20th century logics.

Postulate: knowledge of the contingent is constituted by opinion.

> This is a version of *qualitative* probability, not quantitative !

more or less frequent (quantitative)
more or less well (qualitative)

things are affected by being-in-potency

> *capacitiy*, *disposition*, *capability*, and *ability*

„potentiality of being and of not being resides entirely in *things that do not always exist in act*, things that, since *they may be or not be*, the one as well as the other, *may therefore also come to be and not come to be*."

may be „*raised*" or „*awakend*" to actuality!

pay attention to what a difference it makes whether we say „raise" or „awaken"! While in the former we are within the language game of developing an ability through learning (masterhship), in the latter, it is merely about an impuls starting an automatic unfolding and establishing of a capability. The latter does not allow for distinguishing a graduality: either you can ski or you cannot, there is no more or less well, and hence, no qualitative probability but only a quantitative one.

Is this *real* or *virtual*?
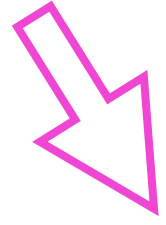
Aristotle's *future contingents, as in the example below*

Aristotle's example of probabilistic truth value based on opinion:

abstraction can accomodate more diversities. abstraction brings relaxation.

A constradiction, if it concerns the accidential, can be treated operationally and can be harvested in the dynamics it unfold – in *ethics*.

theory of the potentiality for contraries

„This garment, for example, *may be cut in two* and yet will not be cut in two, but will wear out first. In the same way, it may not be cut, for it could not wear out first were it not possible for it not to be cut in two. This holds for all other events as well which are mentioned as having the same kind of potentiality."

excursion: # *privation*

my suggestion:

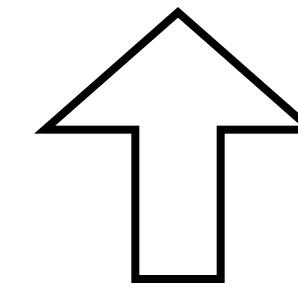For Aristotle, privation is if a thing is hindered in fullfilling its potential.

To what is this kind of potentiality a *proper* potential (to whom or what does it belong)? What could possible „fullfill" it? Or is it not subject to privation at all?

this is *the kind of properties proper to abstract entities* like a community, a constitution, plan, a generalized concept like a form or a schema, etc. The more such potentiality an abstract entity (an artefact) has, the higher its value for societies.

Abstraction allows to conserve this potentiality!

⬆

to have a *potentiality for contraries* is a *meta-property* for Aristotle.

Privation is what many (modern) theories hold as constitutive for „the human", and for ethics. The idea of socalled *Mangelontologien* (ontologies of lack) is that only through affirming privation – the being hindered through communality in fullfilling exhaustively ones potential – can we live together socially.

Motion

generation

Aristotle invokes the distinction between *essence* and *accident*

Accidental non-being, that is to say, privation, gives rise to generation. Yet new things cannot be generated ex nihilo, only substantial instances can *individualize*!

> *Every thing is subject to privation, and gains its individuality thereof.*

Megarians deny it! (no empty space, hence no motion). Or else, so they thought, the principle of contradiction cannot be maintained.

potentiality
desire
interest

But all material beings, as such, suffer privation in virtue of their contrariety, and the missing contrary has a sort of ghostly existence that Aristotle calls potentiality and that, because of its incompleteness, produces an uneasiness calling for change.

> full is the space of quality (substantial & accidental) in Aristotle

Diodorus imagined it like a cinematorgraphic succession of discontinuous states (temporalized statements)

motion is fullfillment of what is in potentiality

only potential aspects can move / become
potential is probabilistic, based on opinion
abstraction creates space for becoming <

As regards quality for example, *potentiality is the ghostly presence of the contrary* (**white**) *in something having a given quality* (**black**). Of course when the potentiality passes to actuality, if ever it does, it will be a development in present or future time just as much for Aristotle as for Diodorus. But for Aristotle it is there at the very core of the thing before becoming actuality. In the same way, motion for Aristotle is the fulfillment of what is in potentiality in so far as it is in potentiality.

‚now' is a limit not part of time

The act of motion, which would be expressed grammatically by the present progressive tense (*this is moving*), could in no way therefore be confused with a succession of immobilities, that is to say, with the positions occupied successively by the mobile in the course of discontinuous time. *The 'now', says Aristotle, is a limit, not a part of time and motion cannot be reduced to a correlation between the points occupied by the mobile and the 'nows' dividing time.*

individuation

Reality, for Aristotle, is *the never fullfilling* – yet ever striving for fullfilling – *actualization of series!*

„we are general and become an individual by realizing in act a continuity of potential points"

an identity put up as *a variable* (avant la lettre!)

what kind of series?

in networks (rhizomes), *every point is the relay of a relation.* anything can be related to anything ———→ Gilles Deleuze

„we are individuals and need to continue series of ordinary points in order to belong to an element of communality."

Aristotle distinguished
two sorts of necessities

essential

probable *exceptions to the principle of bivalence*

> *„every statement has a truth-value"*

„In distinguishing two sorts of necessity Aristotle *abstracts from the difference between past and future*.“

&

„He in no way abstracts from the temporal condition in general.“

how does he achieve this?

conditional necessity
for *probable statements*

the
necessity
of the
consequent
*(simple or
absolut)*

necessity of an event (a temporally determinate proposition, *de dicto*)

If *p* takes place then it is necessary that *p* take place.

eg. 'the sum of the angles of a triangle is equal to two right angles'

tautology

It is necessary that if *p* take place, then *p* take place.

the necessity
of an act of
the event
(conditional)

determine a temporality for the necessity (encapsulate the necessity as an ‚object‘, *de re*)

For any time, t, if p takes place during time t, it is necessary during time t that p take place during time t.

e.g. ‚the sun is eclipsed by the moon', ‚Socrates is walking‘

with *de re* conditional necessities,
it is no longer possible to determine
the truth of all statements abou the future

,the sun is eclipsed by the moon'
–> here it is possible, because there are external reasons that can be determined

,Socrates is walking' –> here it is not possible

can necessities be *composed* or *distributed* then?

Regression of causes – all contingency will fall away from future events!

Fourfold causality of Aristotle
(incl privation and desire of the accidential)

"Even if the cause were supposed no longer what is but what is
becoming, the consequences would be the same: everything
would happen necessarily; for the eclipse will take place
tomorrow if such-and-such happened, and such-and-such
happens if some other thing happens in turn, and that other
thing if a third thing happens". (p. 147)

causa efficiens — determined by an external initial entity or event

cause formalis — determined by the form/scheme

cause finalis — determined by aim/goal (telos)

causa materialis — determined by substrate

The opposition of the two cases distinguished by Aristotle has
nothing to do with the temporal index of causality, but with the
question of whether causality applies to beings or to events

being-in-act
being-in-potency

essential

composed and divided yes, but not distributed!

no contradictions allowed in the essential

(the properties belong to a subject (thing))

accidential

no!

contradictions are operationalized within the dynamics of privation as contradictories the can be *conjuncted* and *disjuncted*

(the properties belong to an event)

Contingency in the universe due to dynamics of privation.

Aristotle economized the principality of his necessitarianist predecessors!

for Aristotle, Truth had a Nature!

This is the Reality-Principle of Aristotle!

„lending articulate voice to that with inarticulate eloquence"

principle of correspondence _{for accidentials}

And the *Nature* of Truth (within Realist Philosophy in Aristotle)
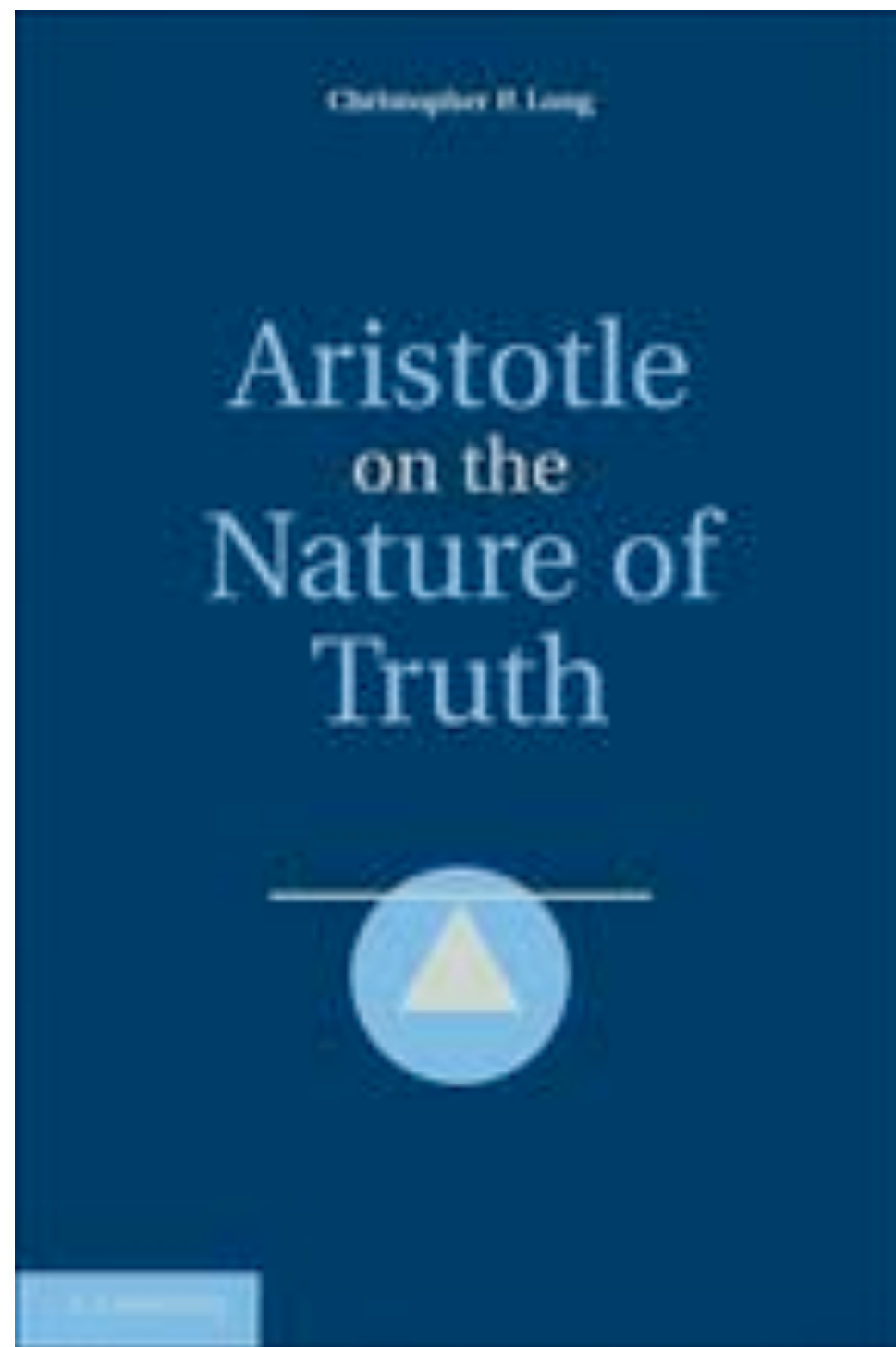
[For Aristotle:]

„Accidental beings are not necessary but indeterminate, and their causes are unordered and infinite."

The principle of correspondence (at work in language) transmits the properties of the things and their causes to the statements about them.

> *correspondence is not representation but articulation!*

how to *term*
without *coercion*?

the idea of a natural flow we can tune in …

highly recommended! Beautiful book on Aristotle's theory of articulation.
available as pdf – let me know!

chance and analysis

is there one universal conncetion in a causal chain?

the meeting of two independent causal series!

can we provoke ‚encounters'?

trough analysis?   *differential equations, partial systems, matrix and vector calculi, SOMs, etc.*

Difference between *chance* and *fortune*: there is determination *and* choice!

chance: *having their final cause outside of themselves;*

fortune: *effects of chance that can be chosen*

the *essential* follows one immanent teleology

conditions can arise

instantaneously

the *accidential* responds to several external teleologies

„the man plowing the grass found a treasure".

being is not *absolute*

for Aristotle

but *numerous*

Aristotle's Reality is analytical, of differential make-up which allows for generation and decay, transformation, becoming
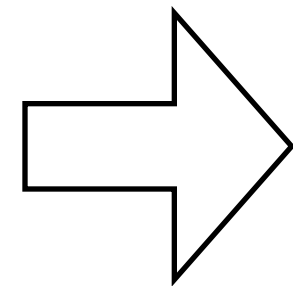
quantification
quantization because of the simultanous existence of contraries

being-in potency can never be fully actualized.

motion
infinity
void
fullness

$\Rightarrow$

Reality actualizes from „linking up" being-in-act (essences) and being-in-potency (accidentials, caught up in the dynamics of contrarity which is driven by potentiality, privation).

numerosity

how to interpret potentiality in terms of coexistence ?

modifying the principle of bivalence (many valued-logics, fuzzy logics, etc)

1 more than two truth-values

calling the principle of bivalence into question e.g. intuitionism

2 modifying the standard definition of truth

operationalizing the principle of bivalence

3 introducing probabilities

truth functors

A Functor is a mapping between Categories. A category needs to be defined by groups (algebraic solution spaces, incl. fields and modules, rings etc).

try to *represent* modality as operators

e.g. Lukasiewitz three- and four valued logics

Binding problem:

how to link the symbolic back to the real?

The category of all categories cannot be *represented*!

modifying the principle of bivalence (many valued-logics, fuzzy logics, etc)

more than two truth-values

indeterminate truth-value

calling the principle of bivalence into question
e.g. intuitionism

modifying the standard definition of truth
by admitting an intuitive criterion of truth

for Aristotle, truth does not *represent* Nature, instead *there is a Nature proper to Truth*

Kant: Forms of Intuition (Space and Time)

Tarski's *Criterion of Equivalence* between logical and metaphysical: *To assert a statement* is equivalent to *asserting the truth asserted by the statement*

for Aristotle they are connected in reality.

proposition: logical form
predicate: metaphyisical form

> value *de re*, but only *ad hominem*!
first principles cannot be demonstrated.
this is today in Critique under the label „anthropocentrism".

Aristotelian and Deleuzian theory of (double) articulation!

to admit indeterminate truth values would be to say that this Nature is indeterminate

> these kinds of assumptions are what
the conceptual and abstract approach by Dedekind,
Hilbert, Noether, want to overcome, because they tend to reduce the capacity
of logics to issues of pure legitimation, not understanding

Yet - what can possibly be a way out???
Us speaking in the name of that which we evocate?

Alfred Tarski (1901-1983)
"Along with his contemporary, Kurt Gödel, he changed the face of logic in the twentieth century, especially through his work on the concept of truth and the theory of models." (Feverman)

A prolific author best known for his work on model theory, metamathematics, and algebraic logic, he also contributed to abstract algebra, topology, geometry, measure theory, mathematical logic, set theory, and analytic philosophy. *(cited on wikipedia.org)*

Tarski and Aristotle on Language

for both, language has impacts on reality
– yet in very different ways!

Aristotle

Tarski

Criterion of Equivalence between logical and metaphysical: *To assert a statement* is equivalent to *asserting the truth asserted by the statement*

"truth and falsity, insofar as things are concerned, depend on their combination or separation, so that he who thinks that what is separated in fact is separated, or that what is combined in fact is combined, thinks truly, while he who thinks what is - *contrary to the nature of the things* is in error."

Truth and Falsity are attributed to statements.

Truth and Falsity are attributed to thought and its affection. This attributin ranges over 1) composites (discursive knowledge, principle of correspondence); 2) simple natures (intuition, presence or absence of truth).

Existence of an object in general, generically.
[If appearance, no existence]

Existence (actuality) of an object *only in particular appearances* [no appearance, no existence]

Symbolic Algebra

Arithmetics and Geometry

The Universal and its Appearance

The General and its Appearance

Aristotle's Nature
that which *expresses* inarticulate Elegance
cannot be exhausted by language, the *poetic* principle of the world
the domestication of Nature by Language

Tarski's Nature
that which *expresses* the appearances
can be determined by formal language, the *semantic* principle of the world
the domestication of Language by Algebra

What happens to the *inarticulate elegance* of that which appears without being forced into expression?

How can Algebra *domesticate* Nature *(de re)* and not only *coerce it into form and consequence* through controlling Speech *(de dicto)*?

the problem of modality is linked to that of aesthetics or naturalness as the sublime

Beauty

that which strikes us in completely *unstrained* manner

how can philosophy affirm algebra without exhausting beauty and poetry *as sources of sense?*

how can philosophy affirm algebra without exhausting beauty and poetry as sources of sense?

a specification

the beauty of an equation does not appear if we see a solution, but from the promise of integrating differences without conflict
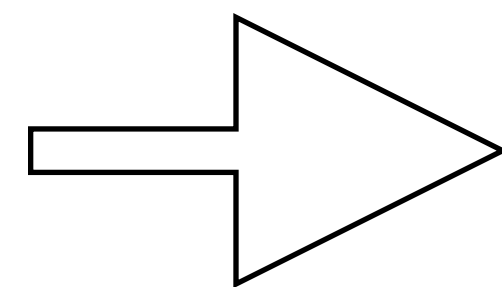
if we can see inarticulate promise in it!

free logic

is that a candidate for an
aesthetics of formula / equations?

anti-
realism

Van Fraassen's languages of supervaluations – gets rid of all predicativity (Universality and Existence claims (E and U operators)

makes no distinction between fictitious and phantastic and real

$\Longrightarrow$ conflates a world of distinctions which produce sense and meaning!

logical complement to „All language is figurativ"

tabula rasa

sentence = proposition = predicate = analogy = allegory = linked up concepts = linked up terms = linked up names etc.

points attention to the quantum level of things that might appear, but makes to productive suggestion of how to deal with it. not natural poetics, total semantics !

Logic of Terms
(not total semantics) *for how could we characterize this totality?*

the main assumption of Aristotle's logic of terms
(rather than *propositional logics*) is the refusal of
an Empty Universe of Discourse

this is the *precondition* for
natural poetics, otherwise we
have total semantics and no
theory of becoming, potentiality,
privation/desire, reality, etc. !
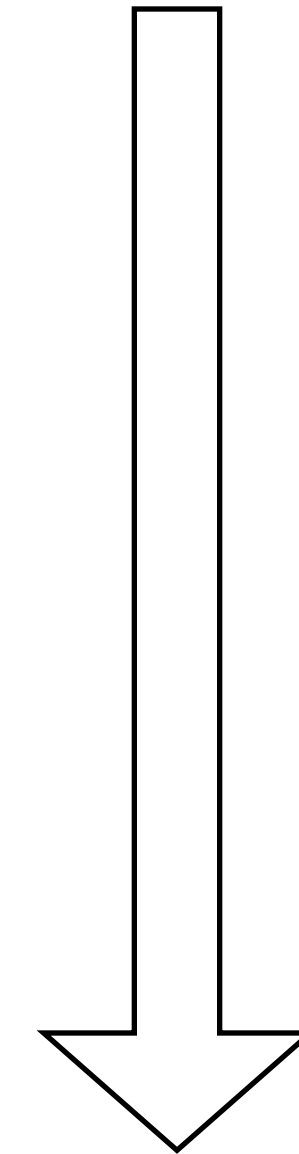
back with the withdrawal from reality

Wikipedia
"One famous ancient argument regarding
fatalism was the so-called *Idle Argument*. It
argues that if something is fated, then it would
be pointless or futile to make any effort to bring
it about."

The *Idle Argument* – affirm anything that happens!
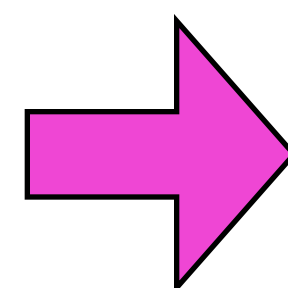
no politics, no economics, no poetry,
no ethos of craftmanship (dignity)

probability

in Aristotle the set of contingent events seems to be sortable into *three classes* (according to Vuillemin p. 161ff.):

is the probable in our knowledge or in nature?

1

low frequency of coming about involving chance (encounter of two series, caused by an external teleology (not entirely controlled by an immanent one)

if it is in nature, can natural selection perform an optimization process (purification through natural teleology, a linearization of the Stoic cyclical time argument?

2

50/50 chance of coming about, depend on deliberate choice

telos of evolution? *For Aristotle no!*

3

high frequency of coming about - unimpeded effect of natural causality

For Aristotle the probable is in reality, neither in our knowledge nor in nature.

It resides in the Domain of Opinion.

The probable applies to single cases, to individuals, to accidental determinations
encounters of series

Calculus of Probability (Vuillemin p. 163 ff) – distinguish Event (x) and Eventuality X

We don't need to read X as a set, instead we can look at the totality of all eventualities for events contained by:
constructing from Eventuality X a Field of Sets

Field (algebra) > Determine the Solution Space

This *solution space* („Field of Sets F") has two properties:

1 contains A and -A, and their logical Sum, in short: *anything that will occur*. The Total Cause.

2 It contains the logical *Sum*, and hence also the logical *Product, the Complement of the Sum.*
This is the *Empty Set* and corresponds to the Absence of Total Cause.
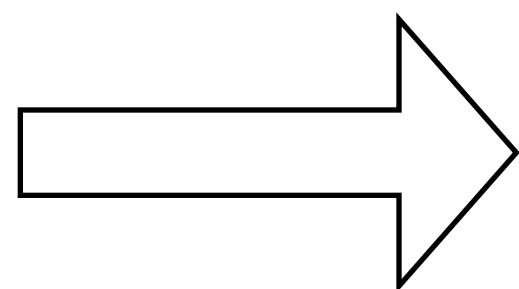
⟹ George Boole's algebra is all about this! *cf. The Laws of Thought.*

Calculus of Probability

meeting of series at *t* in *(x,y)*

there will be a procession *a* at time t in one of the two places *x* or *y* and there will be a procession *b* at the same time t in one of the same two places *x* or *y*.

set and elements

The set *X* of eventualities is formed by *combining* these *elementary eventualities*. It will contain four elements, namely:

I)   a will take place in *x* and b will take place in x,
2)   a will take place in x and bwill take place in *y*,
3)   a will take place in *y* and b will take place in x,
4)   a will take place in *y* and b will take place in y.

Do the two processions would meet or not? combinatoric treatment.

The set of subsets of *X,* say *Y,* has $2^4 = 16$ elements, among which are to be counted the empty set and *X* itself.

They would focus then on the event $A = \{1,4\}$ the processions meet, and the complementary event $\sim A = \{2, 3\}$, they do not meet.

One might for example conceive of the *event* {a takes place at x and b takes place at x or *a* takes place at x and b takes place at *y*} which would be the set {1,2}, that is to say, *the event in which a always takes place at x.*

Do the two processions meet or not?

Focus on probability of the happening of an event. Ask for its *frequency*.

combinatoric treatment:
The Sum of the assignable probabilities is 1.

It is determinably certain *that* A or -A will occur, but not which one (before the happening).

> Aristotle conditioned necessity is not indetermined, and neither is it many-valued if we reconstruct it in terms of probabilities. The excluded middle is veryfiable by assigning complementary probabilities.

the probability sentences *do not fix sufficient cause for an event*, the event still needs to happen in real. Hence, future contingents that cannot be reduced to necessities, but that can nevertheless be talked about.
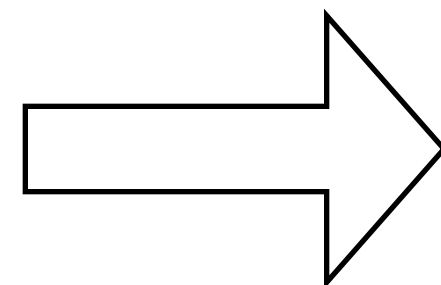
⟹ no treatment of how we could provoke or instigate *the meeting of series* in Aristotle. This would be a theory of arifice / craftmanship.

Aristotle

Reality is being-in-act, which is, on the level of accidents (not on essence) open to contingencies through its relation to being-in-potency.

Being is assumed as *numerous*, in order to determine Reality as *qualitative.*

Deleuze

„To be is to continue a series of ordinary points" (*Logics of Sense*)

Reality is assumed as *numerous*, in order to determine *Being-in-Existence* (neither absolute nor numerous, but quantized).

Existence allows for *quantification and formaliztion*, but first it needs to be quantized !

There is a nature to thought !

An element of *beauty in thought* – this is the *Aesthetics of Formula*

like in Aristotle, where the Nature of inarticulate Eloquence proper to *Things-that-can-be-termed*, for Deleuze there is a Nature of Inarticulate Eloquence proper to *Thought-that-can-be-formulated.*

BUT

the option of explaining Aristotle's conditioned necessities with probabilities nevertheless does *not work out well*, because for Aristotle, the probable only asserts the happening of an event (fully determinable by his economy of contraries - privation). There is no room for subjective probabilities in his Doctrine.

Without subjective probabilities, the verification of the probability of an event by frequencies is rather like the Diodorean system, not the Aristotelian one.

Deleuze did not presume abundance, he tried to deduce „quantitability" from the assumption of primary Difference (a sort of a differential, never positivizable Identity)

only if we presume *primary abundance*, and allow with Deleuze for an Articulateness in terming Quantities would subjective probability have real impacts!

this is the main interest with algebraic numbers, series, polynomial equations etc.

To work towards a grammaticality of artifacts (as the world where subjective probabilities „exist", and which comprehends *anything that can be the case*)