



The Power of Many

As one wag remarked, "If you want to kill the snake, don't form a committee; just go do it..." Yet we are ever reliant on committee decisions in our daily business life (and this includes ECS business also). How effective and optimal are group decisions relative to those made by individuals? It turns out there is a considerable amount of research on this topic and we can learn much from ants, bees, fish, and birds, in that colonies are smarter than individuals. For example, an individual ant cannot optimize the shortest path to the best food source,

allocate workers to different tasks, or even defend a territory from neighbors; but ant colonies routinely accomplish these tasks via a fascinating phenomenon known as "swarm intelligence." Where this collective intelligence comes from has fascinated behavioral biologists and psychologists for many years. How do the simple actions of individual ants, fish, or bees and birds add up to the complex behavior of that particular group? How do a herd of wildebeest or a school of fish react *in tandem* to the sudden presence in their midst of a predator and often leave the latter bereft of a good meal?

Even for us humans, there is now considerable evidence that collective wisdom works and collective decisions can be every bit as effective and authoritative as individual judgments. This may be counterintuitive in that one may be tempted to think that the well-informed may be outweighed by the poorly-informed within a group with the unfortunate result that the group's decision will be worse than that of even the average individual. In his best-selling book, "*The Wisdom of Crowds*," James Surowiecki analyzes the factors that render group decisions to be optimal. The Internet has had a profound influence in the notion of collective wisdom, and in Surowiecki's thinking, the ethos of the Net is fundamentally respectful and invested in the idea of collective wisdom. In fact, he opines that the anti-hierarchical structure of the Net is even hostile to the idea that power and authority should be vested in a select few individuals. In this regard, it is important to note that the ideas discussed here are distinctly different from those embodied in the "groupthink" paradigm (a word coined by the social psychologist, Irving Janis, in 1972). According to Janis, groupthink ignores other alternatives and leads to irrational decisions that dehumanize other groups.

A tradition in the history and sociology of science is the role of the individual genius in scientific discovery—a tradition reinforced by the accomplishments of Newton, Einstein, and the like. In fact, there has been a tendency to equate great ideas with individual names such as the Heisenberg uncertainty principle. However, recent research has shown evidence for an increasing propensity in the effectiveness of teamwork for the production of knowledge (see, for example, a recent paper by Wuchty *et al.*, *Science* **316**, 1036 (2007) and references therein). Does this shift to teamwork promote low-impact science while the highest-impact ideas (e.g., relativity) remain the domain of great minds working alone? From a sampling of 19.9 million papers over 5 decades and 2.3 million patents, the above authors argue that teams increasingly outperform solo authors in the production of knowledge. On the other hand, the *translation* of fundamental ideas to useful products and processes has always remained the hallmark of teams. This is something that industry and national laboratories/government agencies have always done well, i.e., mobilize the best combination of scientists and engineers to accomplish a given task.

I thank Purnendu (Sandy) Dasgupta, Ron Elsenbaumer, Faruq Marikar, Paul Paulus, and Zoltan Schelly for discussions on this topic. Stay tuned.

Raj K.

Krishnan Rajeshwar
Editor

The Electrochemical Society Interface (USPS 010-327) (ISSN 1064-8208) is published quarterly by The Electrochemical Society, Inc., at 65 South Main Street, Pennington, NJ 08534-2839 USA. Subscription to members as part of membership service; subscription to nonmembers \$53.00 plus \$10.00 for postage outside U.S. Single copies \$6.00 to members; \$13.00 to nonmembers. © Copyright 2007 by The Electrochemical Society, Inc. Periodicals postage at Pennington, New Jersey, and at additional mailing offices. POSTMASTER: Send address changes to The Electrochemical Society, Inc., 65 South Main Street, Pennington, NJ 08534-2839.

The Electrochemical Society is an educational, nonprofit 501(c)(3) organization with more than 7500 scientists and engineers in over 70 countries worldwide who hold individual membership. Founded in 1902, the Society has a long tradition in advancing the theory and practice of electrochemical and solid-state science by dissemination of information through its publications and international meetings.

Published by:

The Electrochemical Society
65 South Main Street
Pennington, NJ 08534-2839 USA
Tel 609.737.1902
Fax 609.737.2743
Web: www.electrochem.org

Editor: Krishnan Rajeshwar

e-mail: rajeshwar@uta.edu

Guest Editors: Eric Wuchina and Eric Wachsman

Contributing Editor: Mike Kelly

Managing Editor: Mary E. Yess

e-mail: mary.yess@electrochem.org

Production & Advertising Manager:

Dinia Agrawala
e-mail: interface@electrochem.org

Advisory Board: Daniel A. Scherson (*Battery*),

Barbara Shaw (*Corrosion*), Durga Misra (*Dielectric Science and Technology*), Gery Stafford (*Electrodeposition*), George K. Celler (*Electronics and Photonics*), S. Narayanan (*Energy Technology*), Prashant V. Kamat (*Fullerenes, Nanotubes, and Carbon Nanostructures*), Enrico Traversa (*High Temperature Materials*), Venkat Srinivasan (*Industrial Electrochemistry and Electrochemical Engineering*), Cornelis R. Ronda (*Luminescence and Display Materials*), James Rusling (*Organic and Biological Electrochemistry*), Wesley Henderson (*Physical and Analytical Electrochemistry*), Peter Hesketh (*Sensor*)

Publication Committee Chair:

Subhash Singhal

Society Officers:

Barry R. MacDougall, *President*
D. Noel Buckley, *Vice-President*
Paul Natishan, *Vice-President*
William D. Brown, *Vice-President*
Petr Vanysek, *Secretary*
John R. Susko, *Treasurer*
Roque J. Calvo, *Executive Director*

Statements and opinions given in *The Electrochemical Society Interface* are those of the contributors, and The Electrochemical Society, Inc. assumes no responsibility for them.

Authorization to photocopy any article for internal or personal use beyond the fair use provisions of the Copyright Act of 1976 is granted by The Electrochemical Society, Inc. to libraries and other users registered with the Copyright Clearance Center (CCC), 222 Rosewood Dr., Danvers, MA 01923. Copying for other than internal or personal use without express permission of The Electrochemical Society, Inc. is prohibited. For reprint information, contact Society Headquarters. The CCC Code for *The Electrochemical Society Interface* is 1064-8208/92.

Production Notes

Design Consultant:

O&Y Design,
Trenton, NJ

Printed by:

Cummings Printing Co.
Hooksett, NH

Canada Post:

Publications Mail Agreement #41566012
Canada Returns to be sent to:
Bleuchip International, P.O. Box 25542,
London, ON N6C 6B2