Is the 'Theory of Universal Information' a weak theory?—Truman replies

Royal Truman

An effective way to sharpen thinking is to have one's views challenged. The technical books I read are full of annotations which recall debates and viewpoints expressed decades ago by others, often very hostile to my opinions. I have profited by (but not always enjoyed) such critiques. The issues stick in one's mind.

I respect very much all the authors of *Without Excuse*[1], a book which I edited and wrote a prepublication endorsement for. I have always been a staunch friend and supporter of Werner Gitt (WG) and will continue to support his efforts in every way in the future.

Over the years I looked intensively for model guidance to help understand how information is processed in biological systems, especially in the brain and in cells with all the new epigenetic discoveries. In asking "What are the processes which guide towards an intended goal?" and "How can this be quantified?" I was led in a slightly different direction than the authors of *Without Excuse*. For the record, I agree with the authors in virtually all the substantive issues. *Information*, however it be best defined, does not arise naturalistically, any more than intelligence and will are properties of matter. We have some disagreement in interpreting various nuances, differences which I believe can make the difference between stagnation of a model or fruitful impetus in a better direction.

Often *different* models exist to help understand the *same* physical behaviour, since models tend to reflect only selected portions of reality. Therefore, scientific and engineering models should often be viewed as useful for some purposes, rather than absolutely true. We have no guaranty our models will ever completely reflect true reality, and there is always the risk we are shadowing the real world very well for the moment, but factually in a flawed manner.

WG states that the authors gained the impression that "numerous critical details of the TUI were not understood; otherwise many of his objections would have been seen as superfluous or in error." Given the nature of friendly debate, I will now, of course, endeavour to discredit this claim, and hereby offer my responses to each of the 10 points brought up. My title to each of these points summarizes *the essence of what I had written,*[2,3] followed by my defense to WG's objections.

1. Some definitions of Information lead to quantifiable results, others don't

It is surprising that 'confusion' on my part in claimed, since WG simply restates what I had clearly written. In both parts 1 and 2 of my series I discussed how the approaches and specific definitions of *information* favoured by thinkers like Shannon, Yockey, Durston, Spetner, Dawkins, Meyer, Dembski, and Schneider permit quantifiable conclusions.

The sentence immediately preceding the objectionable quote says, "*The precise definition of information has dramatic consequences on the conclusions reached.*" I then merely stated a neutral fact: WG sees no possibility or need for UI, his particular definition of information, to produce *quantifiable* results. No criticism was meant not implied. I had also pointed out that Williams' particular understanding of *information* led him to question the notion of quantifiability. I also mentioned uncertainty as to whether Bartlett's interesting thoughts on the algorithmic measure of information lead to clear quantifiable results. What WG wrote is certainly true, and precisely the point I was making; that different definitions of information lead to different conclusions. How I, or anybody, could be confused on something so elementary escapes me.

2. Information in living things resides on the DNA molecule

My quote was based on WG's article,[4] where, under the heading of 'A definition of universal information,' we read, "Information is always present when all the following five hierarchical levels are observed in a system: statistics, syntax, semantics, pragmatics and apobetics." I refer to this as *UI Definition 1*.

But instead of continuing with the valuable concept of a *system*, WG then stated that information resides on merely DNA (which is but a small part of the biological processing *system*). I found fault with this view, or at least the wording. WG then responded that apobetics can be contained in the code *implicitly*, which I believe confirms the truth of my objection, since I had pointed out that "The parts of the definition of information which satisfy apobetics (purpose, result) do not reside on DNA."

Furthermore, I suggested that "*External* factors enhance and interplay with what is encrypted and indirectly implied on DNA." In other words, the intended outcome needs not be present or associated with the DNA at all. To illustrate: *identical copies* of the coding and regulatory portions (e.g. cis- elements) of genes (DNA) from a fertilized egg often produce *entirely different behaviours* in the subsequent specialized cells (due to level of gene expression which could now be zero; which exons are spliced together; etc.). The purpose or result had NOT always or necessarily resided on

only the DNA. Therefore, I deny that the complete apobetic picture of living things must reside on only DNA. However, if WG would recognize DNA is part of a broader *system*, he might see how others arrived at the CIS way of thinking.

3. Are different nuances of information being accidentally used?

My quote, "Information comprises the nonmaterial foundation for all technological systems and for all works of art" can be found among other places in one of WG's books.[5] We wonder what is meant by *information* here. *Intelligence*, or *will*, would make sense. But is *UI Definition 1* really meant here or rather the notion of information as intentionality? Is this not a 'valid but different' usage of the word *information*?

On the next page of the quote we read:

NC 1: A number of symbols are required to establish information.

NC 2: The sequence of the symbols must be irregular.

NC 3: The symbols must be written in some recognizable order.

This is consistent with *UI Definition 1*. But must all man-made technologies, like simple tools, always involve statistics and syntax? Computers and so on, yes. What about the non-verbal act of piling rocks in water to cross a stream or laying a branch between two other ones to hold one's weight, planned exclusively in the mind? And in art, where are statistics and syntax found when one absent mindedly paints a sky on a canvas?

To extricate himself, WG now assures us that UI can reside *solely in the mind* (and as part of point 2, WG had also offered an example where the intention *exists exclusively in the thoughts of the programmer*). (Actually, I thought we learned in point 2 that information in living things resides on the DNA molecule.)

But where now are the discrete codes described by NC 1–3? (Or could the mind actually work like analog computers[6] or other information processing methods without the use of NC1–3?)

If UI can be claimed to be safely inaccessible solely in a non-material mind, it is not apparent how we are to confirm the presence of statistics and syntax, requirements to identify UI.

4. Must the storage and transmission of information always require a material medium?

The response does not address the critique I posed. The discussion on 'Mental Imaging Information' (MII) has no relevance to the point I elaborated in so much detail (read the sections I wrote to convince yourself). The issue is the claim that "The storage and transmission of information requires a material medium" or as stated elsewhere, "the symbols conveying the information are indeed observable quantities; e.g. visible (readable text), tactile (Braille) or audible (spoken language)".[7]

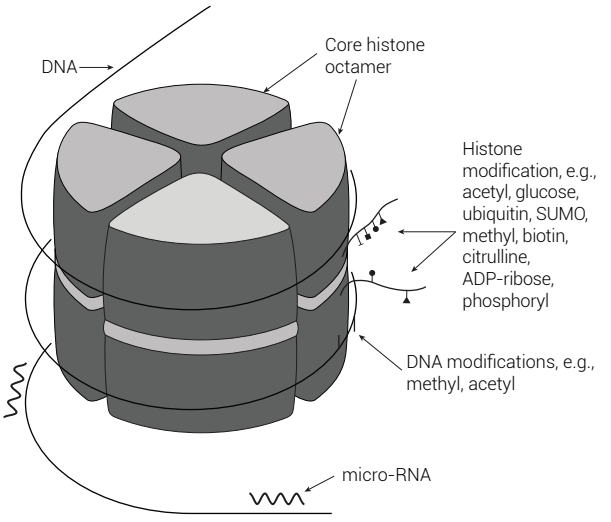

Figure 1. Chemical groups added to histones and DNA can activate or shut down gene expression, in response to intra- and extra cellular signals. There are enzymes which add and remove these chemical groups via carefully regulated logic circuits. DNA here *responds* to external driving factors and is not the source of instructions.

I had argued that there must be some kind of mapping from intention and logic processing in the mind to the material brain. Once the abstract representation of an intention is embedded (coded) in the material world, much becomes clear. But what is the nature of the storage, and subsequent transmission, into the brain? If there is a non-material junction between the mind and the brain, then it is false that *transmission* of information *always* requires a material medium. Alternatively, if the whole storage and path occurs via a seamless material medium (as claimed by WG's problematic sentence), then I argued we must conclude the mind can only be material.[8]

I am repeating what I had already written merely to show that no response was offered. Surprisingly, for the first time WG grants that UI can reside *solely in the mind* (see point 3). Then why the difficulty in further agreeing with me that the storage and transmission of information need not always require a material medium, since we both believe in a non-material mind, a soul, angels, and God? And why must the mind work with discrete symbols before interacting with the material world?

5. Is the message really the *only* input to convey the expected action and intended purpose?

The issue is whether UI Definition 2 is complete and correct. *UI Definition 2*: "Universal Information (UI) is a symbolically encoded, abstractly represented message conveying the expected action(s) and the intended purpose(s)."

I mentioned above, in point 2, that identical DNA sequences (copied with 100% fidelity from the same original gene plus regulatory sequences) can lead to very different biological outcomes in different cell types. I won't elaborate

here, except to hint that what binds to various cis-regulatory elements is often NOT determined by DNA (i.e. the 'message') but by signals external to the cell or even the organism.[9–14] For systems designed to run without active intelligent controls there can be many inputs to communicate desired outcomes, several of which are not coded messages.

Here is an example which contains cosyntics. The message received is: "All is calm, all is bright." What is the expected action(s) and the intended purpose(s)? Does the message transmit UI? I suggest that more than the message alone is often needed to attain a purpose, or to distinguish between several possible purposes. If this message were accompanied by a singing voice, maybe the singer merely liked the tune and no further purpose was intended. There are many other possible answers. Distinguishing among them may require processing a variety of other multimedia inputs, context, and logic. Maybe the true purpose is to wake up soldiers in a humorous manner, and the message is played through a loud-speaker to ensure the intended outcome. Maybe after a child's tantrum a mother goes to the father, winks, and makes the above statement.

My concern is simply the implication that the message *always* does the whole, or major, communication duty. I just showed this is not so, and thus UI Definition 2 is flawed. "I would agree that messages can *contribute* to conveying the expected action(s) and the intended purpose(s) and are indeed often the major contributor."

6. Are the Universal Laws of Information (SLI) true laws of nature?

The critique I made was not addressed. I am aware, of course, of everything WG has published about his laws of information. The issue I raised was whether the limited variety of *unrelated* examples offered for UI would convince objective scientists.

It is true that the word 'law' is used in various disciplines for rather weak principles which hold true,[15] but there is also the more common understanding of the strong claims usually associated with the term 'laws of nature'. These imply that great numbers of *unrelated* phenomena conform (or perhaps *must* conform) to specific principles. For example, Newton's Law of Universal Gravitation or the law of momentum conservation can be measured over a vast range of distances and physical bodies, with precisely quantifiable predictions. Although one can't prove that an exception to a law won't be found someday, the many, many *independent*, positive examples reassure this is unlikely.

If the atheist were to accept WG's SLIs, he would have to admit an intelligent source. He would argue, however, that the examples are mostly limited to systems developed by humans and DNA-based genetics which allegedly derived from but one common ancestor. This might seem like too narrow a data set to qualify as a law of nature. Are laws or theorems being described by WG? This is one line of reasoning which led me to the CIS approach, since there is a better justification for arguing the SLIs won't be disproved (and therefore can be considered laws) than using a limited set of independent examples.

7. What does *entity* mean in in the Scientific Laws of Information?

My concern was not answered. Let's review UI Definition 1 of universal information. This is a very attractive definition, especially given the presence of the word *system*. Let's consider a specific example: cruise missiles have been designed, where the explosives, fuel, computer hardware, and flying equipment represent the lion's share of what is provided to ensure this system's intended outcome. A minor component is the coded message(s) which specifies the target. The *system* as a whole indeed contains all five hierarchical levels. (But surely not the coded instructions to guide the missile, only.)

However, the word *information* is singular, and things get messy when WG needs a suitable word. For the cruise missile *system*, what is the non-material 'entity' alluded to by SLI-2: "Universal information is a *non-material* fundamental entity"? Given that most of the intention-guiding portions of the cruise missile system are actually highly organized material, and that many components were intelligently crafted to ensure an outcome, introducing the word 'entity' muddies the water.

8. SLI-2 through SLI-4 won't ever be falsified

WG misinterpreted my statement. I was not raising the question of falsifiability at this point. What I stated and meant was that I see no danger that SLI-2 to 4 will ever be disproved, based on Definition 1 of UI, since this definition implies the presence of coded messages, for which I see no chance of a naturalist origin ever being found. (I conclude this from my analysis deriving from looking at my CIS model, which demands full identification of all logic processing components. See figures 1 and 2 for examples).

I wrote that I was not persuaded by SLI-1: "A material entity cannot generate a non-material entity", and I remain unpersuaded. It is not clear why a star converting matter into a non-material energy would not serve as a counter-example.

9. Can universal information arise naturalistically?

WG's answer is difficult to follow. I wrote that my concern about tautology refers only to Definition 1 and SLI-3: "Universal information cannot be created by statistical processes."

I don't see how introducing a sender and receiver by WG helps, especially given that in point 2, above, WG admits that an intention could *exist exclusively in the thoughts* of a programmer, and in point 3 states that UI could *reside solely in a mind*. The mind does not consist of matter. I fail to find symbols, statistics, and syntax in some kind of sender–receiver pair in an inaccessible, non-material mind.

My suggestion that the definition of UI implies a putative conclusion remains unresolved. To recognize apobetics has occurred requires intelligence, knowledge of the intention by the creator of the UI. To illustrate the issue, chaos theory studies deterministic non-linear behaviours which are very sensitive to initial conditions (statistically, noise). Sophisticated patterns often arise unexpectedly (recurring bifurcations; non-identical recursions around an 'attractor').[16] Suppose someone believes pragmatics (a functional result) has arisen naturalistically in a chaotic system ('chaotic' in the technical sense used in chaos theory), as has occurred, for example, in Jupiter's massive red spot. How could a putative pragmatics or apobetics result be denied without having to assume the existence of a mind able to judge the matter?

10. Is Definition 2 of UI always correct?

The concern posed was not addressed by WG. The issue was not whether an unknown message constitutes UI. Review Definition 2 of UI above. I wrote, "But it is questionable that the message *must* be responsible to convey the expected action(s) and the intended purpose(s)."

Here is an example which falsifies Definition 2. I wish to get rich quickly and ask an expert for several companies showing rapid growth rate in profitability. The answer I receive ('pull' from the expert) is now a message: "Share prices of Xian, Bugudu, Jiadu, and Gundyu have grown rapidly for over a week." I begin to reflect on how little I know about these companies, whether the share prices are valued correctly, and the effort required to make an informed decision. Finally, frustrated, I go out and buy myself a Porsche. Question: did the message convey the expected action(s) and the intended purpose(s)? No, neither in the question posed nor the answer received.

Decision-making capabilities could exist *a priori* on the part of the receiver, who *pulls* a coded message from a sender, and then decides what to do. (Recall also the cruise missile example, which illustrated how much, sometimes most, of the functional result and/or intended goal could be caused by components other than the message.)

The issue now is that Definition 2 seems to reflect only a *push* concept for a message. However, there are also pull type messages. In querying a data base, looking at a sales catalogue or asking what time it is, the expected action(s) and intended purpose(s) may well not be known at the time the query is posed, but decided upon after evaluation of the message sent back. The message sent back will often NOT represent the intention or expect any action. Resources already present before the query is returned (potential wishes, context, logic, etc.) can then decide, after receipt of the message, what action to take.

I am confident that these replies to all the 10 questions posed will convince WG that very little, if anything, has been misunderstood in evaluating the details of TUI, and I hope he will eventually see that there are substantial reasons, not minutiae in the details such as discussed here, which prompted me and others to proceed in another research direction.

I also wish to assure WG's co-authors that it was after years of honestly trying to put the pieces together using their approach that I decided to make a fresh start. And I am finding the CIS model more fruitful for the research questions I am interested in. If the WG UI model is found to be useful to others for their own purposes or way of thinking, I can only be pleased, and remain more than happy to continue helping WG refine his definitions and argumentation. I never did, do, nor intend to, oppose him or his model.

References

1. Gitt, W., Crompton, B. and Fernandez, J., *Without Excuse*, Creation Book Publishers, Powder Springs, GA, 2011.
2. Truman, R., Information Theory—part 1: overview of key ideas, *J. Creation* **26**(3):101–106, 2012.
3. Royal Truman, Information Theory—part 2: weaknesses in current conceptual frameworks, *J. Creation* **26**(3):107–114, 2012.
4. Werner Gitt, Scientific laws of information and their implications—part 1, *J. Creation* **26**(2):96–102, 2009.
5. Gitt, W., *In the Beginning was Information*, CLV, Bielenfeld, Germany, p. 49, 1997.
6. Gregory, R.L., *Eye and Brain: The Psychology of Seeing*, Oxford University Press, 2003; see pp. 82–83.
7. Gitt *et al.*, ref. 1, p. 75.
8. For other examples, consider cases of intentionality known first in the mind which then causes a physical reaction. If the mind is focused on a nearby item, distant objects are not registered. Then for a split instant one decides to reflect on distant objects in the same sphere of vision. Thereafter, non-material instructions are initiated and transmitted to focus the eyes into the distance. I deny that the entire transmission of instructions from mind into physical equipment must require a material medium. Taken a step further, there can be non-material entities (like angels or the human mind) which are able to transmit information without 'always requiring a material medium' 100% along the whole pathway.
9. Carey, N., *The Epigenetics Revolution: How Modern Biology is Rewriting Our Understanding*, Icon Books, London, 2012.
10. Francis, R.C., *Epigenetics: How Environment Shapes our Genes*, W.W. Norton & Co. Ltd., New York, 2011.
11. Tollefsbol, T. (Ed.), *Handbook of Epigenetics: The New Molecular and Medical Genetics*, Elsevier, Oxford, UK, 2011.
12. Devidson, E.H., *The Regulatory Genome: Gene regulatory networks in development and evolution*, Academic Press/Elsevier, San Diego, CA, 2006.
13. Bray, D., *Wetware: A Computer In Every Living Cell*, Yale University Press, New Haven, CT, 2009.
14. Wooward, T.E. and Gills, J.P., *The Mysterious Epigenome: What Lies Beyond DNA*, Kregel Publications, Grand Rapids, MI, 2012.
15. There are probably thousands of 'laws' defined in various sciences. Usually they only mean generally valid principles, and they are of very limited application. Weber's Law in psychology, states that "the just-noticeable difference between two stimuli is proportional to the magnitude of the stimuli." en.wikipedia.org/wiki/Weber%E2%80%93Fechner_law. This is roughly true, but for human visual perception only and is not universally true anyway: "This law holds fairly well over a wide range of background intensity but it breaks down for low intensities" according to Gregory ref. 6, p. 94. Nevertheless, the term Weber's *Law*, or Weber–Fechner Law, is widely in use.
16. Gleick, J., *Chaos: The Amazing Science of the Unpredictable*, Vintage, London, 1998.
17. Bortle, K.V. and Corces, V.G., Nuclear organization and genome function, *Annu. Rev. Cell Dev. Biol.* **28**:163–187, 2012.