A Model of Consensus

My work is building formal models of human social behavior that go beyond narrative to the extent that they can be tested and improved through computer simulation, and thereby can be used to generate predictions.

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I'm using insights from physics and other disciplines to think about collective behaviors such as protest demonstrations, cults, and even racism. My private term for these phenomena is "social clumping". http://melconway.com/CBH/Missing_Quadrant.pdf

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One form of social clumping that we're aware of a lot now is "separate realities" and "polarization". This essay creates a simple mathematical set model of consensus within a group of individuals. I see it as a step in the direction of formally modeling individual realities

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Here are the sections of this essay:
WAYS OF KNOWING
DEFINITION OF CONSENSUS
A THOUGHT EXPERIMENT
MOVING TOWARD CONSENSUS IS ADDING AN ELEMENT TO A COLLECTION OF SETS

RELATION TO SCIENCE AND POLITICS

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WAYS OF KNOWING
In
https://twitter.com/conways_law/status/1265284306290839553
I introduced the distinction between
The Scholastic way of knowing
and
The Systems way of knowing.

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The consensus model I'll present below is based on this way-of-knowing idea. It seems that ways of knowing exist at different scales. The two ways named above are convenient abstractions; I'll call them Macro Ways of Knowing (MWoKs).

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Now I'll introduce a more fundamental abstraction: the Atomic Way of Knowing (AWoK). This is the smallest indivisible WoK from which larger WoKs are built by inclusion in, and union of, sets.

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I have no idea what an AWoK is, or whether it might have a concrete form. (I'm consoled that Gregor Mendel had no idea what a gene was.)

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In Fig. 1 the largest circle represents the space of all AWoKs. Inside are four imagined and arbitrarily chosen Macro Ways of Knowing arising from four methods of training people: reading lists, problem sets, small farming, and politics.

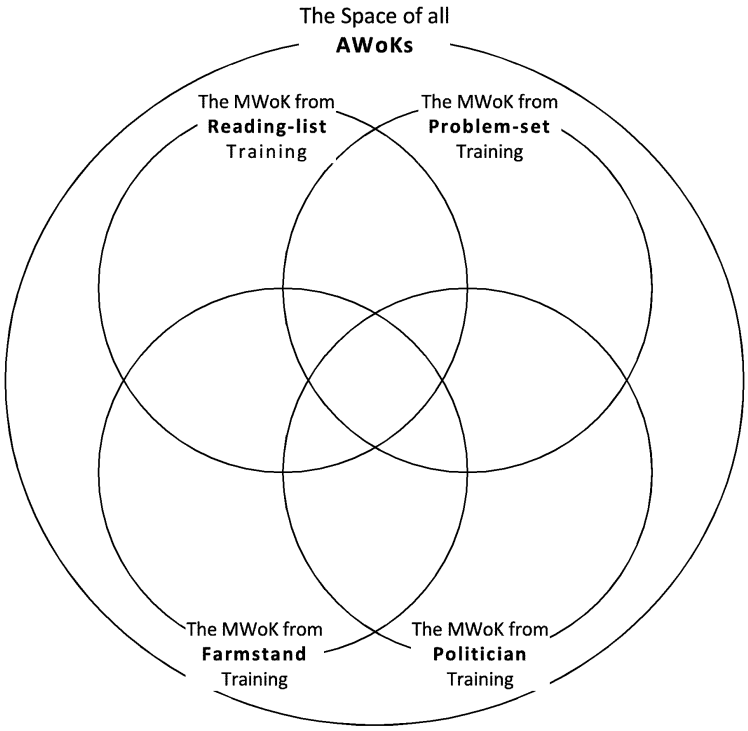

Fig. 1. The Space of All Atomic Ways of Knowing with Four Hypothetical MacroWoKs

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Already this suggests something about education.

Training (all institutional education is training) is a process for implanting pre-designed MWoKs in individuals.

The model suggests that different trainings can build barely intersecting MWoKs.

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Another implication: two individuals whose MWoKs barely intersect would have trouble communicating with each other about their experiences. They would have “separate realities”.

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One more definition.

At each moment each individual has his or her own Individual Way of Knowing (IWoK), which is a subset of the whole space. When you put people together you will get overlaps and disjunctions. These are the smaller circles in Fig. 2.

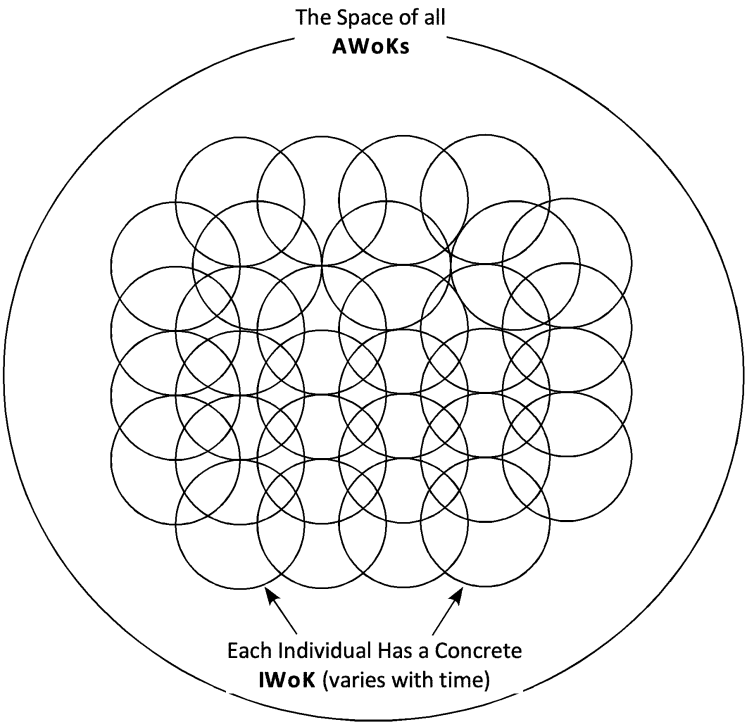

Fig. 2. Individuals Have Their Own IWoKs

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DEFINITION OF CONSENSUS

Now I'm going to build a thought experiment, but first I want to make explicit the underlying axiom of the argument:

Agreement between two individuals is related to the overlap of their IWoKs.

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Hence our definition:

The consensus between individuals A and B *is* the intersection (the common overlapping subset) of A's IWoK and B's IWoK. The thought experiment describes one way to increase that overlap.

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A THOUGHT EXPERIMENT
This thought experiment is an imaginary exercise in team problem-solving.

Assume we want to understand a difficult multi-discipline problem, for example, how does mass disinformation in a pandemic propagate?

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It will be impractical to try to assemble a team in which everybody understands every aspect of the problem. Any one aspect will require ways of knowing in which some people will be strong and some will be weak.

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We must build a collective understanding that is larger than the *initial* understandings of the individual team members.

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The members are chosen primarily for their flexibility and willingness to learn together in certain ways, and secondarily for their knowledge, both depth and breadth.

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Each member takes personal responsibility for the mission of the team:

To deliver a story (i.e., a “theory”) that answers the question in such a way that *every* team member understands it, can explain it, and is willing to own it.

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We put everybody in a room and we give them the problem. What do they do? They try to build a story. The individuals start describing what they understand about the problem in terms of their own ways of knowing.

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Some can understand; some can’t. As each different person speaks, the subset of people who understand what’s being said changes.

But if the team is well designed there will be a handful of people who understand what's being said at any time.

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MOVING TOWARD CONSENSUS IS ADDING AN ELEMENT TO A COLLECTION OF SETS

Fig. 2 above can be seen as showing (only schematically) the initial IWoKs of the team members. There might not be a lot of overlap.

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However, each team member understands that at each stage of story-building, members who understand have an obligation to educate non-understanding members in whatever AWoKs are necessary for understanding.

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That teaching adds those missing AWoKs to the IWoKs of the learners.

That teaching is a key part of the mission of the team. It is the basis of the consensus-building process.

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An extended negotiation occurs through which the team builds a story. This process can be represented as building a path through the space of AWoKs. The path touches all the AWoKs necessary to the understanding of the story. This is shown in Fig. 3.

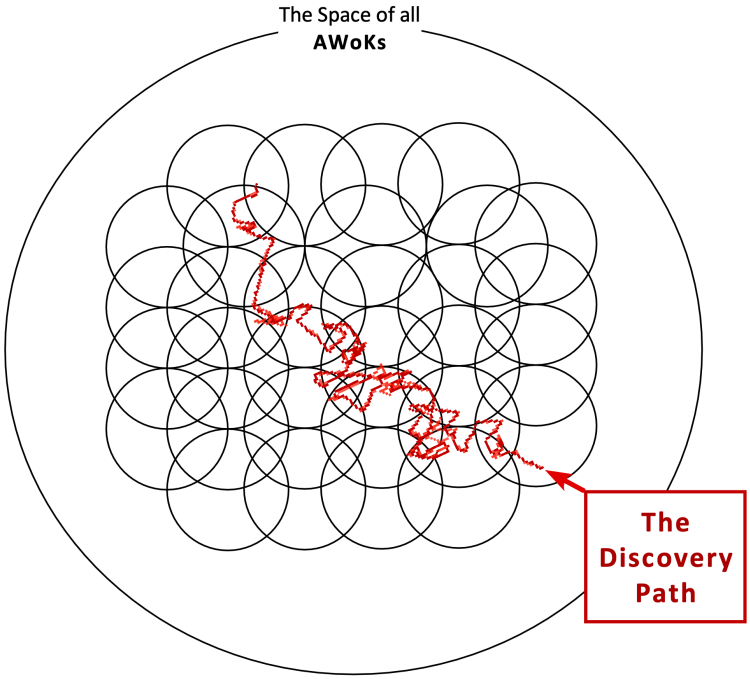

Fig. 3. The Discovery of the Story Is Building a Path Through the Space of All AWoKs

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Each extension of the story extends the path. Each new AWoK on the path is a new way of knowing that each team member must come to own by way of the mutual education process.

(Note: there is no spatial concept of “path continuity”.)

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As each new AWoK is added each teacher-learner interaction enlarges the learner's IWoK to include the teacher's AWoKs that are necessary to their common understanding of that new extension of the path.

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As this proceeds a new subspace emerges, contained in each of the team members' IWoKs, that contains all the AWoKs necessary to explain the story to that point.

We'll call this new subspace the Consensus Way of Knowing (CWoK). Here's what's important about the CWoK:

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1. Every AWoK in the CWoK is in every person's IWoK.
2. The CWoK contains all the AWoKs that are used to explain the story.

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Fig. 4 shows the CWoK built by the team's mutual education process. Most importantly,

The CWoK is a subset of each person's IWoK.

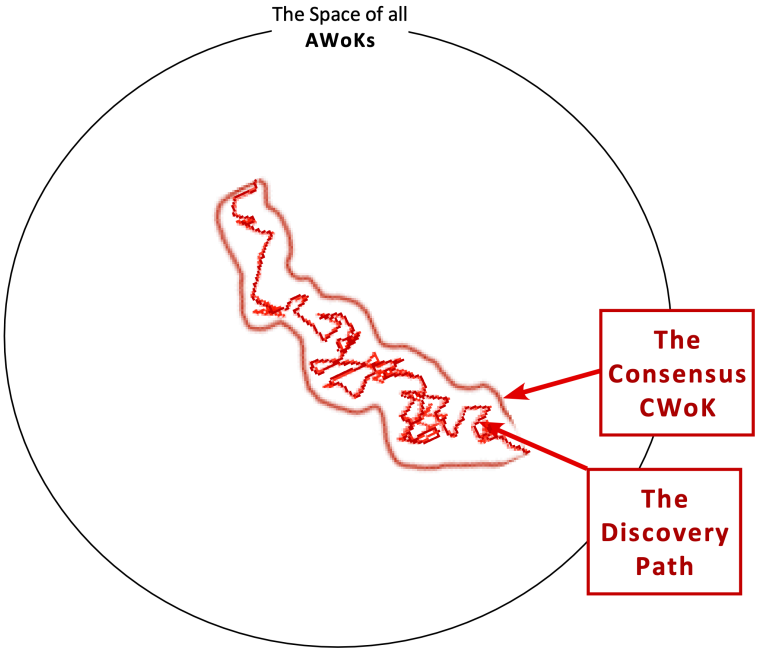

Fig. 4. The Mutual Education Process Builds a Consensus Way of Knowing (CWoK) Common to All Team Members

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Thus, (only) on the matter of the problem given to the team, there is a consensus. It *is* the CWoK.

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RELATION TO SCIENCE AND POLITICS

This thought experiment describes theory-building in science and techniques used by diplomats.

The thought experiment has a problem that science doesn't have: it doesn't have a way to resolve disagreement among participants.

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In science, if A and B assert incompatible IWoKs, the social reward system will incentivize others to devise an experiment to invalidate one of them. If the experiment succeeds, the reward system will cause the others to rally around the winner.

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These are important dynamics that drive science forward.

They suggest that there is peril in considering this social reward system separate from science.

They also suggest an opportunity to rethink politics in terms of its reward system.

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