

## **The frog and the swarm of bees, different views of the universe    Georgina Woodward**

In Max Tegmark's paper 'Shut up and calculate' the idea of the frog and birds eye, different viewpoints of the universe idea is introduced. The frog has a view from within the universe whereas the bird can 'fly above' and see the 'larger picture' of the whole. The notion of different equally valid perspectives is useful. Working from that different points of view idea, it would be good to have a frogs eye view and the view of the hive mind of a swarm of super intelligent bees. (This is not about literal bees, bee communication and consensus of real bee hives. Nor is a metaphor for human beings. It is only a visualization tool to aid comprehension of the idea of of the aggregation of different perspectives of the same objects/phenomena.) The bees can then have multiple viewpoints of the same arrangement and relations within the universe, rather than a singular viewpoint. All of the bees are correct, though having different individual opinions on variable values, or states, (such as velocity, direction of rotation, and orientation). This ties in with relativity.

The hive mind view of a swarm of bees encompass a view of an external reality that is fully relative to many independent sensors (bees), providing an aggregate, (not an amalgamation), multi-state, multi-orientation, multi-value characterization of variables. So that for each variable there is a variable profile rather than individual value or state. That represents, a 'world' of many possibilities prior to selection of a singular viewpoint (or apparatus and method, or protocol) giving a singular state or value. This ties together relativity with a solution to the many worlds conundrum of QM. The bee swarm visualization demonstrates the idea that singular attribute measurements are relative. That is, they come from the relation with the entity under consideration rather than being sole property of the entity independently.

The multi-state/ multi-value variable profile has some similarity to the idea of superposition of states in quantum physics prior to a singular measurement outcome being obtained. The variable profiles change; the individual values varying, as the object/phenomenon under consideration moves through, and is affected by, the environment provided by the apparatus/method. The 'superposition' from this perspective is, the aggregate of the states and or values of the relations of the system formed by the object under consideration and environment provided by the apparatus/method. It is the aggregate of values or states of the relations prior to selection of one viewpoint. Rather than just superposition of those outcome possibilities that the measurement apparatus and or protocol allow. In the quantum experiment there has already been mental reduction of the variable profile to the states that are the quantum bits. For analogy: A coin toss would be described as a superposition of heads and tails

(outcomes) rather than a superposition of all the values or states pertaining to all relations to the object as it falls and orientations vary. The multi state 'superposition' evolution.

The multi-state/ multi-value variable profile arises from realization that singular attribute measurements are relative. That is, comes from the relation with the entity under consideration rather than being sole property of the entity independently. In that way the picture constructed comes closer to the truth than the impoverished single viewpoint, singular value and states that are the product of singular observers 'saying what is there'.

The bees hive mind view, rather than frog's, is many measurement values or states for the same variable. That become just one value or state for a single frog. For the frog, the many worlds, other than its own view, are not other universes but different views of the universe not made by the frog. So for him they are just other possibilities. For the bee collective they are actual measurements (though still a sub set of all measurements that could have potentially been made, taking in to account all possible arrangements and motions of bees.)

The 'multiverse' is not formed at selection of a singular state but the singular state is extracted from the multiverse of possibilities that are potentially detectable in the singular existent universe. Being human we approach the universe from a literally human centred perspective. What we find as a result of our investigations is bound to the context used obtain those findings. To clarify; viewpoint of observation (such as from a single camera), or the protocol (such as in a coin toss), or apparatus and method (for example use of Stern Gerlach apparatus), used to obtain a measurement that is a singular, limited, fixed state outcome.

For example,'velocity' as used in physics is velocity of something (See proviso in footnote below), relative to the observer or other reference object. Primarily the variable must pertain to something. Then, relative, because it is the way variables have been identified; measured by imposing a particular perspective. That, gives a singular value result rather than the complete profile of all possible relative measurements. The value or state determined is relational and not intrinsic to the object alone. Calling the measurable variables 'properties' does not help as it seems from the word that they entirely belong to the entity under consideration. Rather than to the relation formed by the context; viewpoint, protocol or apparatus and method. Therefore the word 'attribute' is more fitting than 'property', for variables that are not intrinsic qualities.

The quantum entanglement issue, it seems, stems from thinking of outcome states or values as properties wholly belonging to the entity under investigation rather than being the outcome of the relations that have pertained in finding it. So, an isolated relative value or state does not exist until the experiment and /or protocol or viewpoint is imposed, (that is, the singular state or value forming relation/s happen). Applying the same context to two separate particles, (formed as a pair that are in some way opposites), will inevitably identify opposite singular values or states. All of the solutions to different test are not carried as hidden variable *properties* because the variables are relational that is relative, and the individual sates or values are formed by the relations or context applied.

In "No rule without an exception, except this rule." Stefan Weckbach points out that true falsehood is a kind of truth itself.

Truth could theoretically be arrived at by finding all of the falsehoods and putting them out of the way. Which is how the scientific method at its best works, culling falsehood. Practically it isn't possible to uncover all falsehoods to reveal the complete truth. Nevertheless it is a good method. It will only work well where there is a clear division between not disproven and disproven. Not statistically significant is not a great help.

There are some things that are unknowable for practical reasons, such as what is in deep space, (at uni-temporal Now), beyond the reach of our space faring technology. Not merely Terra incognita but Terra inscrutibilis. Other things are unknowable because they are mutually exclusive; such as the precisely simultaneous position and velocity of an object. Which is an impossibility, as one measurement requires the object to be stationary and the other for it to be in motion.

Direct measurement of the object itself alters its relation to the observer, so the second variable measurement will not be exactly as if the other variable has not previously been measured. The latter point is less significant for macroscopic measurements than those at the atomic or subatomic scale. Firstly because the perturbation can be small in relation to the size of the object measured. Secondly often it is not objects themselves that are measured but visual products that are considered to be the object. Which means the material object itself need not be directly affected by the measurement.

Now having realized that velocity and position are relational and not intrinsic to the object of consideration alone, it can be said that it is the observer who decides when the measurement of position, or the measurement of velocity, forming either a position or a velocity singular, limited, fixed state outcome, will be made. That isolated result value is *selected* at measurement by imposing the relative viewpoint and time of observation. The result does not exist in the universe until the relation/s at measurement that define the measurement value happen.

'Certainly not like that' is potentially closer to the truth than 'it might be like this *or it might not*' of a not dis-proven hypothesis. A theory, hypothesis or method can not be known as truth even after long standing. It may just have not be pitted against the necessary challenge to its validity. It (considering the truth of both truths and falsehoods), is rather like drawing done by outlining the positive filled spaces or by drawing the outline of the negative empty spaces. The techniques arrive at the same outcome if done accurately. Using both can help with accuracy of the drawing. So the scientific method provides both positive (preliminary) not disprovens and certain disproven hypotheses or discredited methods, bringing us closer to 'how it is'/'is happening'. Which is a 'realm of truth', by which I mean the existent universe, as it fully is and is happening, 'alive' rather than static; comprised of the ever changing pattern of existence, that is also changing relations between the different differentiated parts of that existence.

#### Footnote

Proviso re. 'velocity' is velocity of something'. Very often macroscopic measurement doesn't involve interaction with the something itself, as it is with a camera trap trigger for example, but relies upon vision. In which case the velocity is that of the visual product not source 'something' to be precise.

#### References

Tegmark, M., (2007), "Shut up and calculate" via <https://arxiv.org/abs/0709.4024>

Weckbach, S., (2017), "No rule without an exception, except this rule." via <https://fqxi.org/community/forum/topic/2973>