Physical aspects of Kelly's bowling *vs.* curling metaphor – creatio ex nihilo *vs.* continua

http://tph.tuwien.ac.at/~svozil/publ/2019-Svozil-Casablanca-pres.pdf
based on https://doi.org/10.1007/978-3-319-70815-7_22 (OA)

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Some *caveats*

- my *ignorance* both as a person and as a contemporary: *Ei mihi, qui nescio saltem quid nesciam!* (Alas for me, that I do not at least know the extent of my own ignorance!) – Aurelius Augustinus, 354–430, "Confessiones" (Book XI, chapter 25) Besides *unknown unknows* there are even *unknown knowns*; that is, things we believe we know but actually don't know (cf. Donald H. Rumsfeld, February 12, 2002; documentary 2013)
- what constitutes a *message* – that is, (non)randomness? — *means relativity* of (non)randomness
- there appears to be an obvious continuum between a *"chaotic"* universe (Exner, 1909) on the one hand, and a *clockwork* universe; with *miracles* and some sort of *Ark of the Covenant* in-between. *On what point in this bracket are we?*

Mathematics of indeterminism/randomness: non-operational & non-constructive & blocked by provable non-provability

- there is no mathematical definition for a *finite* sequence of events
- *(a)causal (in)dependence* of two or more events is subject to (spurious) correlations
  https://doi.org/10.3390/philosophies4020017
- transfinite definition of (in)determinism *via* infinite sequences and theory of (in)computability
- transfinite definition of randomness *via* infinite sequences and algorithmic incompressibility
  https://doi.org/10.1016/0030-4018(87)90271-9
- formal proofs of (in)determinism are in general blocked by Gödel/Tarski/Turing-type incomputability
- formal arguments *depend on the assumptions* (axioms, rules of derivation) made – aka "garbage-in-garbage-out" – there is no *"archimedian ontological anchor"* on which to base whatever

Bowling *vs.* curling / gap scenario in classical physics: uniqueness of solution of ordinary differential equation

According to the Picard-Lindelöf theorem an *initial value problem* defined by a first orderordinary differential equation of the form $y'(t) = f(t, y(t))$ and the initial value $y(t_0) = y_0$ has a *unique* solution if f satisfies the Lipschitz condition and is continuous as a function of t. A mapping f satisfies (global/local) *Lipschitz continuity* (or, used synonymously, *Lipschitz condition*) with finite positive constant $0 < k < \infty$ if it increases the distance between any two points y_1 and y_2 (of its entire domain/some neighbourhood) by a factor at most k:

$$|f(t, y_2) - f(t, y_1)| \leq k|y_2 - y_1|.$$

That is, f may be nonlinear as long as it does not separate different points y_1 and y_2 "too much."

Recent example for non-uniqueness: *Norton dome*
https://www.pitt.edu/~jdnorton/Goodies/Dome/

Bowling scenario in classical physics II: deterministic chaos

- assume classical continuum; select (as per the axiom of choice) one element thereof as a "seed" or initial value
- deterministically "reveal" the information of the seed such that initially "close" states become "hugely separated"

Curling / gap scenarios in quantum mechanics – how to market weakness as strength

- quantum complementarity: in certain situations characterized by finite physical means you can't have your cake and eat it too
- quantum value indefiniteness (aka contextuality): attempts to interpret certain finite configurations of quantum observables as classical value definite properties fail miserably https://doi.org/10.1063/1.4931658
- (radioactive) decay and spontaneous as well as stimulated emissions: no causes found so far

Remarks regarding quantum (in)determinism

- "quantum mechanics only" is inconsistent (permutative state evolution vs. measurement; nesting) https://doi.org/10.1103/RevModPhys.29.454
- quantum physics is "vector world" – different from classical logic based on power sets
- many "evangelical theoreticians" preach various quantum gospels; no consolidated "interpretation" (aka semantics) https://doi.org/10.1007/978-3-662-05032-3_6
- general (deterministic) extensions of quantum mechanics exist and cannot be excluded; specific ones can

Executive summary in one short phrase

(almost) “anything goes”

(ask Paul Feyerabend & Cole Porter, in that order)

Of the many scientific narratives conceived so far, not much is of any relevance for theology; but what they tell has a great utility (technology-wise).

Thank you for your attention!