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## *What has collective wisdom to do with wisdom?*

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Conventional wisdom holds two seemingly opposed beliefs. One is that communities are often much better than individuals at dealing with certain situations or solving certain problems. The other is that crowds are usually, and some say always, at best as intelligent as their least intelligent members and at worst even less.

Consistency would seem to be easily re-established by distinguishing between advanced, sophisticated social organizations which afford the supporting communities a high level of collective performance, and primitive, mob-like structures which pull the group towards the lower end of the achievement scale. But this reconciliation meets with some objections. The most familiar ones concern the mixed record of elaborate social systems, which are said to occasionally or even, according to some accounts, systematically produce wrong decisions, poor assessments, disastrous plans, counterproductive measures, etc. A more recent set of objections rests on cases where 'crowds', *i.e.*, groups *not* organized in a sophisticated way, produce good results, in fact, results which better those of most, or even all, members of the group. Such cases are collected in James Surowiecki's book *The Wisdom of Crowds*, which argues more generally in favor of an 'order out of chaos' view of collective thinking: whether sophisticated or simple, social organizations for the production of knowledge or problem-solving can benefit from the absence of certain individualistic constraints which are traditionally thought to foster excellence in cognitive tasks.

This flavor of paradox is enhanced by Surowiecki's choice of phrase: at the surface level, 'wisdom of crowds' conflicts with the well-entrenched cliché of the folly<sup>1</sup> of crowds; but at a deeper level, Surowiecki seems to appeal to one frequent connotation of 'wisdom' which is precisely its paradoxical character. Whether Surowiecki actually intended to exploit this connotation is not entirely clear, as he uses 'wisdom', 'intelligence' or even sometimes

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<sup>1</sup> Or 'madness': *cf.* the title of Mackay 1852, quoted in Surowiecki 2005, 285.

'knowledge'; and similarly, 'wise', 'intelligent', and even 'smart', interchangeably<sup>2</sup>. However, **and** despite the fact that a lot of attention is given throughout to 'group' (or 'collective') 'intelligence', the book, as I read it, also strongly suggests that the wisdom of crowds should be seen as more than mere collective intelligence, and be thought of instead as partaking of wisdom. Indeed, wisdom of crowds does seem to share with the ordinary concept of wisdom some important features, which in particular do not typically belong to intelligence. Thus as a concept, and as a project, wisdom of crowds invites us to take a closer look at wisdom, in particular in its relation to intelligence or rationality, quite in the way AI invited us decades ago<sup>3</sup>, and in a new guise today invites us again<sup>4</sup>, to take a closer look at (human, ordinary) intelligence, in particular in its relation to cognition or logic for example.

The paper is organized as follows. It starts with a brief clarification of the target phenomenon: wisdom of crowds, in Surowiecki's book, covers a wide variety of phenomena which cannot be encompassed within a single approach, and I will spell out where my focus lies, *viz.* in the 'mindless' processes of aggregation of individual cognitive competences which tend to result in cognitive progress. I will then propose a contrastive characterization of rationality, intelligence and wisdom, as they apply to individuals. Next I will examine the possibility of extending these terms to collective entities or processes (leaving rationality to the side, for reasons which will become clear) and ask to what extent wisdom of crowds can be regarded as a form or realization of collective intelligence and/or collective wisdom. The answer will turn out to depend on which variety of collective processes one is considering: wisdom of crowds in the sense which is central to Surowiecki's argument will qualify as collective intelligence, not as collective wisdom. I will argue, on the other hand, that there exists a more familiar kind of collective process which does meet the requirements on a reasonable extension of the concept of wisdom to the collective level, but is at best distantly related to what Surowiecki reports on and commends.

## 1. Wisdom of crowds and collective cognitive processes

Processes which pool, in one way or another, the cognitive resources of a plurality of human beings, are anything but rare and unusual. Humans have forever been discussing and settling matters collectively. From day-to-day decisions about what, where and when to hunt, pluck or fish, cook, sow, or graze, to the most elaborate systems of knowledge production (such as contemporary science) and deliberation (such as contemporary advanced democracies), people attempt to pool together their intellectual resources in order to come up with answers which they hope, quite reasonably, to be on the average better than any of those which they would have reached individually had they proceeded on their own. Such

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<sup>2</sup> See also his reference (*ibid.* 286) to H. Rheingold's 2002 book *Smart Mobs*.

<sup>3</sup> See *e.g.* Haugeland 1981, Dennett 1978.

<sup>4</sup> Goertzel & Pennachin 2007.

cognitive processes, in which potentially all the cognitive and communicative resources of the individual participants are on call, I propose to call *thickly* collective.

By contrast, processes in which individual agents, far from deliberating, exchanging information and arguments, simply provide their own conclusions, which are then fed to some aggregating algorithm or mechanism, I will label *thinly collective*. Most forms of collective cognition studied by legal theorists, political scientists and historians, are of the thick sort. These fall under the wisdom of crowds concept in its widest extension, but the emphasis, in Surowiecki's book as well as related work in the recent scholarly literature, is on thin collective processes, which will henceforth be denoted by WoC (examples follow presently).

The main contrasts between the two sorts are the following. (1) Individuals participating in thick processes typically interact, in thin processes they do not. (2) During the course of interaction characteristic of thick processes, individuals can, and often do, change their minds or go from indecision or confusion to a firm opinion and a relatively clear view. In thin processes, there is no place for such intra-individual dynamics. (3) The aggregating procedure of a thin process is insensitive to everything but certain data delivered in a predetermined format, and it is fixed throughout the procedure. In particular, it is insulated from the participating individuals' views on the process; for example, it cannot be improved or modified in any way as the process unfolds. By contrast, thick processes allow, except perhaps in highly formalized settings, for changes in the procedure. In particular, as the process unfolds, participants usually have an opportunity to form and revise their understanding of the procedure and may argue in favor of changing it.

In fact, the two types of processes are polar opposites, between which intermediate cases arise. Classical 'thick' procedures can be simplified so as to limit interactions to a more or less restricted set<sup>5</sup>, and symmetrically WoC procedures can be enriched so as to allow 'thicker' information to be transmitted and aggregated. Locating a particular collective process on this scale can be difficult, a challenge for the historian, the political scientist or the cognitive scientist. Sometimes there is no obvious way to individuate a process. For example, an election can be seen as a thin process if it is limited to the voting procedure, while it appears as thick, or somewhat thicker, if the campaign is included.

One condition however is essential to thinly collective processes: the aggregating function must be filled by a computational, automatic mechanism. The central agency must be essentially 'dumb', or rather 'semantically blind'<sup>6</sup>, in order for the WoC effect to be fully

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<sup>5</sup> An example might be the Delphi method; see *e.g.* Linstone & Turoff 1977.

<sup>6</sup> The disputed conceivability of genuine artificial intelligence makes this point hard to put concisely: 'dumb' computers may turn out to be 'intelligent'. Yet they remain, on the classical analysis, 'syntactic' machines, with no direct, 'first-person' access to the semantic content of the symbolic structures which they process; hence the appeal to 'semantic blindness'. In practice however, there is in most cases no difficulty involved in locating a given collective cognitive process on the thickness axis, and in classifying it as essentially thick or thin.

expressed. In the simplest case, the individual inputs are numerical quantities (the estimated weight of a prize ox, a preference order, a one- or two-dimensional interval expressing the agent's estimate of the location of some unknown, etc.), and the aggregation is performed by averaging, or some comparably simple operation. More complex cases are prediction markets, with the bookmaker implementing a possibly non strictly algorithmic procedure<sup>7</sup>, yet still restricted to the odds on offer, and accepting no further information or rational consideration bearing directly on the situation under scrutiny.

Another distinction is relevant to the discussion of the collective processes gathered by Surowiecki under the 'wisdom of crowds' label. He distinguishes three kinds of such processes, according to whether they are meant to solve cognitive, coordination or cooperation problems. The latter two are important both for Surowiecki's theoretical project and to his business, economics and public affairs constituency.

The three kinds of problems would seem to be quite different: while cognitive problems involve an individual or a group assessing an aspect or a fragment of the world which is roughly independent of her or them and remains essentially unchanged as the cognitive process unfolds and delivers a result, coordination and cooperative problems are inseparable from the agents' condition, and the solution arrived at by definition alters the situation they have been working on. In traditional parlance, cognitive problems belong to reflection, more specifically world-directed reflection, while coordination and cooperation problems belong to action, more specifically to self-directed action. Moreover, cognitive problems lend themselves most naturally to an individualistic analysis, one addressing the idealized setup of a single cognizer facing a mind-independent reality; this is the base camp from which one ventures in the exploration of collective setups, as the present chapter illustrates. Coordination and cooperation, by contrast, appear as collective from the start.

Yet from another viewpoint, the three families are all species of a genus, *viz.* problem-solving. Assessing the weight of an ox or finding the best way to make people pay taxes, to move along a crowded train platform, to regulate traffic on week-ends or to establish authority on the Web are all problems which can equally well be taken on (though not necessarily solved) by an individual, by a somewhat structured group pooling its cognitive resources through a standard 'thick' collective process, or yet again by a crowd enrolled in a WoC 'thin' process. And the essence of 'thin' processes can be stated in general terms covering all three kinds of problems: renounce central control by a sentient planner in favor of a pre-organized or self-organized process feeding on the individual members' resources, whose outcome is a solution to the problem at hand. A rough analogy may be drawn with a well-studied contrast among AI systems. On this analogy, thick processes would correspond to classical AI, with inference schemes operating on complex symbolic structures by virtue of central control and planning, while thin processes would map onto connectionist or 'parallel distributed' models of cognition, where typically numerical data are processed in parallel by

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<sup>7</sup> I don't know enough about prediction markets to feel any confidence on this point.

simple automata, without central control, and where the competence of the system lies in the connections between nodes, rather than in any privileged component<sup>8</sup>.

Finally, it is worth noticing that some of the most interesting real-life situations (*e.g.* the scientific enterprise) involve a mix of the three kinds of problems: collectively solving a ‘cognitive’ problem may well involve solving coordination or cooperation problems.

Beyond these very general remarks however, attempting to deal with all three kinds of collective processes at once would be futile. Henceforth the focus will be on collective processes deployed for cognitive purposes, or, briefly, cognitive collective processes (CCPs), and within that set, on thin CCPs, also denoted by WoC.

## 2. Rationality, intelligence, and wisdom

Wisdom and intelligence are inextricably intertwined in common parlance. This is especially true for the adjectival forms, ‘wise’ and ‘intelligent’: in many cases, exchanging one for the other in a proposition seems to preserve its core meaning, although not necessarily all the connotations. What one journalist will describe as a wise move on the part of a politician will be characterized by another as an intelligent (or smart) thing to do. Taking some time to dispassionately determine the right car to buy (or whether to buy a car at all) can equally be said to be intelligent or wise, and putting an end to the search for a perfect answer to be wise or intelligent. On the other hand, saying of someone that she is a wise person is not the same as saying she is intelligent, or remarkably intelligent. The substantives lend themselves even less to interchange: wisdom is typically associated, in folk psychology, to age and experience, intelligence is found in the very young. Such intuitions based on ordinary usage are not to be taken on board uncritically. I will try and show however that (i) there is a distinction and (ii) that it does not rest solely on a difference in domains of deployment.

‘Wisdom’ and ‘intelligence’ are not only notoriously slippery concepts, they are also extraordinarily loaded terms. Analytic philosophers, by and large, have all but ruled them out of bounds<sup>9</sup>; they have thought of them as too loose for theoretical purposes, leaving them for popular writers, psychologists, computer scientists to discuss. Intelligence has been represented, on the contemporary philosophical scene, by rationality, cognition or knowledge. Wisdom has split into two very unequal parts: practical wisdom is extensively scrutinized by moral philosophers under labels such as ‘flourishing’, ‘the good life’, ‘prudence’; theoretical wisdom appears in epistemology under the guise of ‘judgment’ or

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<sup>8</sup> Rumelhart & McClelland 1986.

<sup>9</sup> Characteristically, Lalande’s *Vocabulaire* (1<sup>st</sup> edition 1902–1923, 5<sup>th</sup> edition 1947) has entries for both terms, while the comparably sized *Cambridge Dictionary of Philosophy* (Audi 1995) has neither.

'reasonableness'<sup>10</sup>. Wisdom as a term of art is definitely philosophically outdated. As for intelligence, its theoretical status of has been put into question, due to its less than stellar (some would say disastrous) scientific track record, and also for ethical and political reasons. Yet we cannot avert our gaze from these contested topics if we want to get clearer on the purported 'wisdom' of the phenomena described by Surowiecki.

By contrast, rationality is all the more philosophically respectable as it is a term of art which only philosophers and social scientists use, although the adjectival forms (rational, irrational) have been incorporated in common parlance. As just mentioned, it is closely connected to intelligence. Perhaps rationality is just the philosopher's code word for intelligence. Let us take a closer look, first at one, then at the other.

### *Rationality*

As an area of research, rationality is fairly well-defined. As a concept, however, it is not: there is no consensus on what it covers<sup>11</sup>. There is nothing alarming about this: the important thing is that there exist a rich set of overlapping theories of rationality, whose precise articulation constitutes a stimulating goal for the entire field<sup>12</sup>. For present purposes, a working definition is needed. I propose to distinguish three families of definitions which together cover most uses of the concept in the current literature, with the following *caveat*.

One of sources of plurality is the variety of entities to which the rationality predicate can be applied: beliefs, judgments, desires, intentions, actions, behaviors, emotions, and many other things which incorporate some means toward a stated end, ranging from persons to laws, rules or customs. There is a debate as to which are primary and which secondary. Here I will restrict myself to sets of mental entities, comprising beliefs, intentions, habits of mind, (internal) norms or values, preferences, etc.. with occasional extensions to individuals harboring such entities.

N-definitions (N for 'narrow') take rationality to consist in a demand for consistency and coherence among the beliefs of an agent, or between her beliefs and her goals, at any moment in time or over an extended period. Consistency in turn is cashed in as absence of contradiction, and coherence, a more problematic notion, aims at characterizing the unity of the set under consideration, the extent to which its various elements are connected, and the principled or systematic nature of the connections.

B-definitions (B for 'broad') define rationality in terms of reason: rationality is a commitment to the deliveries of reason. Reason in turn stands for a variety of demands:

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<sup>10</sup> This traditional division between two kinds of wisdom will be questioned in what follows (§2).

<sup>11</sup> See for example Mele & Rawling 2004. For another piece of lexicographic evidence, as of this writing there is no 'rationality' entry in the Stanford Encyclopedia of Philosophy.

<sup>12</sup> See for example Spohn (2002).

objectivity, reproducibility across contexts and persons, conformity to recognized norms, rules and method of reasoning, respect for evidence, openness to and curiosity for new facts, preference for comprehensiveness, consistency, coherence, careful weighing of relevant factors, and, importantly, acceptance of the dispassionate critical game of public giving and taking of reasons.

R–definitions (R for ‘resistance’) take rationality to consist in the capacity to resist distorting factors in the formation of one’s beliefs, intentions etc. Rationality on this general view is an active avoidance of subjectivity, dogma, prejudice, bias such as discounting of less salient or less favorable evidence, disregard of base rate, reliance on surface features of wordings, wishful thinking, bad faith, etc.

No attempt is made here to minimize overlap or completely avoid circularity (which I take to be impossible in any case). Within each family of definitions, many delicate choices must be made in order to deliver an acceptable, reasonably precise definition. What concerns me here is to motivate the stipulative definition which I will need to proceed. So let us first note that B–definitions trivially encompass both N– and R–definitions. N–definitions don’t seem to imply B–definitions, except perhaps if coherence is given a very broad extension indeed; on any moderate version of N–rationality, someone could be N–rational without, for example, letting into her belief system certain types of evidence, or while refusing the game of public giving and taking of reasons. R–definitions don’t imply B–definitions, on the face of it, although if it were possible to extend the list of misdemeanors which are to be resisted to all the violations of the demands of reason, one would presumably trivially obtain equivalence. More interesting perhaps is the related question of whether R–definitions don’t *presuppose* in some way a B–definition: supposing for example that you specify your R–definition of rationality as an active avoidance of bias, would you not have to say that a bias is a systematic tendency to deviate from B–rationality? This would be avoided by an R–definition which would specify an explicit, finite list of the biases to be shunned; but such a definition would be vulnerable to the discovery (conceptual or empirical) of some hitherto unsuspected bias.

A final consideration is that only B–definitions make explicit and central the connection of rationality with reason, and this indeed seems to be a feature which would have to be included in any non–arbitrary definition. B–definitions appear to be the more basic, and this leads me to propose as a stipulative definition of rationality the following version. *A set of mental entities (states, dispositions, processes...) is rational to the extent where it accords with the demands of reason: objectivity, communicability, public reason–giving and taking, including honest acceptance of critical argument, regard for evidence and openness to novel facts, comprehensiveness, consistency and coherence.*

*Intelligence*

As remarked earlier, intelligence, unlike rationality, is a household word with a thousand and one uses, and intelligence judgments often seem to say at least as much about the judge's tastes and abilities as about the person being judged. Cognitive science has all but discarded the notion as non-scientific, in large part because it seems to rest on a view of the mind as a homogeneous system, whose performance can be assessed along a single dimension<sup>13</sup>. On the other hand, intelligence is universally seen as an almost priceless commodity and has been the focus of enormous quantification efforts on the part of psychology, working in tandem with educational and military authorities, as well as human resources departments of businesses and administrations. This work has also had momentous consequences in penal practices<sup>14</sup>. Finally, as mentioned in the introduction, Turing and the artificial intelligence movement have defined intelligence for their own purposes, drawing on an essentially unanalyzed reference to human intelligence: intelligence is whatever is exercised by a human agent in order to accomplish a task generally considered as requiring... intelligence; and a machine which can carry out such a task is thereby considered to exhibit some degree of intelligence<sup>15</sup>.

This gives us a lead. First, intelligence is to a large extent a matter of getting the job done, *i.e.* of solving problems in finite time. Second, this performance cannot be the outcome of a series of strokes of luck. Intelligence comprises another dimension, which is the capacity to understand the world (construed in the broadest possible sense). The two dimensions are not wholly independent. The understanding is an important factor of the problem-solving capacity, and at the same time it is heavily dependent on it: one gets to understand the world in part by solving problems of categorization, causal attribution, etc. Yet they are distinct: understanding is also brought about by cultural transmission (in particular formal and informal learning, imitation), by experience, and for some aspects of the human world by empathy; conversely, the solution of certain problems seems to require very little, if any, world understanding—that would seem to be the case of abstract logic, mathematics and other formal set-ups such as chess, go and other games and puzzles.

Intelligence comes in degrees. Although sometimes the term of reference is left unstated, it is an essentially comparative notion. On this count, the two dimensions of intelligence are also correlated, but only partly so. It is hard to imagine a very deep understanding of the world accompanied by a very low problem-solving capacity, and the reverse seems true: except for ill-understood and rare cases of prodigy-level performance in some restricted kinds of problem-solving, accompanied by very feeble understanding of the world (idiots savants, certain forms of autism), a high problem-solving capacity is a good predictor of a fair level of world understanding. However one may score high on

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<sup>13</sup> See *e.g.* Piatelli-Palmarini 1980, Barkow *et al.* 1992.

<sup>14</sup> As illustrated for example in Flynn 2007.

<sup>15</sup> Turing 1950, Newell and Simon 1976.



understanding and modestly on problem-solving, and conversely. All of this remains true if one chooses to break down intelligence into domain-specific abilities<sup>16</sup>.

How do psychologists view intelligence? Problem-solving is directly or indirectly involved in their characterization of intelligence, but it is not usually complemented by 'world understanding'. Instead, they list elementary capacities, such as those which form the WISC IQ test: information, arithmetic, vocabulary, comprehension (a very elementary form of world understanding), picture completion, object assembly, coding, picture arrangement, similarities<sup>17</sup>. Alternatively, R.J. Sternberg proposes to complement 'analytic intelligence' (abstract problem-solving) with 'creative intelligence' and 'practical intelligence' (deployed when applying concepts to real-world situations)<sup>18</sup>.

By contrast, J.R. Flynn suggests in the beginning of his recent book, *What is intelligence?*<sup>19</sup> that before we can start to make sense of the famous Flynn effect (the robust and steady increase of IQ in all populations, during the 20<sup>th</sup> century, at a rate in the order of .3 IQ points per year), "we must dissect intelligence into solving mathematical problems, interpreting the great works of literature, finding on-the-spot solutions, assimilating the scientific worldview, critical acumen, and wisdom". This is remarkable in two ways: first, it features world understanding prominently; second, the view of intelligence it proposes is externalist in part, in the sense where what counts as 'understanding' and what counts as 'the world' are not determined on purely individualistic grounds, but have a crucial social-cultural component. The internal component Flynn attempts to explicate, later in the book, by proposing a pretheoretical concept of intelligence in the form of "*an answer to a question: what traits affect our ability to solve problems with cognitive content?*". He lists mental acuity ("the ability to provide on-the-spot solutions" to novel problems), habits of mind, attitudes (which "lay the foundations for acquiring habits of mind"), knowledge and information, speed of information processing, and memory retrieval<sup>20</sup>.

Psychologists thus waiver between, or combine internalist or partly externalist functional definitions of intelligence and 'chemical' definitions, which go by listing elementary 'ingredient' properties and/or sources of intelligence. The commonsense (or 'folk-theoretical') notion seems to rest on a third kind of definition, substantive or essentialist: intelligence is something 'out there', present (in varying degrees) in people's minds, and which accounts for the presence, in the intelligent person's minds, of all the ingredients detected and tested by the psychologist.

Against this rather complicated background, we should recall the goal of the present chapter: examine the contrasted or complementary claims that collective cognitive processes

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<sup>16</sup> There is no need here to open a debate about forms of intelligence and the independent reality of general intelligence (the psychologists' 'g factor').

<sup>17</sup> See Flynn 2007: 5.

<sup>18</sup> Sternberg 1988, as summarized in Flynn 2007: 79.

<sup>19</sup> Flynn 2007: 10. Flynn defends a three-pronged approach to intelligence, based on 'Brain, Individual Differences, and Social trends' (*ibid.*, 56-7).

<sup>20</sup> *Op. cit.*: 53-4.

constitute forms of 'intelligence' or forms of 'wisdom'. It seems that the most natural stipulation at this juncture, regarding (individual) intelligence, is to define it functionally, as *the capacity to understand the world and to use this understanding in order to find in due time acceptable solutions to an unlimited variety of pressing problems, including problems arising from the need to better understand (describe, explain, predict) the world*. The definition is to be understood comparatively, thus allowing for degrees of intelligence in different individuals and relative to different realms, and partly dependent on the cultural context. In particular, it is intended to make room for a modulation of performance according to the region to which someone's mind is attuned, and according to the degree of versatility achieved—the breadth of problems which can be successfully attacked, and the fluid passage from one kind to another.

### *The link between rationality and intelligence*

Rationality and intelligence are closely connected. Intelligence enlists rationality. Reason is the best proven resource for accomplishing the typical tasks facing intelligence: it is a rare problem which does not benefit from the recommendations of reason for its resolution. These recommendations can be positive—for example, coherence and comprehensiveness are often good heuristics. The instrumental role of rationality also comes into play: wanting to solve a problem and believing that this requires solving some subproblem leads one to a course of action which is conducive to the solution of that subproblem. But reason's recommendations can also be, and arguably are more often used negatively: rationality *rules out* erroneous solutions, for examples, those which violate the consistency requirement, or those which succumb to one or another kind of bias. Here the R-side of rationality is on full display: intelligence enrolls R-rationality to prune its search tree. Altogether, intelligence is a rational employer of reason, and in particular tends to deploy typically rational methods.

Connected as they are, rationality and intelligence are nevertheless distinct. This is clear from a commonsense or folktheoretical standpoint: someone may be highly rational and of average intelligence, or acutely intelligent though not meticulously or uniformly rational. On our stipulative definition, as we have just seen, rationality disallows certain thoughts, thought processes, intentions, desires and actions, recommends others, but doesn't systematically prescribe any. Neither does rationality prescribe intense activity, over and above the minimal requirements of survival: the rational person can be minimally active without necessarily ceasing to be rational. She may be constitutionally slow, slower than would be in her best interest, and too slow to accomplish even moderate feats of intelligence: one cannot fault someone's rationality for their being slow. The same goes for memory: poor memory doesn't impugn (except perhaps in pathological cases) on someone's rationality (else we would have to say that a better memory is indicative, *ceteris paribus*, of a higher degree of rationality, which doesn't seem right). But (as Flynn reminds us) memory is

an important resource for intelligence, and one which an intelligent person will consciously cultivate.

Most importantly, intelligence seems to rely on a kind of grasp which allows it to see the problem situation as a foreground/background structure and to zero in on a promising direction. Intelligence can change perspectives, initiate a new approach (which is to say, it can redescribe the problem and impose a new foreground-background structure), take a step back or sideways. Intelligence favors serendipity: it is able to discern, in a chance encounter, the long-sought solution to a seemingly unrelated problem<sup>21</sup>. Intelligence is creative or imaginative in this sense (which may be connected to, but is distinct from the usual meaning of these words: it is not part of intelligence that it rely on the rare ability to produce entirely novel forms). Although some authors attribute this ability to rationality, it lays clearly outside the perimeter of the working definition we have adopted.

Taken together, the above considerations seem to imply a form of inclusion: intelligence would appear as rationality *supplemented* by certain further abilities or virtues. But this is an oversimplification, for at least two reasons.

First, it would seem that intelligence can co-exist with at least a certain amount of irrationality, that is, clear breaches of rationality. Trivially, someone can display both a high degree of intelligence and a deeply irrational behavior or train of thought, as long as the areas concerned are distinct (a gifted mathematician can be an irrational gambler, Othello is manifestly intelligent and no less visibly irrational –the same can be said, in fact, of many political figures, and generally of many outstanding individuals–, cognitive psychologists have shown that high-ranking intellectual professionals systematically violate, under certain conditions, elementary rules of logic or probability, etc.). It is not so clear that someone can be at once irrational and intelligent, in other words, that the same train of thought, piece of behavior (overt or covert) etc. can count as being both irrational and intelligent. But it does become arguable once one realizes that a piece of behavior, say, can be seen as irrational in the larger context, and intelligent in the narrower context. So fixing the washing machine can count as an achievement of intelligence, and also appear as quite irrational if performed at a time of disaster or emergency.

Second, but more controversially, intelligence seems compatible with a degree of a-rationality, that is, there may be cases where intelligence floats free of rationality altogether. This might occur when the solution to a given problem immediately ‘springs’ to the mind, without any systematic search, reasoning or deliberation. There is no doubt this happens frequently. It has been abundantly documented in grandmaster-level chess, and it is a feature often seen as characteristic of expertise. What make these cases moot is the role played by unconscious processes: there is no guarantee that the agent is not, after all, performing very fast rationality-sanctioned operations, in part due to a huge repertory of

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<sup>21</sup> The history of science provides many famous examples of so-called ‘chance discoveries’, such as the rediscovery of penicillin by Alexander Fleming in 1928.

memorized situations and a well-trained 'similarity module'. But then, there is *always* a level at which conscious processes bottom out, including rational deliberation.

However it be, we may summarize the differences between rationality and intelligence as follows. First, intelligence, unlike rationality, contains a success clause; in this respect, intelligence stands to rationality somewhat in the way performance stands to competence in the realm of language. Second, it cannot be ruled out that intelligence occasionally deploys non-rational procedures to reach its goals.

Should we then reject our initial view of intelligence and rationality as being strongly connected? Hardly. Despite being possibly (if some of my arguments are roughly correct) an *oversimplification*, the model of intelligence which first emerged, in which intelligence by and large includes rationality and supplements it with performance factors (such as swift application of a judicious and efficient problem-solving or proof-seeking procedure, prompt memory retrieval, etc.) remains *basically* correct. As for the last suggested discrepancy, which has to do with the possibility of non-rational shortcuts, it can be argued that although intelligence may not always *proceed* in explicit agreement with rationality, its *end products* can always be accounted for in rational terms. To put the point more vividly, although intelligence may not always proceed stepwise, with reasons provided for every step, it typically yields trajectories which can be reconstructed as a series of reasoned steps.

### *Wisdom*

There is a traditional conception of wisdom which makes it obviously distinct from intelligence, but which is of no relevance for our present purpose. WoC has clearly not much to do with the higher ends of human existence, with flourishing or with the proper way to "meet with Triumph and Disaster". On the other hand, wisdom is often understood precisely as the art of living a life worth living. Intelligence might then be considered, to put it briefly, as the art of knowing (explaining, predicting, discovering,...), and so the two would appear as distinct by virtue of applying to different domains, and 'wisdom of crowds' would appear as a simple misnomer.

On this traditional view, wisdom and intelligence also differ in nature: while wisdom is seen as a virtue of character (exemplified by the Stoic philosopher, the philosopher *tout court* in the popular imagination, the Zen master, or again Kipling's 'man'), intelligence is a virtue of reason. Wisdom is about controlling one's desires, emotions, ultimate goals, and mustering courage and moral strength; intelligence about controlling one's belief fixation procedures and determining one's action plans in a rationally optimal way.

This view, which is at least roughly Platonic, aligns therefore two contrasts: (i) knowledge / life; (ii) reason (or intellect) / character. Aristotle however saw, against Plato, that leading the good life is not merely a matter of character, and that it *also* requires a special sort of *intellectual* virtue: neither theoretical knowledge nor character are enough to

insure the competence required for practical purposes. This only *phronêsis* provides, and it is, next to *sophia* (theoretical wisdom), an intellectual virtue (*i.e.* one attached to that part of the soul to which reasoning properly belongs)<sup>22</sup>. On this view, wisdom and intelligence both belong to reason, and thus do not differ in nature, but only in their domains of competence<sup>23</sup>.

I would like to propose a symmetrical move, and thus complete the 4–place logical space created by crossing, instead of aligning, the two above–mentioned contrasts. Just as the pursuit of a life worth living calls on two distinct resources, one purely intellectual (practical wisdom in the Aristotelian sense) and the other pragmatic (character: courage, temperance, justice, etc.), I tentatively propose to regard the pursuit of knowledge as resting on two pillars, intelligence (closely related, as we saw, to reason *via* rationality) and *epistemic* wisdom, as I will call it. In the following table, the key feature is the presence of two elements on the ‘knowledge’ line; the choice of terms in the other boxes, which might cause concern, can fruitfully be left unexamined here:

Domain ↓	Faculty →	Rational/intellectual skills (theoria)	Pragmatic skills (praxis)
Life		<i>phronêsis or practical wisdom</i>	<i>character</i>
Knowledge		<i>sophia or intelligence</i>	<i>epistemic wisdom</i>

The task before us now is to make a case for epistemic wisdom as an ability or skill not already included in intelligence. The discussion can hardly be conclusive, given the highly elastic semantics of the words under consideration, and its purpose is to motivate a stipulative definition needed to provide an answer to my title–question. The motivation, in rough outline, is straightforward enough: intuitively, one step above rationality is intelligence, and one step above intelligence is wisdom– after all, wisdom has been associated, since the beginning of philosophy, to the notion of ultimate or supreme quality, and this association remains clearly central to the everyday use of the word.

A good starting point may be to think of those cases where intelligence runs out. In the moral domain, the analog might be the cases where one’s powers run out, where there is nothing one can do to prevent or repair misfortune. Traditionally, this is where wisdom takes over: the sage draws the fundamental distinction between what depends on us and what

<sup>22</sup> *Nicomachean Ethics* VI, 2. I am indebted to J. Labarrière’s article on wisdom and temperance in Canto–Sperber 1996: 1326.

<sup>23</sup> Thus Robert Nozick writes: “Wisdom is what you need to *understand* in order to live well and cope with the central problems and avoid the dangers in the predicaments human beings find themselves in” (Nozick 1989: 267, quoted in Ryan 2008; my italics), and proceeds to give a long list of pieces of knowledge, of kinds of know–how, of instances of understanding which are all required for wisdom. Sharon Ryan calls this conception ‘Wisdom as Knowing How to Live Well’.

doesn't, and turns this intellectual insight into fortitude; this allows him to live through the storm and remain true to himself. In the theoretical domain, epistemic wisdom consists in the inquirer's recognition and acceptance of her epistemic finitude, and her ability to live with it without renouncing her epistemic ideal. This is the 'humility' criterion, first put forward by the wisest of Athenians, Socrates.

It is quite important not to confuse the humility criterion with the notion of bounded rationality. As Jon Elster remarks, the inflexible demand for optimal rationality is not true rationality but 'addiction to reason'<sup>24</sup>. The key insight incorporated into the notion of bounded rationality is that the truly rational being or system takes into account the finiteness of its resources (including the time available before a decision must be made) and consequently settles for suboptimal answers. More generally, intelligence is supposed to regulate our epistemic agenda: it is clearly within its purview to evaluate the difficulty of certain tasks and to recommend not to take them on<sup>25</sup>. But bounded rationality, or self-aware intelligence, is still rationality or intelligence. "Wisdom, Elster rightly insists, is not the ability to terminate deliberation at the right moment, but the ability to know that there may be no (knowable) right moment combined with the serenity to be unaffected by this indeterminacy."<sup>26</sup>

How do we go from humility to mastery? What makes wisdom different from mere acceptance of defeat? The answer is that wisdom is 'a man for all seasons', it is in charge come what may, triumph as well as disaster and everything in between, or, in the epistemic realm, it countenances equally a complete solution to a given problem, a total blank, and all partial solutions. Wisdom's function is to take in the creature's predicament in its entirety and, having let the normal processes of rationality, emotion, intelligence run their course, to draw a conclusion *all things considered*, one which it proposes or bets will turn out to be the best possible *in the fullness of time*. In other words, while intelligence seeks answers which are optimal given a *local* problem situation and a *limited* horizon of evaluation, epistemic wisdom is answerable to the *global* problem situation and aims for approval *in the long run*.

This feature of epistemic wisdom (henceforth simply 'wisdom') I will call *inclusiveness*. I take it to be one of two key attributes of wisdom. Inclusiveness accounts for several other traits commonly attributed to wisdom. The most common is the possession of considerable experience (of experiential knowledge): one common use of 'wise' makes it all but synonymous with '(very) experienced', and closely linked to 'knowledgeable'. Indeed, inclusive judgment, in the sense just outlined, cannot be caught by surprise: it had better have learnt from extended exposure to previous cases what might turn out in the situation at hand.

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<sup>24</sup>Elster 1989, 117–22; and Elster 1999, 290–1.

<sup>25</sup>Note in passing that the exclusive focus on limitations characteristic of the bounded rationality movement misses about half of the phenomenon: for the ability to realize that some difficult task, contrary to first impression, is within the range of possible accomplishments, is also a mark of intelligence, in fact, a mark of high intelligence.

<sup>26</sup>Personal communication.

Second, wisdom has an air of mystery; its phenomenology is somewhat paradoxical, and markedly different from that of intelligence<sup>27</sup>. It is part of the commonsense use of wisdom that it defies a fully rationalistic account, that it sometimes at least seems to work like magic, unaccountably yielding superior results with none of the exertions of intelligence working full blast. It seems to operate without intermediate steps, appearing as a kind of intellectual vision: it is holistic and intuitive<sup>28</sup>. Wisdom seems to have a synoptic view of the reasons and solutions procured by intelligence, yet to follow its own agenda, putting an end to fact-finding, reason-giving, argument-weighting. Like the folk-theoretical concept of vision, wisdom has an air of passivity: while intelligence is active, busy, wisdom requires a form of letting go, it seems to consist in a return to immobility.

Note that the *phenomenology* of wisdom need not be taken as an indication of its underlying nature. It provides no reason to deny the possibility that wisdom supervenes, in some sense, on natural properties and processes. To seem to work like magic is not the same as to be magical; to seem immobile is not the same as to be immobile, etc. Indeed, we know from cognitive science and other fields such as immunology that complex dynamical systems can exhibit counterintuitive behaviors which share some of the traits (holism, absence of intermediate steps, return to equilibrium, 'unearned' success,...) of the phenomenology of wisdom.

Third, wisdom and intelligence are often hard to tell apart on the basis of their particular pronouncements (as was remarked earlier). The reason is that the globality of inclusiveness can be approximated by a sufficiently broad form of locality. Intelligence can, and its higher forms does in fact extend its horizon to a very large perimeter, and delivers solutions which are indistinguishable on the spot from those sanctioned by wisdom. It may only be in the very long run, over a very large series of episodes, and from a very wide perspective, that wisdom may pull apart, so to speak, from intelligence. Nor is eventual success, in any form, guaranteed. In fact, the wise person can die unrecognized and utterly defeated, because fate denied him the temporal horizon in which his wisdom would have become manifest.

Indeed, wisdom is not omnipotence, nor is inclusiveness omniscience<sup>29</sup>. Wisdom implies risk-taking, that is responsibility. The second cardinal trait of wisdom as I see it is its irreducibly moral character. Even when restricted to cognitive or theoretical matters, rather than applied to the broader pursuit of a life worth living, wisdom is an attribute of a self.

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<sup>27</sup> Under a construal of intelligence which, as the one I propose, strongly links it to rationality. Flynn, in the passage quoted above, makes wisdom a component of intelligence: to me, this confuses the issue. Elsewhere in the book, he seems to deploy a different concept of wisdom, one more consonant with the one I am expounding. For example, on p. 159 he writes: "[... wisdom] exists only when human beings integrate the intellectual and moral virtues into a functional whole".

<sup>28</sup> "Wisdom must be intuitive reason combined with scientific knowledge—scientific knowledge of the highest objects which has received as it were its proper completion." *Nic. Eth.* VI, 1141b. This brief sentence manages to combine three of the features listed in the text: knowledge (experience), completion (close to what I call inclusiveness), and intuitive character.

<sup>29</sup> God's 'infinite wisdom' is not a good model or paradigm of human wisdom.

Nothing short of a self can take responsibility for putting an end to deliberation, on the basis of a willful and conscious (be it partly intuitive) taking-in of the entire situation. To use another vocabulary, nothing short of a self can bear a judgment. Nothing short of a self can face the possible consequences of its decisions, and accept them when the time comes.

Epistemic wisdom, in the logical space I have proposed, stands at the intersection of knowledge and praxis. As partaking of knowledge, its distinguishing mark is inclusiveness. As partaking of praxis, its distinguishing mark is responsibility. Selfhood, the necessary rooting of wisdom in a human individual, is presupposed by both: inclusiveness is relative to the unifying assessment of an individual, and responsibility is relative to the pragmatic, normative involvement of an individual.

To sum up, I propose to regard (epistemic) wisdom as *the capacity to guide the epistemic trajectory of an individual by taking, in the space of reasons and in the temporal horizon, the broadest possible perspective, and on the basis of extensive experience, as well as the constraints of rationality and the fruits of intelligence, assume responsibility for the individual's final, "all things considered" decisions regarding her beliefs and other epistemic attitudes and dispositions, which decisions tend to lead to the best possible outcomes, as evaluated in the fullness of time* . As in the cases of rationality and of intelligence, this definition is meant to allow for comparative assessments based on the eventual judgment borne by the community on the outcome: wisdom is not taken here to be an all-or-nothing affair.

### 3. Intelligence and wisdom in collective cognitive processes

Is it helpful to regard a glass eye as an eye? A computer virus as a virus? Synthetic urea as urea? There is of course no determinate answer to such questions. They begin to make sense once one fixes a further aim; for example, a glass eye is an eye of sorts for the purposes of restorative medicine; it is an eye-for-the-sake-of endowing a human face with a normal appearance, in a way comparable to the way a regular eye contributes to the appearance of a typical face. Synthetic urea is urea of sorts inasmuch as it can play in organic chemistry and in biochemistry the very role which is played by naturally-produced urea. A computer virus is a virus of sorts inasmuch as it spreads among computers and tends to harm them in ways comparable to biological viruses spreading among organisms and harming them.

The concepts of rationality, intelligence and wisdom are rather more slippery than those of eye, virus or urea, making the matter of their extensions more involved. Still, we now have working definitions which circumscribe their use in relation to individuals or individual minds. On the other hand, we are presented with two broad families of collective cognitive processes (CCPs), thick and thin. The label given to these processes by Surowiecki invites us



to ask in what sense it might be helpful to regard them as rational, intelligent or wise. I shall leave aside the issue of collective rationality, which has received extensive treatment in philosophy and the social sciences, and is not directly at stake in the WoC literature. Rationality came in as a close relative of intelligence, and it was useful to clarify the connection between them before examining the properties of CCPs, but there is no novel problem raised by the distinction at the collective level.

### *Collective intelligence*

So let us begin with the sense in which CCPs can be said to be intelligent. A starting point is provided by Turing's pioneering argument in favor of the notion of machine intelligence<sup>30</sup>. Turing showed that one could usefully strip the received notion of intelligence of some of its familiar traits and that the resulting notion still pinned down a function which is central to human intelligence and could conceivably be attributed, under suitable conditions, to certain machines<sup>31</sup>. Since then, the notion of collective intelligence has become the focus of a small but growing intellectual *cum* social-political movement, originating in a variety of sources: ethology and 'swarm intelligence', distributed artificial intelligence and computer science, social science, media studies, and whose subject matter comprises most of Surowiecki's case studies. There is however no consensus on the definition of collective intelligence, and one of the subgoals of the present chapter is to provide one.

According to the working definition proposed earlier, an entity has intelligence to the extent that it has an understanding of the world which allows it to find in due time solutions to a large variety of pressing problems, in particular to expand the understanding itself. The part of the definition which lends itself easily to an extension is the solution-finding capacity; indeed, this is the path chosen by AI: if a machine can solve a problem (a problem being the search for a non-obvious solution, one which requires human intelligence), it is *ipso facto* intelligent.

AI however ran at an early stage into two difficult questions. One was whether by solution one should be content with a final result (for example, in a chess game, a solution would be a winning or strategically optimal move; in a scene recognition program, a solution would be a correct labeling of the various significant regions in an optical array; in a natural-language question-and-answer system, a solution might be a relevant answer to any one among a series of well-formed questions in a restricted domain, etc.), or whether more was required, viz. a similarity between the process leading the machine to the solution and the path taken by human intelligence in solving the problem at hand. The first criterion was named 'weak equivalence', the second 'strong equivalence', and a subsidiary question was: if

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<sup>30</sup> Turing 1950.

<sup>31</sup> In a similar spirit, Harsanyi 1977 shows to what end it might be useful to extend the notion of rational behavior to a robot.

weak is not good enough, how strong should strong be? The grain at which isomorphism should be demanded could not be too fine, as clearly the microstructure of a computer is vastly different from that of a brain. On the other hand, the weak equivalence criterion makes a soap bubble intelligent, insofar as it ‘solves’ a highly non-trivial problem of energy minimization; and a sufficiently rich, well-indexed conversation book ‘solves’ the question-and-answer problem in a straightforward way. The weak vs. strong conundrum blended into the better-known problem of *genuine* understanding, made famous by Searle’s Chinese Room argument<sup>32</sup>: neither the soap bubble nor the conversation book have any real understanding of the problem situation, which they can deploy in order to come up with a solution.

It is fair to say that AI is still struggling with these problems, and this should warn us against too facile an answer to our question. Our definition does indeed present us with a difficulty, which concerns the understanding condition. While it is easy to say that a CCP may, under certain conditions, provide a solution to a given problem, the sense in which it uses its ‘understanding’ or the (relevant aspects of the) world in order to come up with the solution is anything but obvious. What does it mean for a group of people to collectively understand anything?

For thick collective processes, there is a straightforward way of answering this question in such a way that these processes come out as endowed with collective intelligence. The reason is that by and large, their products and inner workings are such that they can in principle be reproduced or simulated by an individual. So even though they may not be equivalent to individual processes to an unlimited fineness of grain, they can be reconstructed so as to exhibit considerably more similarity to individual processes than mere equivalence of final results. This makes it plausible to attribute collective understanding to the group inasmuch as a sufficiently tight series of intermediate steps are individually understood and acted upon by various individuals in the group.

As recent work in social epistemology has shown, particularly in the case of science, this is in fact far from obvious: trust, authority and the division of labor play a key role, to such an extent that both inference and reference are distributed so that no single scientist could in practice know with some precision what all the terms she uses refer to, according to the best available theories, or how to conduct the necessary inferences leading to propositions she accepts<sup>33</sup>. But I will leave these rather subtle issues to the side, for they pale in comparison with the problem posed by thin collective processes<sup>34</sup>.

What gets in the way in that case is the fact that agents have no access either to one another’s reasons, nor to the aggregation function which produces the final, ‘intelligent’

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<sup>32</sup> Searle 1980.

<sup>33</sup> Hardwick 1985, Schmitt 1994, Goldman 2002 .

<sup>34</sup> Another tack would be to question the idea that science today is a case of thick collective intelligence, precisely because of the difficulties just mentioned, and think of it instead as a case of thin collective intelligence. As was mentioned earlier, it is one example which resists a simple classification.

outcome of their joint labors. Even when the aggregation is performed by a human being relying on her ordinary rational resources, the rules of WoC prevent her from judging her constituents' estimates on their merits: she must accept them at face value, and treat them as partial evidence in favor of a particular value or hypothesis regarding the outcome of an unknown or uncertain process. It is precisely this voluntary blindness which makes the results so surprising in some cases. Not only are the participants not in a position to ascertain the evidence available to the others in the group, or the validity of the aggregating function. They may not even know that they are participating in an episode of collective intelligence, let alone that they are successful. As Surowiecki says (p. xviii), sometimes "the people in the group aren't [...] aware that [they are making decisions or solving a problem]".

Thin collective processes may nonetheless, I submit, be regarded as exhibiting collective intelligence in a suitably extended sense, on two distinct interpretations, which I will call internalist and externalist respectively.

On the internalist interpretation, the one which immediately comes to mind, WoC is, so to speak, Minsky's 'society of mind' writ large<sup>35</sup>. Just as Minsky, and cognitive science more generally<sup>36</sup>, attempt to show how intelligence emerges from an assemblage of non-intelligent components, each one in charge of a narrowly defined task, thin collective processes produce intelligent behavior, or intelligent effects, by interconnecting in specific ways agents which are deliberately used as mere 'sensors' of a certain narrow segment of the world. One might be tempted to say that, in contradistinction to thick collective processes, there is no intelligence *in* a WoC system, but intelligence *of* the system. This would not be quite right however, for the components of a WoC system are not assumed to be entirely devoid of intelligence: the 'sensing' they accomplish can be complex<sup>37</sup> and involve inner workings which are those of a fully intelligent creature. So there is, after all, some intelligence *in* the system, *plus* a specific intelligence *of* the system. Thus a thin CCP is more akin to the hybrid models favored in AI today, which are networks of complex, rather than simple, components. Altogether, a WoC system may be regarded as intelligent if one is prepared to sever the link between the two components of intelligence: the world understanding is achieved, in a distributed fashion, by the individual members of the group (each one possessing a partial yet genuine understanding), while the search for a solution is achieved by the architecture of the system in a purely formal (*i.e.* semantically blind) fashion. An example which comes to mind is provided by the internet, in particular a search engine such as Google.<sup>38</sup>

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<sup>35</sup> Minsky 1985.

<sup>36</sup> Dennett 1978, Hoston 1985.

<sup>37</sup> In fact, according to Hong & Page (this volume), they must be, at least to the extent that the variety of the individual contributors doesn't make up for their low competence.

<sup>38</sup> See Origi, this volume.

On the externalist interpretation<sup>39</sup>, a thin collective setup is viewed like a sophisticated tool in the hands of a discerning agent or agency. Somewhat like the advanced software used in design, investment, forecasting etc., such a set-up is recruited by an intelligent individual in order to achieve an intellectual performance which is presumably better than what he would have obtained without it. The intelligence here consists in setting-up and making good use of a complex tool. A fine example is provided, according to Surowiecki's account, by John Craven's search for the lost submarine *Scorpion*<sup>40</sup>. In such examples, the intelligent system comprises the tool and its user.

The two interpretations are not mutually exclusive. In fact the externalist one depends on the internalist one, as it would not be an intelligent strategy to set up and use a complex, expensive tool if it didn't deliver, in the case at hand, an 'intelligent' assistance. The reverse is not true: a thin collective process may conceivably operate without some exterior operator harnessing it for his own purpose. In fact, this is the situation of the 'invisible hand' of free market economy, and more generally of self-organized social systems. It might be doubted that such a system is self-aware in the way in which individual intelligence appears to be. But what we mean by self-awareness, and what might correspond to it from a scientific standpoint are far from clear; besides, there is no reason to demand that collective intelligence resemble ordinary intelligence in every way.

To sum up, we may offer the following stipulative definition of collective intelligence: *A system exhibits collective intelligence insofar as there exists within the system fragments of world understanding which are exploited by the system in such a way as to produce in due time solutions to a large variety of pressing problems, including problems arising from the need to further world understanding.* The definition does not demand that the solutions be the outcome of an intention of the system to find them. Under this definition, then, both thick and thin CCPs may be said to be collectively intelligent.

The *conceptual* question has been answered. The modality ('may be said') however is to be interpreted thus: it makes sense to inquire whether some CCPs do *in fact* possess collective intelligence. The answer to that empirical question need not be obvious, at least in the case of thin processes. To suppose otherwise is to accept, on the basis of limited experience, that thin collective intelligence in fact delivers<sup>41</sup>. We can regard, as I have proposed, the idea of thin collective intelligence as conceptually coherent, without thereby assuming that it is empirically sound. Compare: Turing convinced many that we could eventually accept the idea that machines might be able to think, or that they might be considered intelligent. But this did not settle the question of the *actual* intelligence of the real machines which we can in fact build. Many agree that, as far as our present machines are concerned, it is still at best very primitive, and the new wave of 'artificial general

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<sup>39</sup> Clark & Chalmers 1998.

<sup>40</sup> *Op. cit.*, xx-xxi, and Sontag & Drew 1998, 146-50.

<sup>41</sup> Hong & Page (*op. cit.*) is a step in that direction.

intelligence'<sup>42</sup> is an attempt to remedy this. Regarding WoC systems, I don't mean to imply that I have grounds for pessimism, but we cannot avoid asking whether they could become truly intelligent, under sufficiently general conditions. In particular, one may ask to what extent they can meet the versatility criterion: applicability to a wide variety of problem situations, and fluid transfer from one to the other. This last question is precisely the one which the artificial general intelligence movement thinks should be answered in the case of machines.

### *Collective wisdom*

We now have two routes leading to the problematic notion of collective epistemic wisdom. The present paper delivers a 'fourth proportional' description: collective epistemic wisdom (if it exists) is that notion which stands to collective intelligence in the way (individual) epistemic wisdom stands to (individual) intelligence (E1), and which stands to (individual) epistemic wisdom in the way collective intelligence stands to (individual) intelligence (E2)<sup>43</sup>. Note that the inexact nature of the relations prevent (E1) and (E2) from being equivalent, as they would be in the case of numbers.

The other route is provided by a wide array of real-life processes which regulate or permeate the social lives of communities large and small. If we take as our reference point the ordinary notion of wisdom, which does not distinguish between epistemic and existential ends, it seems a natural step to collective wisdom. Just as the wise person has drawn the lessons of prolonged experience, accumulated a wealth of do's and don'ts, weeded out false beliefs, destructive desires, utopian plans, the wisdom of a community comprises a shared set of maxims and skills which shield it from disastrous enterprises, and keep its members from coming to grief. Just as her wisdom allows a person to go straight to the true or the probable, and forego the slow and laborious process of examining and eventually rejecting a whole series of inferior hypotheses or plans, collective wisdom proceeds directly to the heart of the problem at hand, and among plausible candidate solutions, puts its finger on one.

Collective wisdom in this sense<sup>44</sup> includes fairly organized bodies of explicit, fully articulated beliefs, which are widely shared and are to a large extent common knowledge, serving as a reservoir of epistemic and other behavior-guiding beneficial resources for both individual and collective tasks, ensuring in particular an essential function in coordination

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<sup>42</sup> Goertzel & Pennachin 2007.

<sup>43</sup> I am indebted to Jon Elster for suggesting this formulation.

<sup>44</sup> Which differs, it should be noted, from popular wisdom (in French, '*sagesse des nations*') in at least two respects. First it is not limited to maxims and sayings, or to shared beliefs, public norms, etc. Second, it is restricted to those practices which are considered by the community to foster its essential interests, all things considered and in the fullness of time. By contrast, popular wisdom is often used with derisive intent, as referring to empty or erroneous generalizations, or (in a wider sense) as sanctioned practices which in fact have a deleterious effect.

and cooperation. But a large part of collective wisdom seems to lie in a set of unarticulated assumptions, social norms, inculcated (rather than explicitly taught) skills, practices and perspectives, which serve the function of an invisible guardian angel for the community.

Where does this kind of collective wisdom fit into the picture sketched in this chapter? First, we need to restrict it to the set of epistemic practices. This is not a simple matter, as such practices tend to be intertwined with other processes. But let us assume, for the sake of the argument, that we can group together those social processes whose main purpose or effect is to produce within the community an increase in world understanding and epistemic capacities. The resulting set of CCPs will comprise scientific practices, but many other things besides: formal and informal education and training, expert committees, media and publishing, formalized and informal discussions, etc. Most of these processes will be typically thick, in our technical sense, although some 'thinness' may appear in the guise of non-conscious constraints or habits which contribute to the outcome unbeknownst to the participants, and thus insensitive to their consciously held beliefs and preferences.

We can now ask whether this traditional form of collective wisdom satisfies 'equations' E1 and E2. As for the second equation, the answer is fairly straightforward. The move from individual to collective intelligence involves (i) lifting the obligation of co-location of the epistemic resources and thus (ii) allowing 'blind' processes to play a part in the processes leading to a solution of the problems at hand (the blindness may extend to the solution itself, which may not necessarily appear as such in any conscious mind.) The kind of process which we are examining now seems to stand to individual wisdom in a somewhat similar position.

Whether equation E1 is also satisfied is a more involved matter. Going from individual intelligence to individual wisdom implies a coordinated series of changes, three of which appear as crucial: the spatial and temporal horizons expand from local to global; inference and computation give way to holistic decision; impersonal, objective problem-solving takes second place to personal responsibility. If we start from collective intelligence, we have no concept of a person ready at hand. The challenge then is to retrieve a functional equivalent of a person, a self of sorts, in collective processes. The concept of a collective self has been contentious for a very long time debated, but for present purposes we can perhaps bypass the controversy. What I have proposed to regard as traditional epistemic wisdom is relative to a given community, and is a part of what many people would call its culture. Its importance is all the greater as it is among the more enduring, entrenched parts of culture, and as it contributes to the self-perpetuation of the community across inessential changes as well as hard times. It is a commonplace that a society's culture either defines, constitutes, or enables that society's identity. If we accept, then, that the group's identity is actually predicated on its collective wisdom, then we retrieve the needed functional equivalent of the self, and the 'all things considered' goodness of wisdom falls out as well: what is good for the group as such is precisely the perpetuation of its culture, hence its identity, across

change, and it is wisdom again which steers the group in the 'right' direction. Cultures which fall apart as a result of endogeneous or exogeneous factors simultaneously lose their wisdom and their identity.

The upshot is that one may indeed regard traditional, 'thick' collective epistemic wisdom as satisfying also equation 1, and thus fully deserving of the label.

How do thin collective processes, the focus of the wisdom-of-crowds movement, fare with respect to our two equations? Again, E2 can be regarded as satisfied, and again the serious problem concerns E1, due to the requirement of some analog of personhood. But this requirement would seem to directly contradict the essential 'blindness' of thin collective processes. Even if we were prepared to grant some form of collective personhood to the participants in a given WoC operation, on the mere basis of their participation in the process, the resulting ersatz self would lack essential attributes of selfhood such as self-reflection and responsibility. A stronger form of selfhood would perhaps result from a 'common spirit', such as binds together a tightly-knit community, something like a rowing team, a drama company or an orchestra performing, an army brigade in action, constantly coordinated and recalibrating their mutual expectations, blending into a 'we' capable of we-thoughts, we-intentions, we-actions. But such a collective would be maximally distant from the sort of group which can support WoC, because it would lack precisely the diversity and independence required from a well-functioning WoC setup. It would fall prey to a form of 'groupthink'. We have thus finally reached an answer to our initial question: the wisdom of crowds has not much to do with wisdom, beyond differing from individual intelligence. There does exist something which may deserve the name of collective wisdom, but it is nothing other than a set of culturally transmitted beliefs and practices which are at considerable distance from the wisdom of crowds in the focal sense (WoC) which makes it interesting to Surowiecki.

Of course, this is not to rule out the possibility that recommending a WoC setup to settle or regulate a particular issue, or to systematically favor such setups in a wide variety of situations, may be regarded as wise, either on the part of a single social or political engineer or of a group. But the wisdom does not belong to the thin processes proposed.

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