The Set Structure of Precision

Rabanus Derr, Robert C. Williamson

The “Foundations of Machine Learning Systems” Group

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Led by
Robert C.
Williamson

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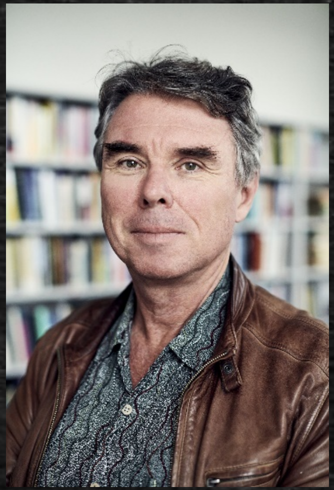

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Why does ISIPTA take place?

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Imprecise Probability

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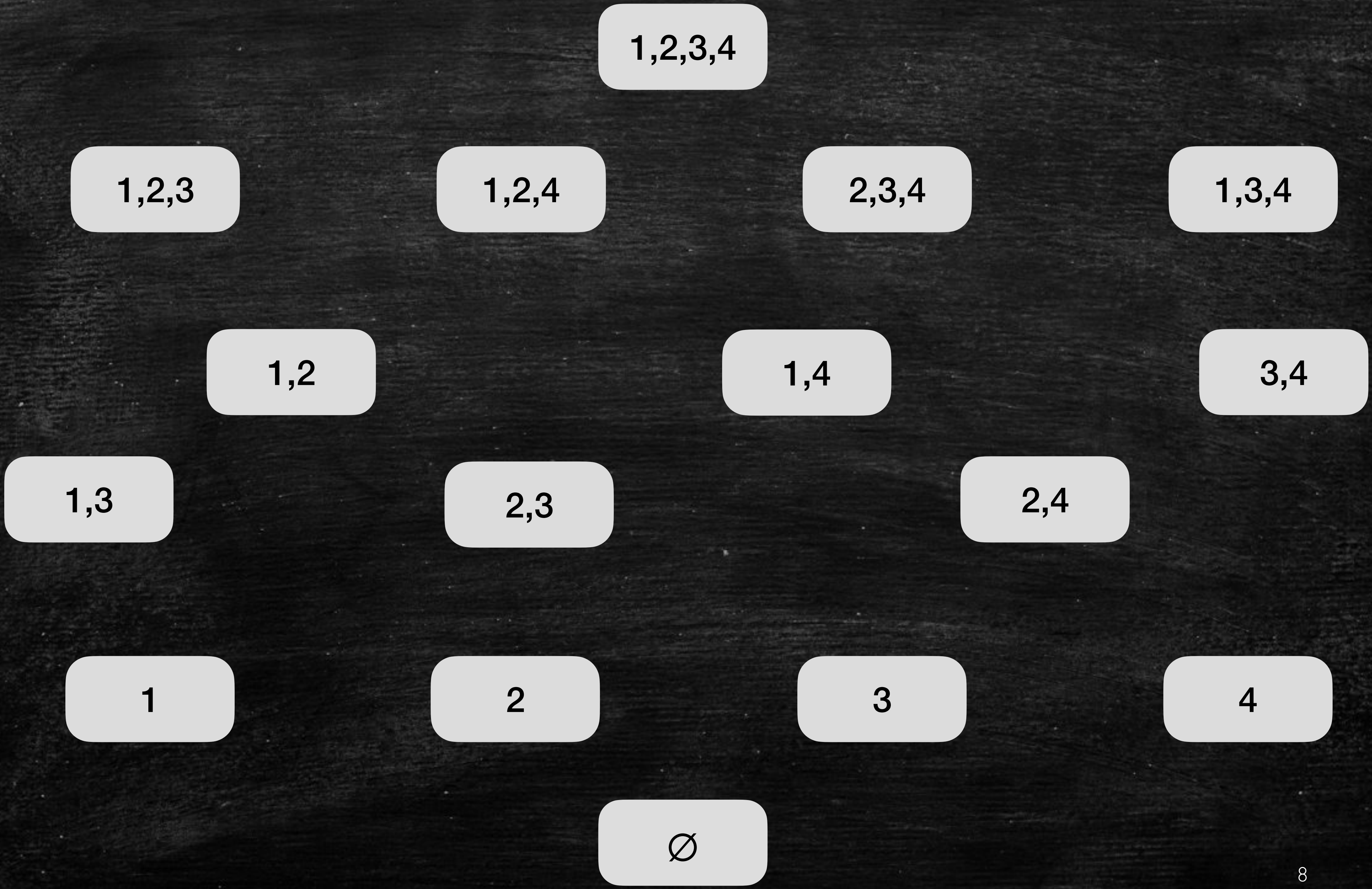
Imprecise Probability

On which events are imprecise probabilities precise?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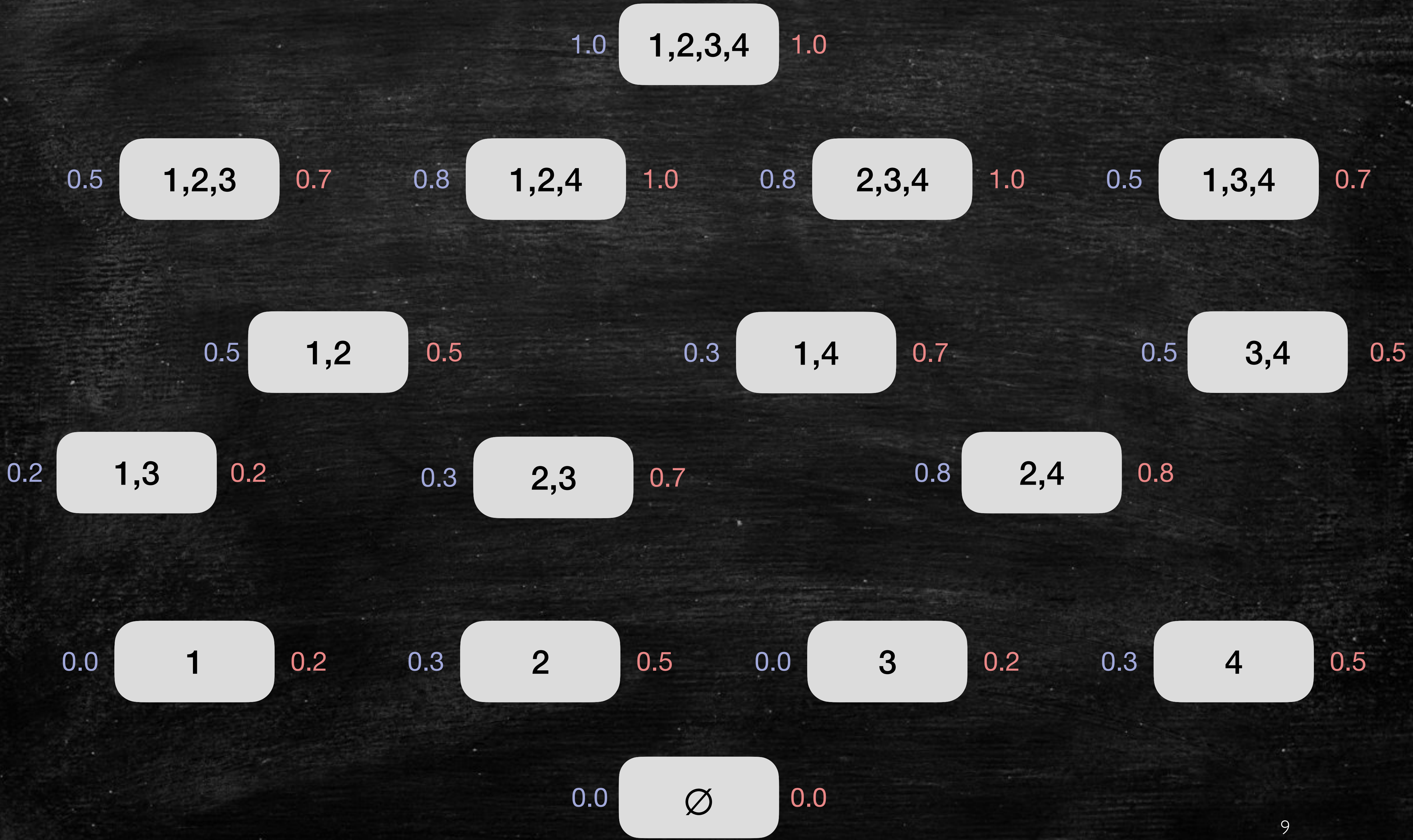
4
∅


1.0 1,2,3,4 1.0
0.5 1,2,3 0.7
0.8 1,2,4 1.0
0.8 2,3,4 1.0
0.5 1,3,4 0.7
0.5 1,2 0.5
0.3 1,4 0.7
0.5 3,4 0.5
0.2 1,3 0.2
0.3 2,3 0.7
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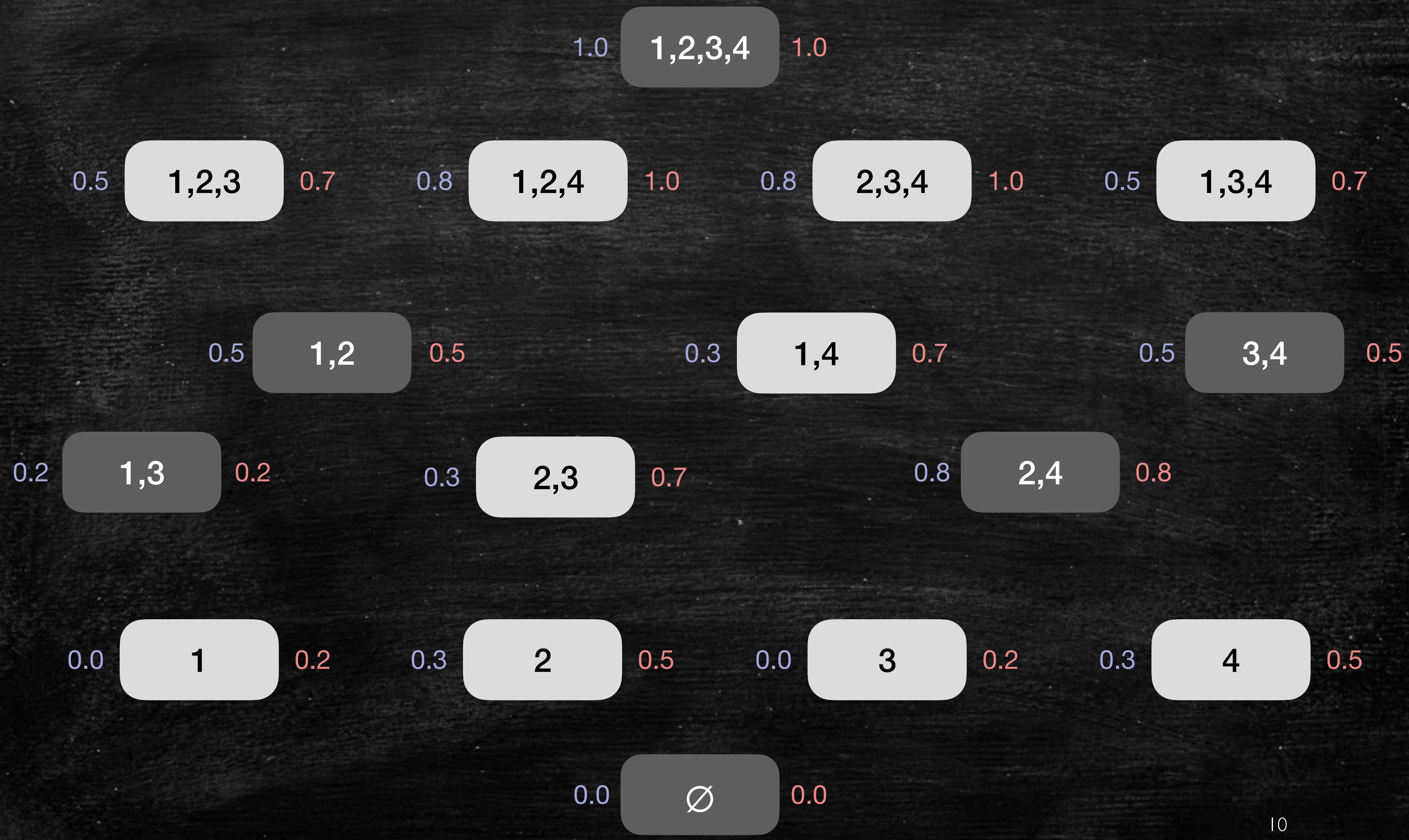
0.0 3 0.2
0.3 4 0.5
0.0 ∅ 0.0


1.0
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2
0.5
0.0
3
0.2
0.3
4
0.5
0.0
∅
0.0

On which events are imprecise probabilities precise?

Imprecise Probability {
A. Normalization
B. Conjugacy
C. Subadditivity
D. Superadditivity

=>(Pre-)Dynkin-Systems

(Pre-)Dynkin-Systems…

$\mathscr{D} \subseteq 2^{\{1,2,3,4\}}$

(Pre-)Dynkin-Systems…

$\mathscr{D} \subseteq 2^{\{1,2,3,4\}}$ $\varnothing$

1. $\varnothing \in \mathscr{D}$

(Pre-)Dynkin-Systems…

2,3

$\mathscr{D} \subseteq 2^{\{1,2,3,4\}}$ $\varnothing$

1. $\varnothing \in \mathscr{D}$
2. $A \in \mathscr{D}$

(Pre-)Dynkin-Systems…

2,3

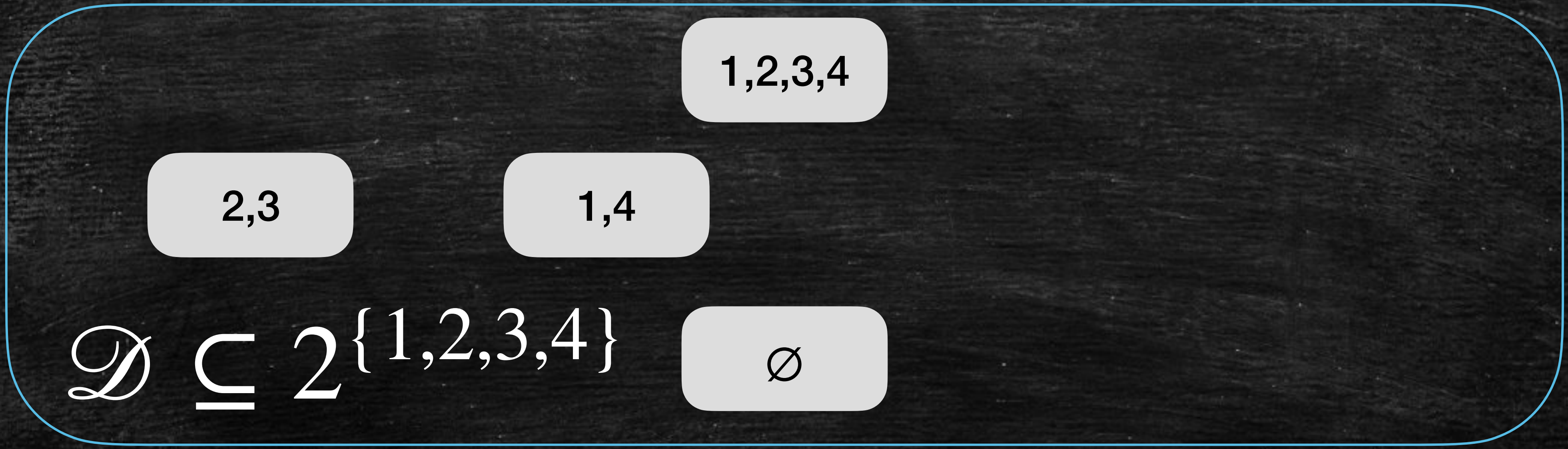
1,4

$\mathscr{D} \subseteq 2^{\{1,2,3,4\}}$

$\emptyset$

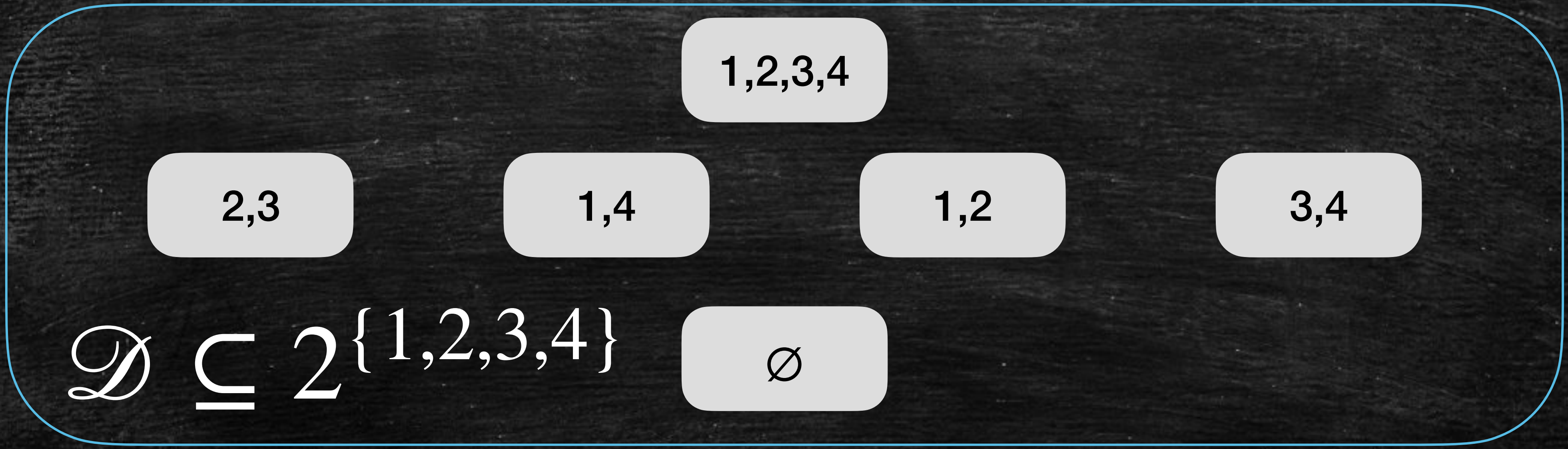
1. $\emptyset \in \mathscr{D}$
2. $A \in \mathscr{D} \implies A^c \in \mathscr{D}$

(Pre-)Dynkin-Systems…



1. $\emptyset \in \mathscr{D}$
2. $A \in \mathscr{D} \implies A^c \in \mathscr{D}$
3. $A, B \in \mathscr{D}, A \cap B = \emptyset \implies A \cup B \in \mathscr{D}$

(Pre-)Dynkin-Systems…



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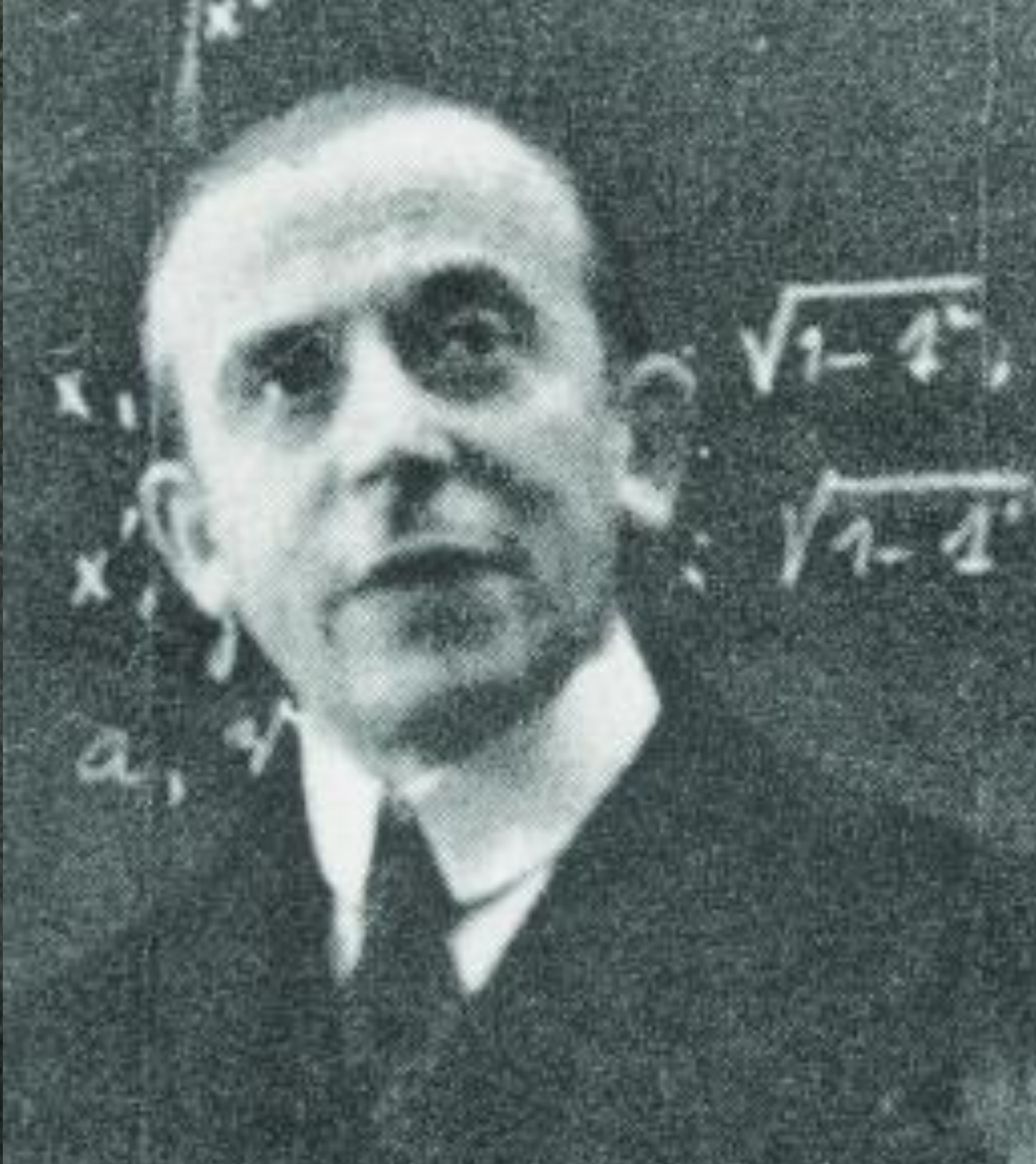
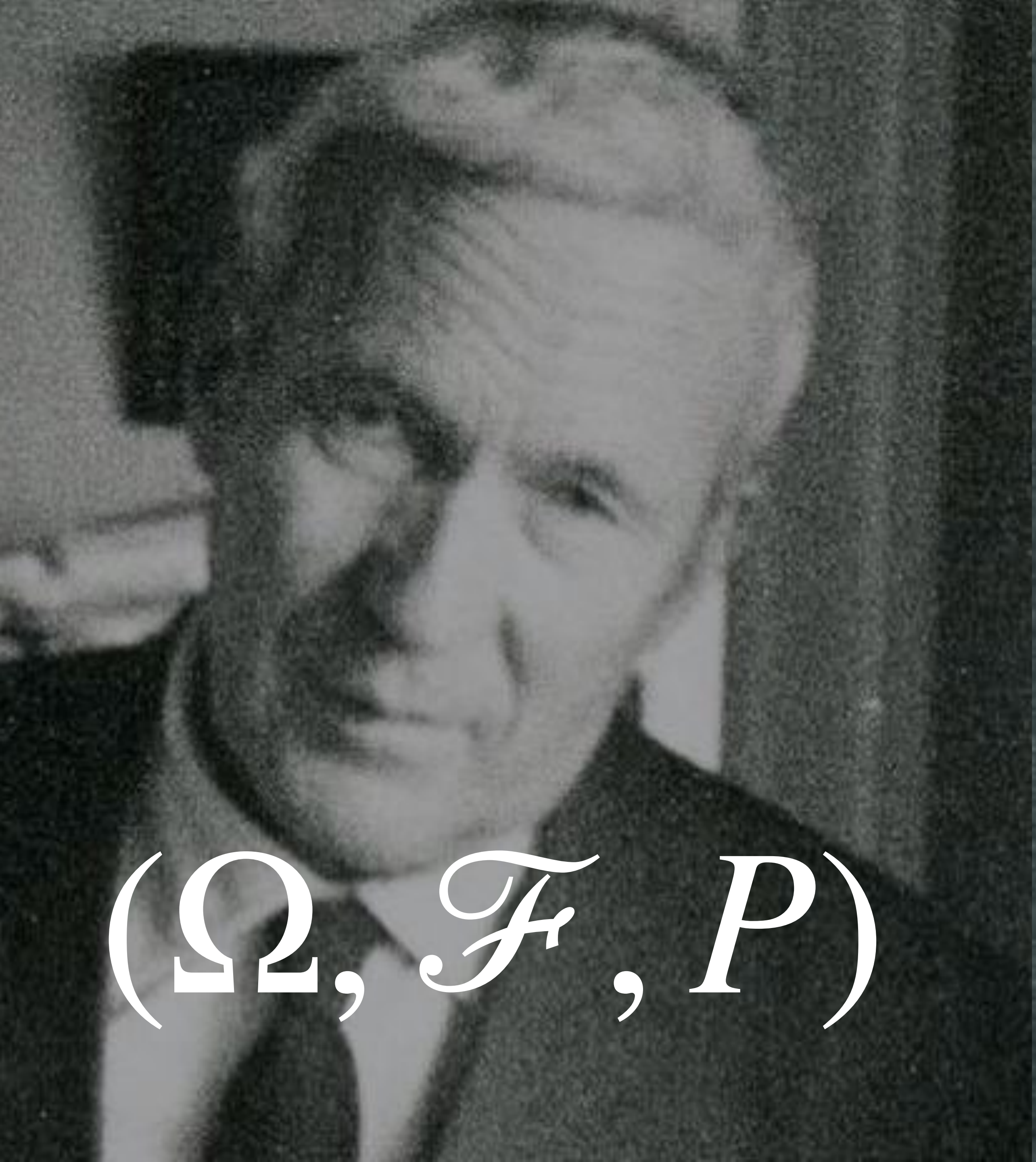
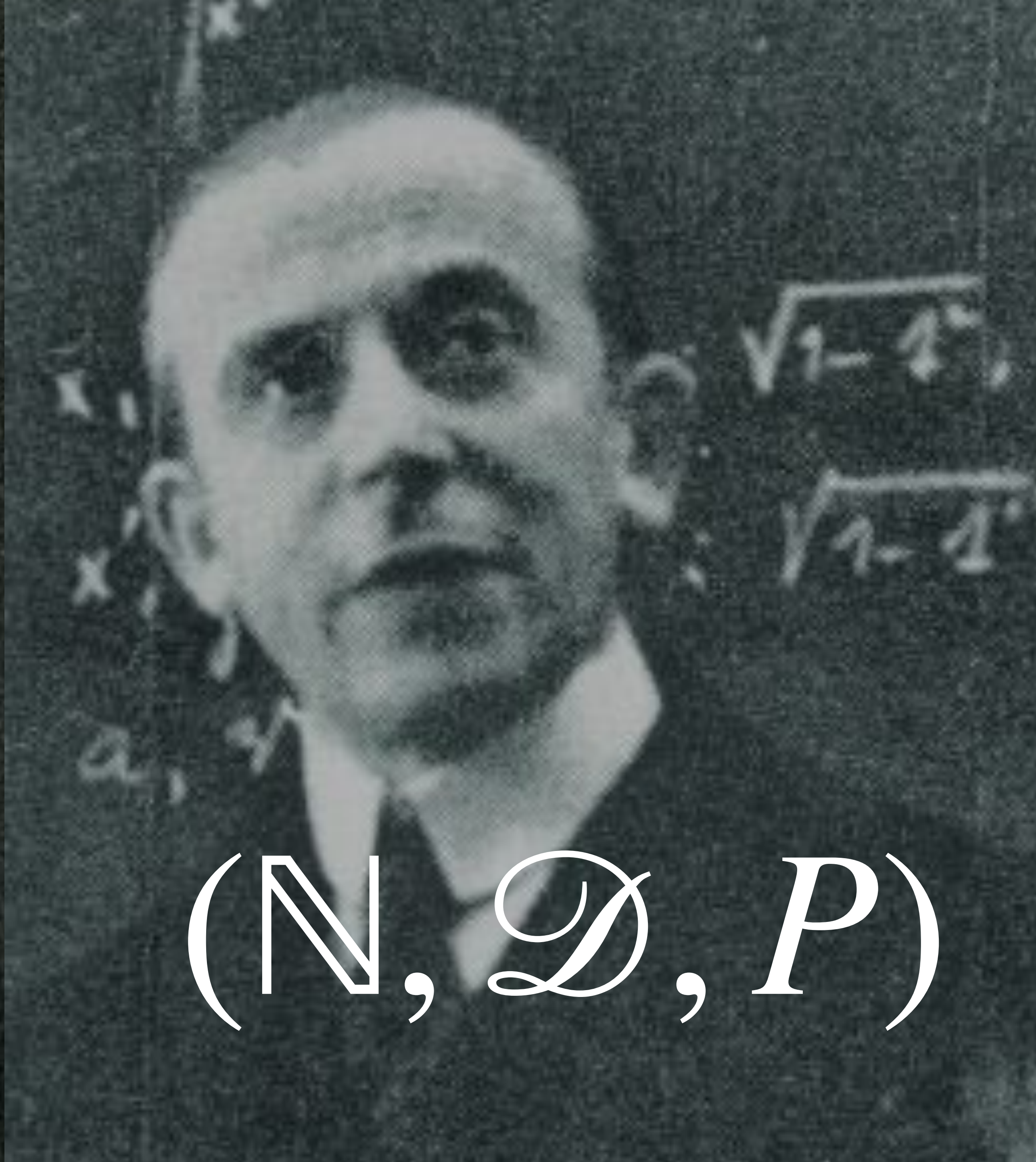
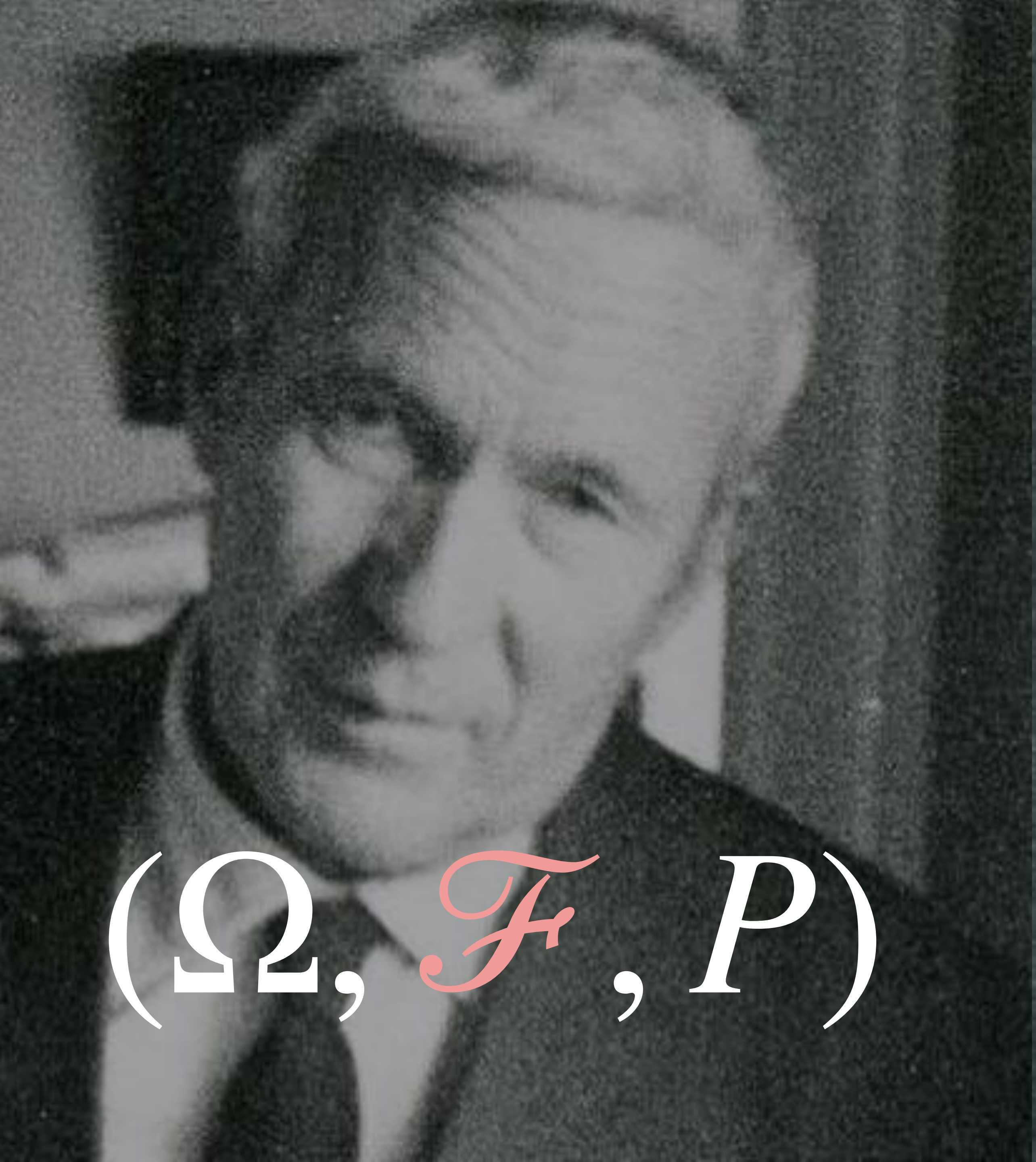
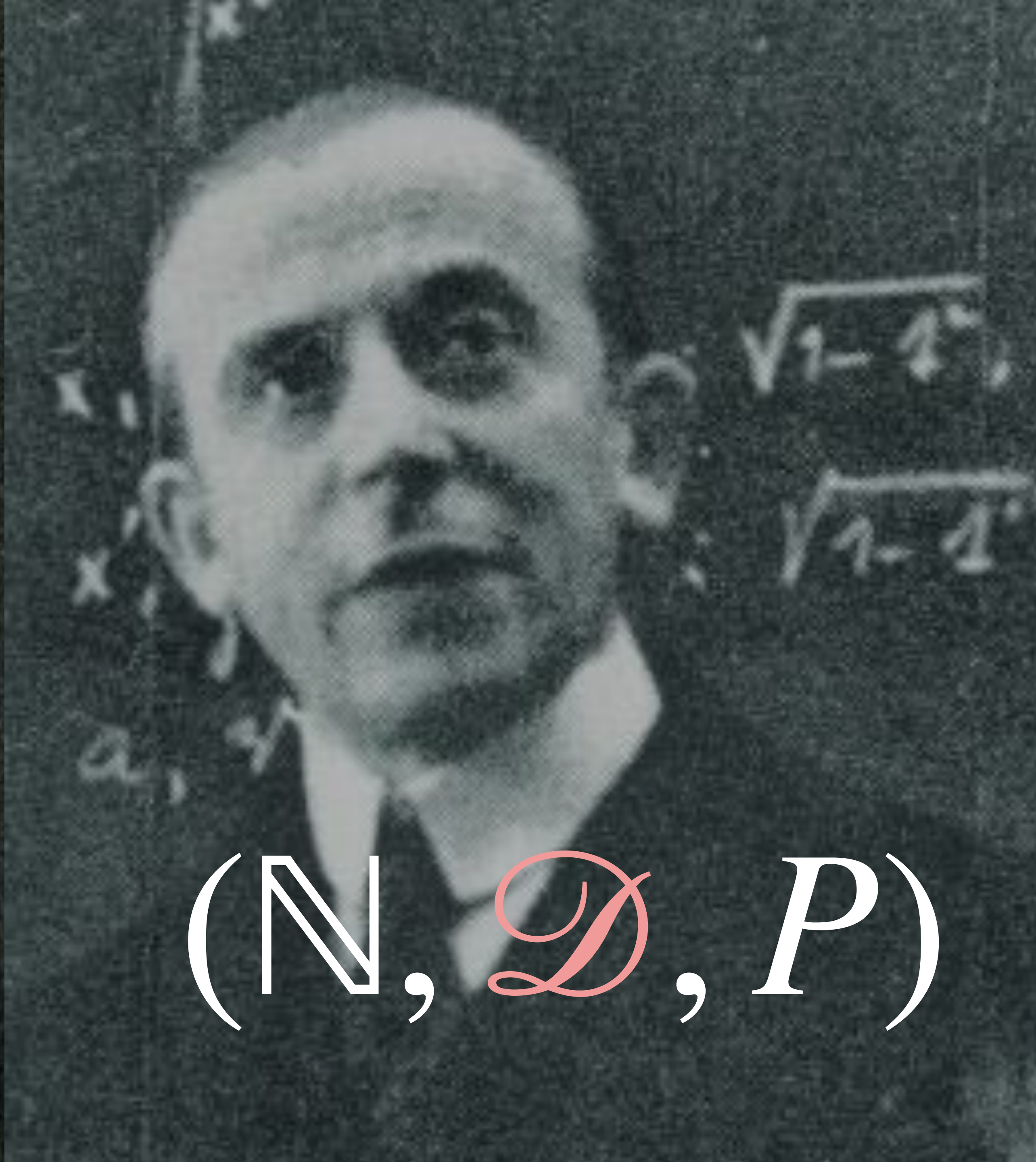
How we actually started…

The same story told from a different start

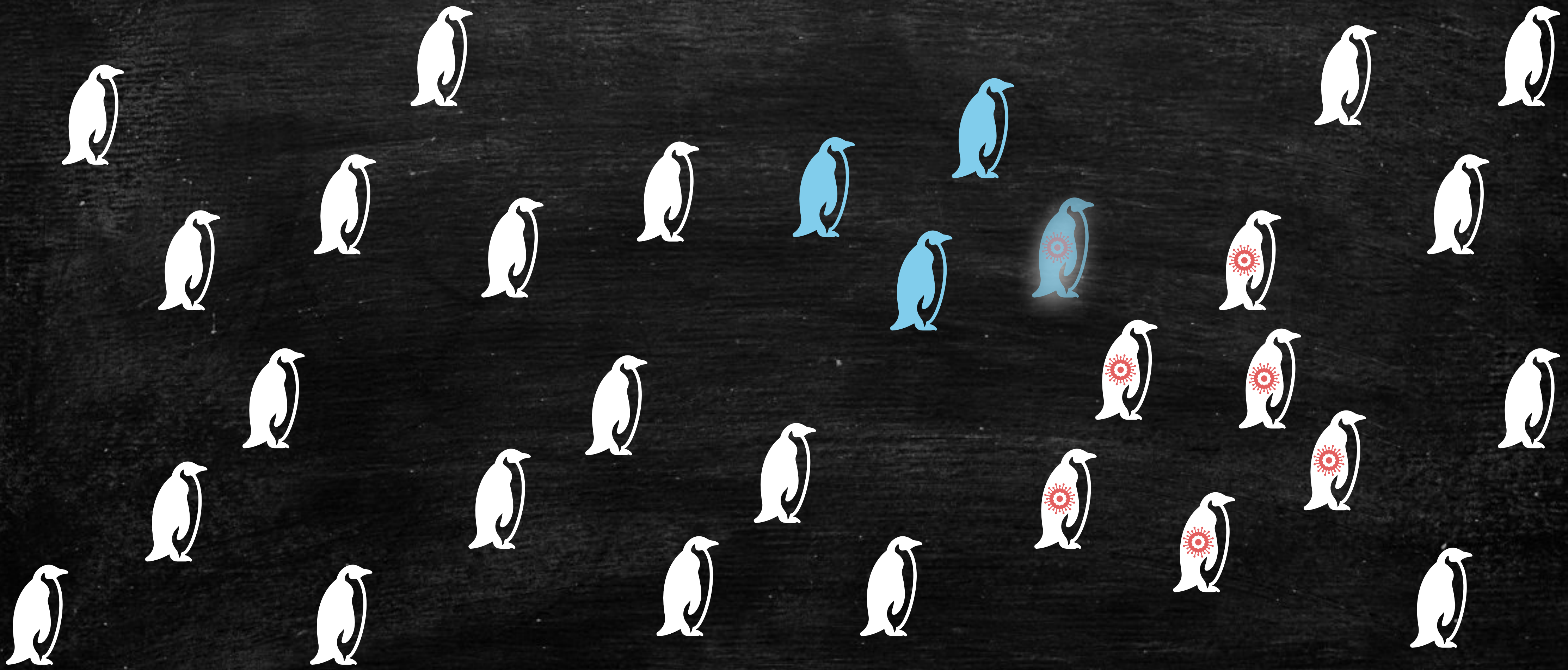




$(\Omega, \mathcal{F}, P)$

$(\mathbb{N}, \mathcal{D}, P)$

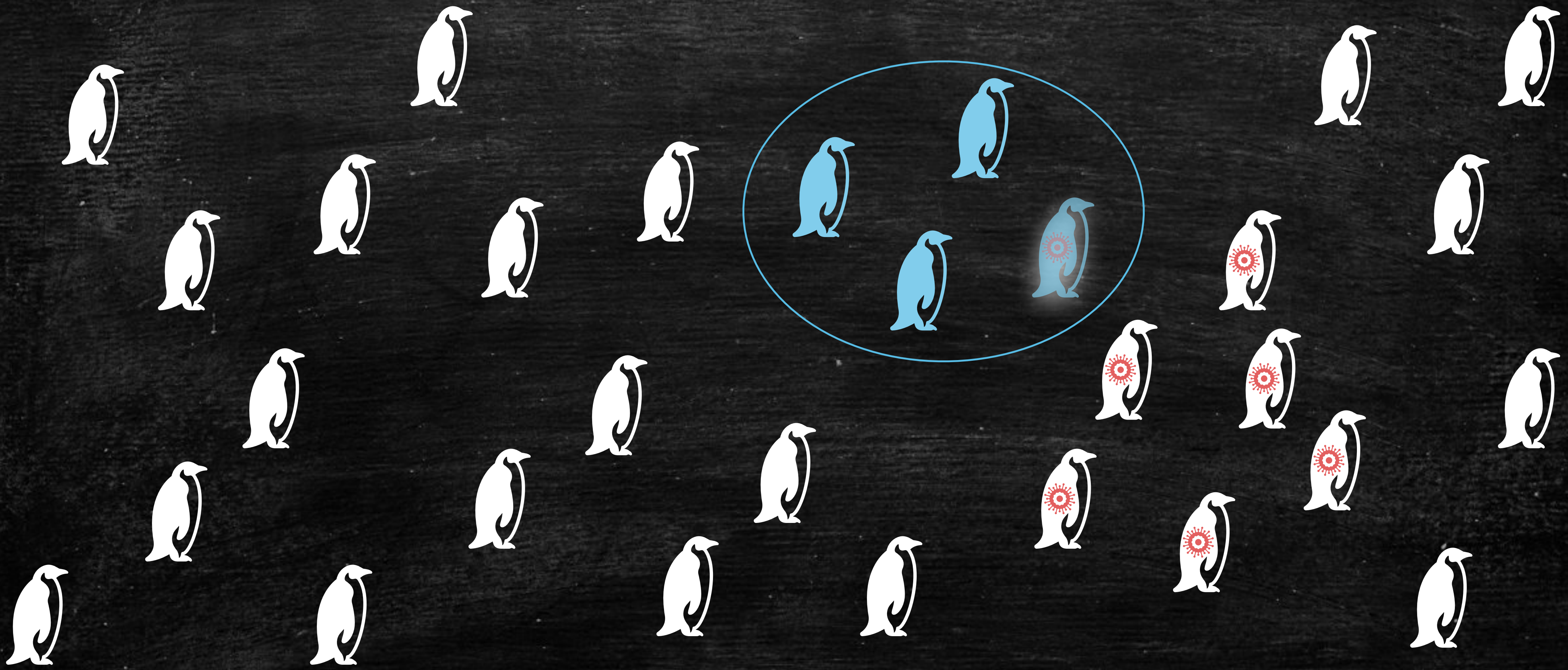

$(\Omega, \mathcal{F}, P)$


$(\mathbb{N}, \mathcal{D}, P)$

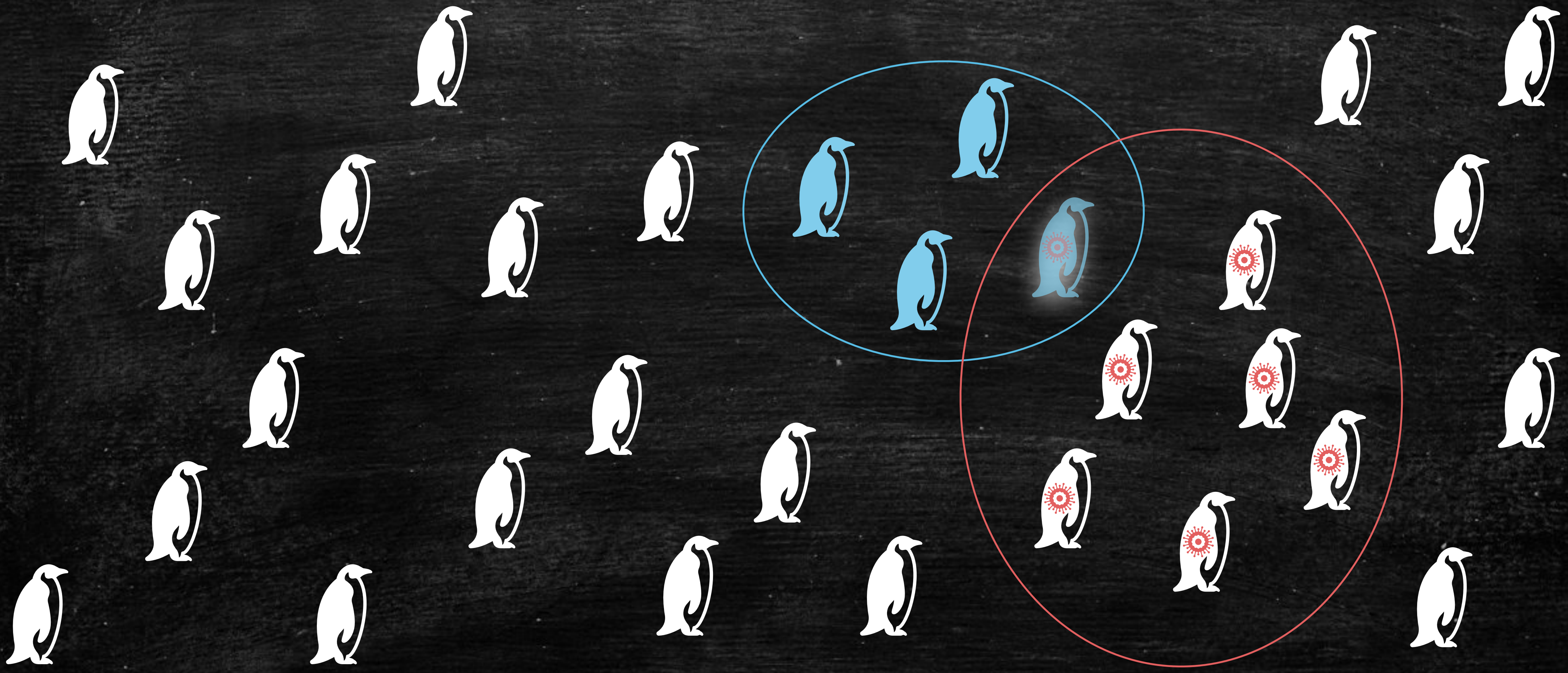
Unmeasurable Penguin Colonies



Unmeasurable Penguin Colonies



Unmeasurable Penguin Colonies



(Pre-)Dynkin-Systems Occur Regularly

Discrete Chebyshev Classifiers

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Coherent risk measures induced by partially specified probabilities

Ehud Lehrer*

December 6, 2007

A preliminary draft

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Econometrica, Vol. 69, No. 2 (March, 2001), 265–306

SUBJECTIVE PROBABILITIES ON SUBJECTIVELY UNAMBIGUOUS EVENTS

BY LARRY G. EPSTEIN AND JIANKANG ZHANG[1]

This paper suggests a behavioral definition of (subjective) ambiguity in an abstract setting where objects of choice are Savage-style acts. Then axioms are described that deliver probabilistic sophistication of preference on the set of unambiguous acts. In particular, both the domain and the values of the decision-maker's probability measure are derived from preference. It is argued that the noted result also provides a decision-theoretic foundation for the Knightian distinction between risk and ambiguity.

KEYWORDS: Ambiguity, Knightian uncertainty, subjective probability, probabilistic sophistication.

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QUANTUM PROBABILITY SPACES

STANLEY P. GUDDER

1. Introduction. In [**5**] P. Suppes introduced the notion of a quantum probability space. He noted that such spaces may be used to describe the position and momentum of a quantum mechanical particle but cannot be used for more general systems. This author has considered quantum probability spaces not only because they are an interesting example of a nonclassical logic but because quantum mechanical phenomena are seen to develop in a quite transparent fashion in this case.

by

partially specified probabilities

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partially specified probabilities

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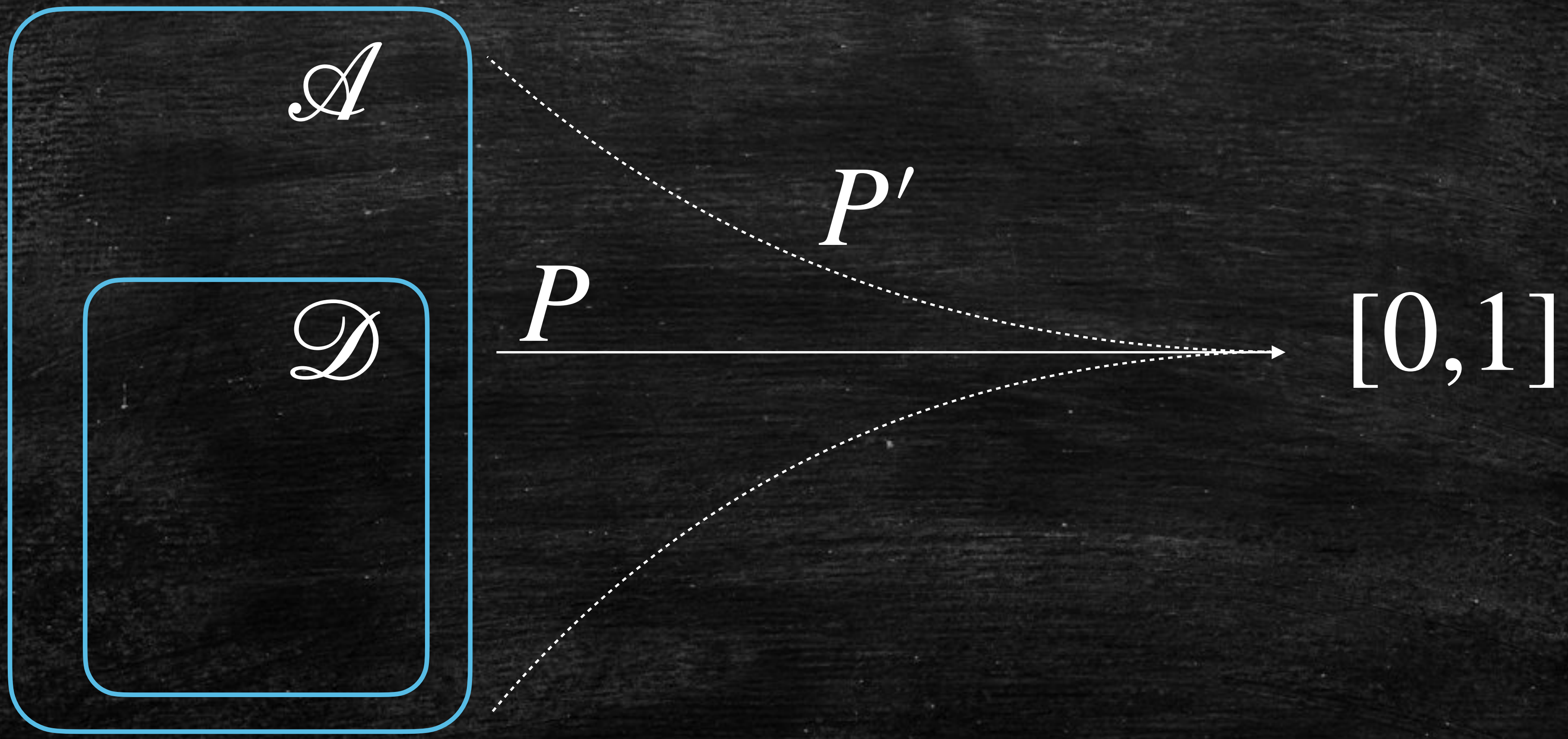
G. SCHURZ
H. LEITGEB

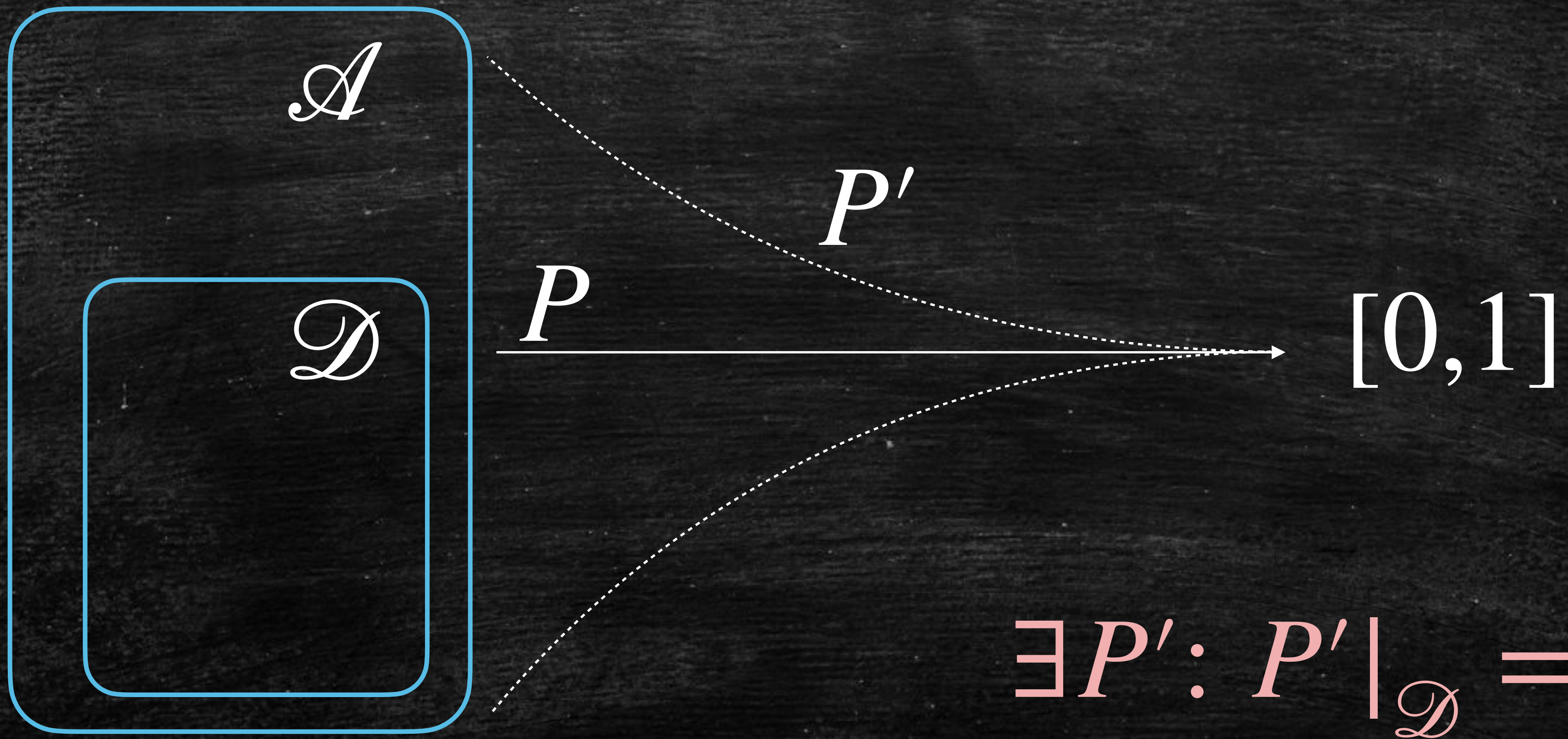
Finitistic and Frequentistic Approximation of Probability Measures with or without σ-Additivity

Better be Extendable

Better be Extendable



Better be Extendable



$$\exists P' : P'|_{\mathscr{D}} = P$$

Extendability = Coherence

A Deeper Link?

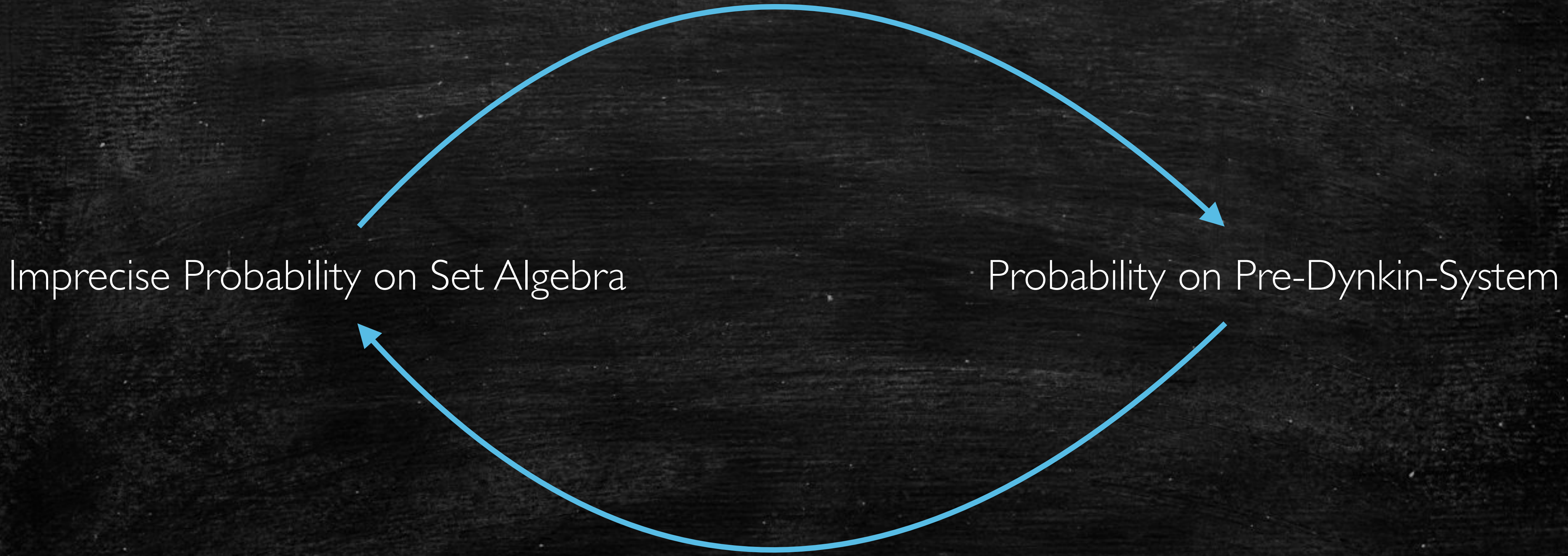
Imprecise Probability on Set Algebra

Probability on Pre-Dynkin-System

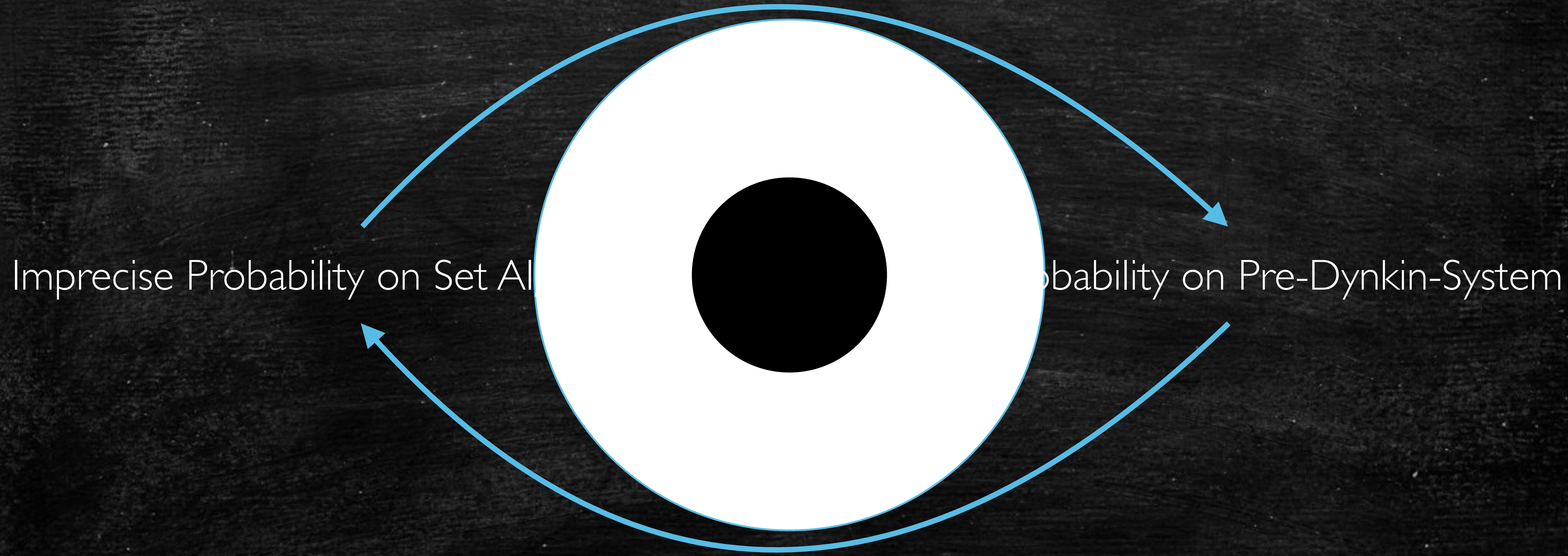
A Deeper Link?

Imprecise Probability on Set Algebra → Probability on Pre-Dynkin-System

A Deeper Link?



A Deeper Link?



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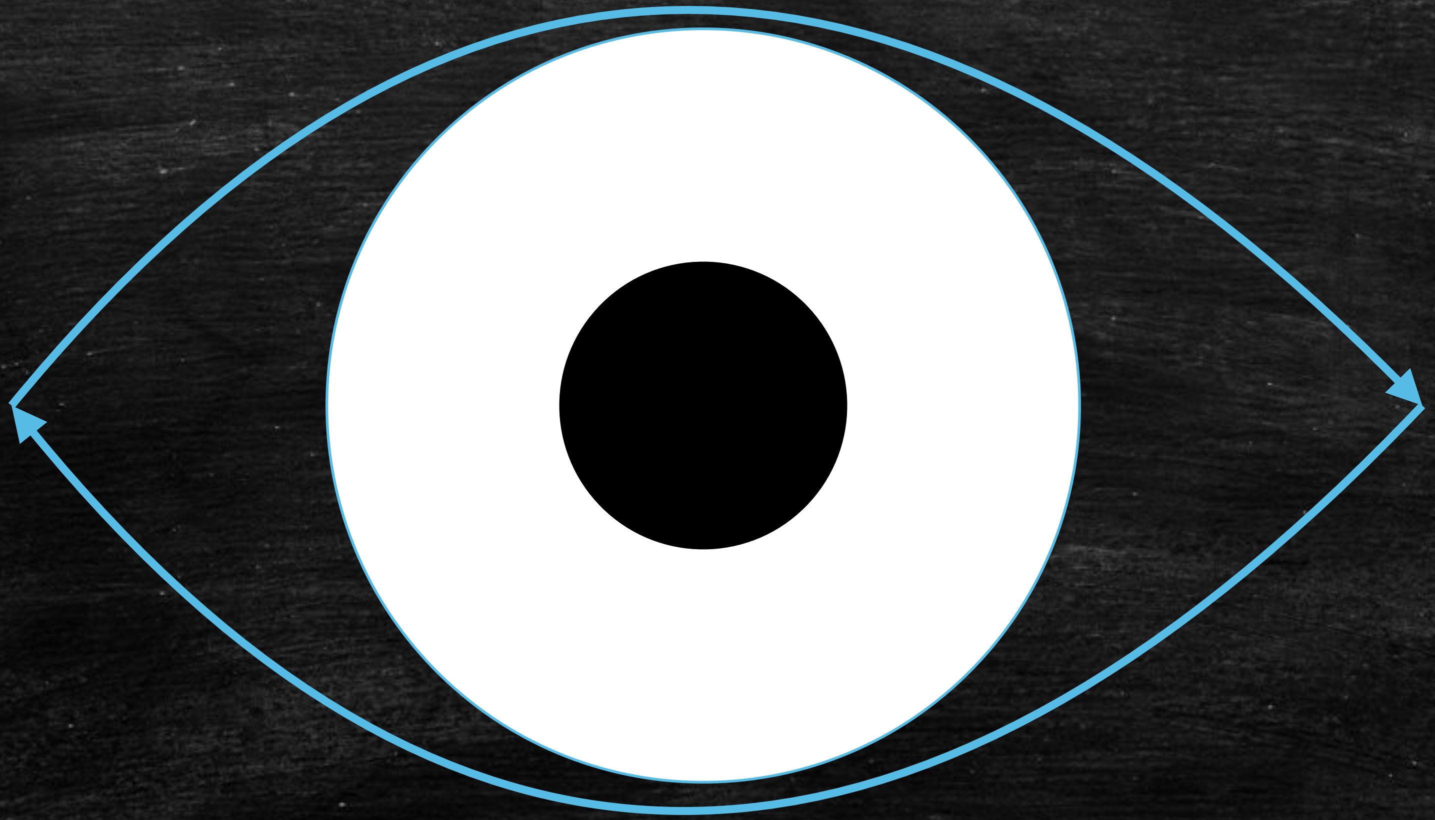

See our Poster


Thank You!