

EADM 826.3

Executive Book Summary By: Lisa Danaher

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Summary

In his book **Honeybee Democracy**, Thomas D. Seeley tells the story of how honeybees make decisions collectively and democratically when choosing new nest sites. Their democratic decisions are based on a face-to-face consensus-building process. Honeybees engage in a process that includes collective fact-finding, vigorous debate, and consensus-building reached through quorum. These social animals have developed a fool-proof system of decision-making that rivals that of primate brains. Thus Seeley argues that this process can and does work effectively for humans. Decision-making groups must consist of people that have shared goals and mutual respect. The group leader's power and influence

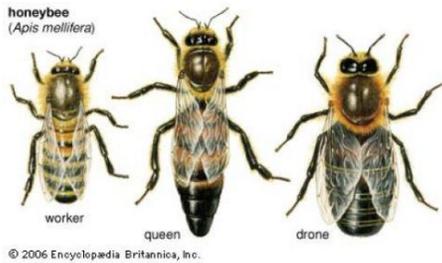
must be minimized. Open debate is a necessity. A variety of solutions should be explored. Finally, the majority of the group members must be involved in the final decision. He suggests that decision-making groups, either human or honeybee, are more intelligent than the most intelligent individuals in the group. Seeley concludes that humans can and should learn from honeybee democracy.



Thomas D. Seeley at work



Honeybee at work



Introduction

- a colony achieves almost absolute accuracy when choosing a new nest site

- contrary to popular belief, the work of the hive is not ruled by

the queen, but rather it is governed collectively

- a beehive is a community whose members work together to achieve common goals

- beehives are smoothly functioning communities in which democratic decision-making is routine

- they are harmonious societies in which as many as ten thousand of individual bees cooperate to achieve the colony's goals



- the 1.5 kg of bees in a colony, equal to 1.5 kg of neurons in the human brain, achieve their goals even though each individual has limited individual information and intelligence

THE QUEEN BEE: NOT YOUR TYPICAL MONARCH

THE QUEEN DOES NOT RULE THE NEST.

- amazingly, the worker bees maintain harmony as they labour without any supervision

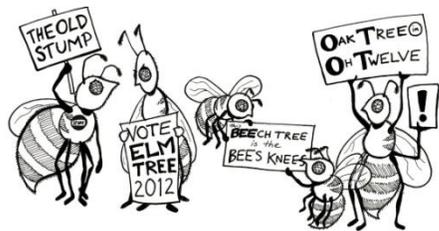
- they manage to create an enviable work environment in which the group's accomplishments far outweigh those of the individuals





Apis mellifera

The honeybee belongs to the largest class of animals, the insects. It has three pairs of legs and its body is divided into three sections: head, thorax, and abdomen.



Bee Debate

Bees have a sophisticated system of debate.

FAST FACTS

10000

The average number of bees in a colony; but can be several times higher.

2400 BC

The earliest known beekeeping and honey preparation was done by the Egyptians.

DID YOU KNOW?

Scout bees are able to accurately measure the volume of a potential nest cavity, and they will make up to 25 trips to get the measurement.

Life in a Colony

- the scientific name of the honeybee is *Apis mellifera*
- the honeybee is just one of 20000 species of bees that are found around the world
- their energy source is the nectar they eat from flowers
- they pollinate flowers in the process of food collection
- a colony can be thought of in two ways: as a society or as a super organism
- perspectives are valid as evolution has repeatedly built higher level units of organization by assembling unified societies of lower level units
- a honeybee colony can be thought of as a single organism that carries out all of the physiological processes of life
- but the most important evidence of a honeybee colony as a super organism is its ability to act as an intelligent, cohesive, democratic unit when choosing a new home

Dream Home: The Scout Bees' Debate

- honeybees practice direct democracy when they choose a new home
- those individuals who choose to participate in the decision-

making do it personally instead of via representatives

- they reach decisions by consensus building
- each decision is a reflection of hundreds of participants
- each choice is freely given and equally weighted
- the control is distributed among many bees, instead of a single leader
- the decision makers are full participants in the search process therefore information from several sources is available
- an open competition is held for all proposals
- a valuable lesson for humans is that having an open and equitable competition of ideas is a wise solution to the challenge of making a decision based on diverse ideas presented by many individuals

...for so work the honey-bees,

*Creatures that by a rule in nature
teach*

*The act of order to a peopled
kingdom.*

*William Shakespeare, Henry V,
1599*

- debate plays an integral role in the decision making process
- honeybees follow a three step process for debate:
 - first, the bees' debate starts relatively slowly due to the large amount of information that is being accumulated as the bees

- return from scouting runs with their choices
- second, the bees undergo a amount of information that is being accumulated as each bee presents her choice
- second, the bees debate in earnest
- finally, the bees make a decision once consensus is reached

- honeybees demonstrate a method of decision making that is highly distributed
- it involves hundreds of individuals
- each bee has an equal voice in the debate
- it is thus highly democratic

DID YOU KNOW?

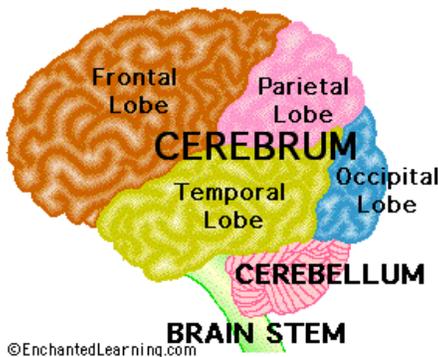
Scout bees will not check out a cavity unless the entrance is at least 5cm x 8cm.

THE AVERAGE HEIGHT OF A NEST ENTRANCE

IS 6.5M.

Scouts bees do the wiggle dance to advertise their choice of site.

Agreement on Best Site



- a honeybee swarm has a very sophisticated strategy for decision making
- it involves processing all of the information that is relevant to the

- problem of choosing the best location to build a new nest
- the swarm's democratic organization is powerful
- hundreds of individual bees work collectively to accomplish the two fundamental aspects of decision making: acquiring as much information about alternatives as possible and processing that vast amount of information to make a wise decision

- ultimately, honeybee democracy results in nearly perfect decision making as bees rarely choose a site that fails



Building a Consensus...Swarm as Cognitive Entity

- the goal in honeybee decision making is a dissent free decision
- “out of chaos, order gradually emerges” p. 118
- humans often use adversary democracy in decision making
- it is common for humans to end a democratic process such as an election or a debate with members strongly divided
- in order to achieve a single choice, it is necessary to invoke some type of complicated and ultimately unsatisfactory system, such as voting for majority rule
- in contrast to human systems, swarm bees employ unitary democracy for group decision making
- worker bees possess innate knowledge of what an ideal site entails
- she will advertise her choice tirelessly until all decision makers have come to her side
- dissent eventually expires
- and consensus is achieved
- decision making consists of acquiring and processing information in order to make a choice between two or more alternatives
- primate (human)brains and honeybee swarms have three stages in decision making:
 - first is sensory transformation
 - second is decision transformation
 - third is action transformation
- scout bees employ several methods for building the swarm’s sensory representation
- the sensory body of a swarm is a large number of scout bees
 - they collect sensory information for days
 - each scout make an independent evaluation about sites
 - scouts recruit other scouts to their chosen site
- in decision transformation, the sensory representation is converted into a set of possible choices
- the main function of the second transformation

BUSY BEES



Quorum

Honeybees use a quorum to expedite some decision making .

DID YOU KNOW?

Honeybees can regulate the temperature of the swarm by huddling in more tightly and reducing the amount of air in the cluster.

- as evidence builds for one choice, it inhibits the accumulation of evidence for the other choices
- in the third stage, a single response is rendered when a threshold level is reached for one choice

...this being an Amazonian

or feminine kingdome.

*Charles Butler, the Feminine Monarchie,
1609*

Swarm Smarts

What lessons can humans learn from honeybees about how to structure a decision making group so that the knowledge and brainpower of its members is effectively marshaled to produce good collective choices?

Lesson #1

Compose the decision making group of individuals with shared interests and mutual respect.

Lesson #2

Minimize the leader's influence on the group's thinking.

Lesson #3

Seek diverse solutions to the problem.

- make the group sufficiently large for the challenge it faces

- make sure the group consists of people with diverse backgrounds and perspectives

- foster independent exploratory work by the group's members

- create a social environment in which the group's members feel comfortable about proposing solutions

Lesson #4

Aggregate the group's knowledge through debate

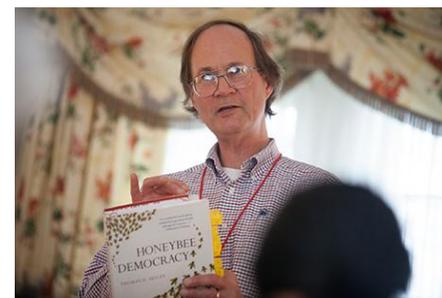
- use the power of an open and fair competition of ideas, in the form of a frank debate, to integrate the information that is dispersed among the group's members

- foster good communication within the debating group, recognizing that this is how valuable information that is uncovered by one member will quickly reach the other members

- recognize that while it is important for a group's members to listen to what everyone else is saying, it is essential that they listen critically, form their own opinions about the options being discussed, and register their views independently

Lesson #5

Use quorum responses for cohesion, accuracy, and speed.



Critical Evaluation

I will admit that I chose this book because of the cover, and I was happy to discover that sometimes you can, in fact, judge a book by its cover.

Honeybee Democracy, by Thomas S. Seeley, is a fairly quick, easy read. I would recommend it particularly for those with an interest or background in biology because the language does get somewhat technical at times. A few of the chapters lagged due to the tedium of reading about experiment after experiment, where disturbingly, a large number of bees were killed.

Seeley draws a strong analogy between a swarm of honeybees and a primate brain, where the

behavior and intellectual capacity of a single honeybee is likened to a single neuron in a brain.

Thus a parallel is drawn between the collective intelligence of a swarm of honeybees and the entirety of the neurons that make up a primate brain. The collective decision making power far surpasses that of the individual.

The last chapter, where Seeley outlines the five lessons to be learned, was intriguing. They describe a group of individuals who have a common goal and who work in an environment of respect. There are no leaders. Everyone has an equal voice in the decision making process. Debate is the forum for sharing one's voice. The final result is a decision made by consensus.

This is a system that has no room for toxic leaders. This might be what education needs today.

Discussion Questions

#1: Do you belong to a group that makes decisions based on consensus building? If so, does it work? If not, would you want to belong to such a group?

#2: Are leaders necessary or can a group function successfully without?

#3: Do you think that this type of decision making would foster a toxic leader?

#4: Considering the context in which we teach in Saskatchewan today, does consensus making have a place?

#5: Is Seeley's argument that a swarm of bees is like a primate brain reasonable?



*Go to the bee,
thou poet:
consider her ways
and be wise.*

George Bernard Shaw, Man and Superman, 1903



Reference

Seeley, Thomas D. (2010). *Honeybee Democracy*. Princeton, New Jersey: Princeton University Press

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