# Is It Wrong to Quantify Wonder?

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## Outer wonders



 $14^{h}$   $13^{h}$   $12^{h}$   $10^{h}$   $9^{h}$  $16^{h}$   $16^{h}$   $10^{h}$   $10^{h}$   $9^{h}$   $10^{h}$   $10^{h}$  10

right ascension

#### **2dF redshift survey south**



(data taken by the 2dF redshift consortium)

Inner wonders

(video: Inner Life of the Cell, available at <u>http://www.studiodaily.com/main/searchlist/6850.html</u>)

### Kinesin "walking" molecule

(video: Kinesin, available at <a href="http://www.dnatube.com/view\_video.php?viewkey=a8ae0be8b5306971900a">http://www.dnatube.com/view\_video.php?viewkey=a8ae0be8b5306971900a</a>)

(video: Flagellar assembly, available at <a href="http://www.arn.org/docs/mm/flagellarassembly-l.mov">http://www.arn.org/docs/mm/flagellarassembly-l.mov</a>)

**DNA Replisome** 

(video: available at <a href="http://digg.com/general\_sciences/How\_DNA\_Copies\_Itself\_Video#">http://digg.com/general\_sciences/How\_DNA\_Copies\_Itself\_Video#</a>)

# DNA Polymerase (video copyright: David Keller)



# Quantifying the fine tuning?

**DNA Polymerase Model** 

15 interaction points
 positions x 3 = 45
 strength/range x 2 = 30
Hinge position, stiffness = 7
Shapes, stiffnesses of parts ~10

~90 parameters



(video copyright: David Keller)

Why are many people uncomfortable with quantitative arguments for design?

"I know it when I see it."

Past "built-in" human functions which have been quantified:

- temperature
- pressure
- voice recognition
- face recognition

# Failures of human built-in functions







# **Detecting Design**







Can we come up with general criteria for identifying designed things?

#### Inductive argument:

All known designed things have property A.

No known un-designed things have property A.

 $\Rightarrow$  If I find something with unknown history with property A, it is probably designed.

#### What can constitute "property A"?

We want measure of *degrees* of apparent design: "well designed" vs. "borderline," as in face recognition.

Problem: all things in the universe are designed by God. How say some things are designed and others are not?

Requires concept of "domain of control": in *our* sphere of influence, we can create both designed things and undesigned things.





"Defining Undesign in a Designed Universe," D. Snoke, PSCF 60, (2008)

Analogous to the problem of free will and evil.

At lower level, atoms etc. are designed, but at our level, we can make design or not.



Proposed standards for design detection:

#### Order?

A crystal is highly ordered but actually most probable configuration given the attraction between atoms at room temperature.

We associate order with design because at macroscopic scale, it is unlikely except from intelligent causes.





#### Improbability?

Any dice throw is equally improbable.

Few equivalent states? "Negentropy"

Does cooling something make it more designed?

Complexity? Total information content (number of bits to describe)

Pattern of fibers in any cotton wad is very complex.

Information to fully describe a random pattern is large.

*Irreducible* complexity? Behe Complexity plus function which is dependent on it.

Binary yes/no test

Specified complexity? Dembski Match of pattern with prior specified pattern.

Problem of intrinsic, or a priori, specifications.







#### Proposal: Sensitivity (fine-tuning)

In well-designed systems, every little thing matters.

Therefore, changing one little thing has large effect on function of whole.

Expect large change of function w/ small change of internal parameters.



Is modern art a counterexample?

Try changing part of it.



Is an avalanche a counterexample? small change, big effect

# Another aspect of good design:

#### Robustness

Little change if *external* parameters changed.

Requires defining "internal" and "external" of system.



Why do many accept quantitative fine tuning arguments in cosmology, but not in biology? (e.g. F. Collins)



A simple numerical model of evolution of complexity

Why is the amount of vestigial material in living systems so *low*?

Assume energy cost for non-functional elements.



General conclusions of model:



reward value:

1) "Fitness collapse" occurs due to weight of nonfunctional chains, even as number of targets hit increases monotonically. 2) Fraction of "vestigial" (non-functional) chains increases to unity over time.



Overall: models of increasing biocomplexity need to be very concerned about problem of suboptimality. Simple models of random search imply high degrees of non-functioning elements.

Cf. "Systems biology" = productive paradigm in biophysics that assumes near-perfect optimality (e.g. Bialek)



**General conclusions:** 

A computer algorithm to identify a face does not remove the love I may have for that face.

Attempts at quantitative definitions of design in ID do not need to change our awe or love of God.

We do, in fact, see high degrees of fine tuning in nature at all levels.