Measuring and Resolving Inconsistency in
Declarative Process Specifications

We address the problem of measuring inconsistency in declarative process specifications, with an emphasis on linear temporal logic (LTL).

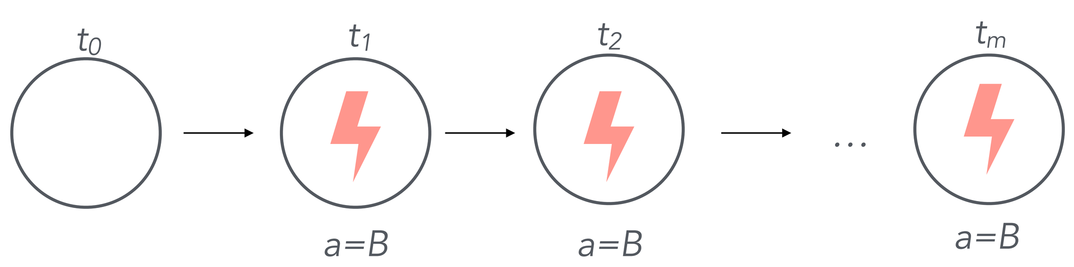
Measurement

$K_1 = \{\mathbf{G}a, \mathbf{G}\neg a\}$ $K_2 = \{\mathbf{X}a, \mathbf{X}\neg a\}$

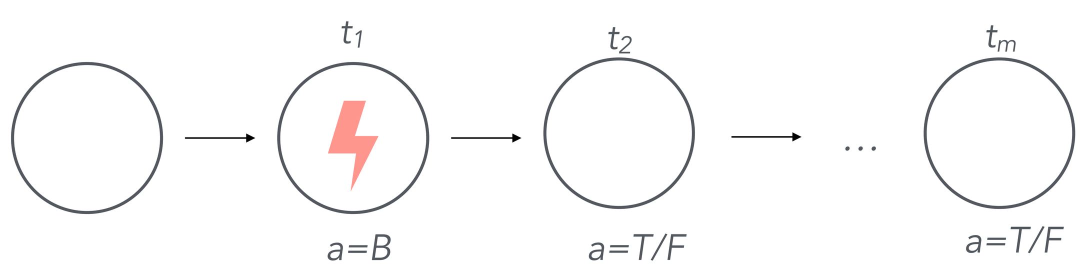
// PROBLEM

- Current measures are mostly set-theoretic
- No distinction possible, yet, inconsistency is arguably different
- We aim to measure inconsistency in a **time-sensitive** way (notion of *affected states*)

$K_1 = \{\mathbf{G}a, \mathbf{G}\neg a\}$



$K_2 = \{\mathbf{X}a, \mathbf{X}\neg a\}$



// EXAMPLES

D_1 = {Init(a), Response(a,b), Response(b,c), NotResponse(a,c)}

Then: $I^A(D_1)$ = **1** *for any* ***m>1***

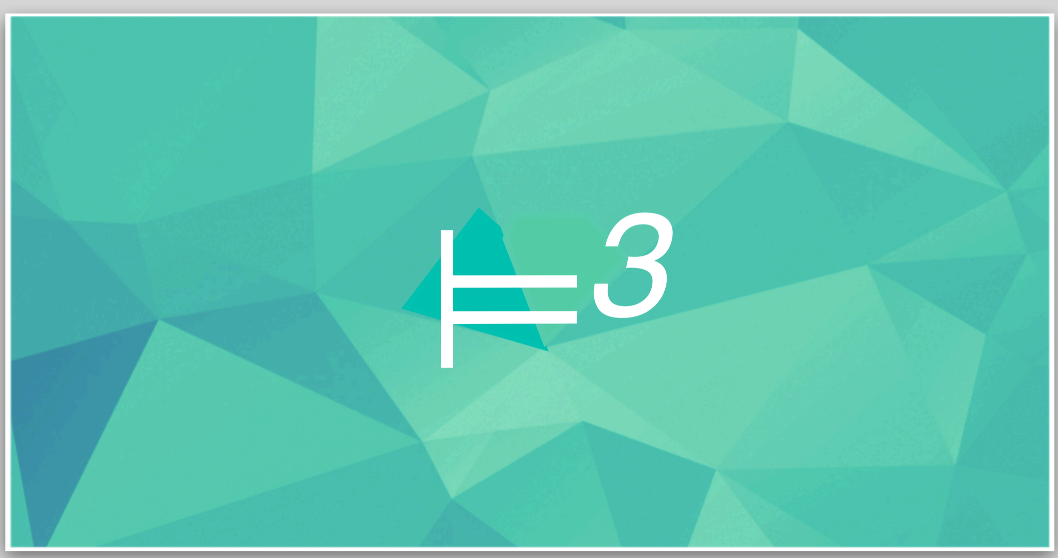
D_2 = {AtMost(a,1), AtLeast(a,**2**)}, and

D_3 = {AtMost(a,1), AtLeast(a,**100**)}

Then: $I^A(D_2)$ **<** $I^A(D_3)$ *for any m>1*

(1) Di Ciccio, C., & Montali, M. (2022). Declarative process specifications: reasoning, discovery, monitoring. *Process Mining Handbook. LNBIP*, *448*, 108-152.
(2) Priest, G. (1979). The logic of paradox. *Journal of Philosophical logic*, 219-241.
(3) Roveri, M., Di Ciccio, C., Di Francescomarino, C., & Ghidini, C. (2022). Computing unsatisfiable cores for LTLf specifications. *arXiv preprint arXiv:2203.04834*.
(4) Thimm, M. (2019). Inconsistency measurement. In International Conference on Scalable Uncertainty Management (pp. 9-23). Springer, Cham.

3-VALUED SEMANTICS



We present a **paraconsistent** semantics for LTL_f

MEASUREMENT/REASONING

This enables paraconsistent reasoning and **inconsistency measurement**

IMPLEMENTATION

We present a novel **implementation** based on MaxSAT encodings

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