Darwin’s Target:
The Aristotelian View

• Plants have some powers
• Animals have all those plus more
• Human beings have all animal powers plus some distinctively human powers
  – Note that there is a kind of similarity between animal and man here
    • In apprehension:
      – sensation is similar to intellect.
        » Each, in some sense, presents the world to the apprehender.
    • In appetite:
      – the sense appetite of the animal is similar to the rational appetite (will) of man.
        » Each in some sense, impels to action.

<table>
<thead>
<tr>
<th>Plants</th>
<th>Animals</th>
<th>Man</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetative Powers</td>
<td>Nutrition &amp; Growth Reproduction</td>
<td>Nutrition &amp; Growth Reproduction</td>
</tr>
<tr>
<td>Sensitive Powers</td>
<td>―</td>
<td>Sensation Appetition (Emotions)</td>
</tr>
<tr>
<td>Rational Powers</td>
<td>―</td>
<td>―</td>
</tr>
<tr>
<td>Mechanical Powers</td>
<td>Nutrition &amp; Growth Reproduction</td>
<td>Nutrition &amp; Growth Reproduction</td>
</tr>
<tr>
<td>Consciousness</td>
<td>Sensation</td>
<td>Appetition (Emotions)</td>
</tr>
<tr>
<td></td>
<td>Appetition (Emotions)</td>
<td>Locomotion</td>
</tr>
<tr>
<td></td>
<td>Intellect</td>
<td>Will</td>
</tr>
</tbody>
</table>

Darwin’s Target:
The Cartesian View

• Plants & animals are machines
  – Animals lack consciousness (i.e., sensation, appetition (emotions), intellect & will
• Human beings have consciousness (i.e., sensation, appetition (emotions), intellect & will

<table>
<thead>
<tr>
<th>(Plants &amp;) Animals</th>
<th>Man</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Powers</td>
<td>Nutrition &amp; Growth Reproduction</td>
</tr>
<tr>
<td></td>
<td>Locomotion</td>
</tr>
<tr>
<td>Consciousness</td>
<td>Sensation</td>
</tr>
<tr>
<td></td>
<td>Appetition (Emotions)</td>
</tr>
<tr>
<td></td>
<td>Intellect</td>
</tr>
<tr>
<td></td>
<td>Will</td>
</tr>
</tbody>
</table>

Darwin’s Ideas

• Against the Cartesians:
  – Animals have emotions
    – cf. his The Expression of the Emotions in Man and Animals (2872)
• Against the Aristotelians:
  – Man does not have any power that animals lack altogether
    – cf. his The Descent of Man (1871)

The Structure of the Early Chapters of Darwin’s Descent of Man

• Chapter 1
  – Man’s body structure bears clear traces of animal descent
• Chapter 2-3
  – Man and animal are alike with respect to their higher powers,
    • in general
    • in their moral sense.
• Chapter 4
  – The manner of man’s development from animals

Darwin: Anthropology & Evolution

• The Origin of Species (1859) hardly mentions the origin of mankind
  – There, the general thesis is the common ancestry of all living things from one or a few first kinds of organism
    • So, it implicitly includes man (and everyone realized this)
  • The evolutionary origins of man were early defended explicitly by T. H. Huxley, Evidence as to Man’s Place in Nature (1863)
• The Descent of Man (1871) argues that
  – man is not different in kind from other animals and
    therefore there is no reason to exclude man from the general thesis of the Origin
    • i.e., his origins must be sought, as are those of all other animals, in descent with modification from earlier kinds of organisms, i.e., in evolution
    • So
      – Darwin does not argue
        • from the idea that man evolved from animals
          • to the idea that man must be an animal
            • Rather he argues
              • from the idea that man is an animal (defended on independent grounds)
              • to the idea that man’s origins must be sought in evolution (just as are those of any other animal)
The Darwinian Task

• The first move must come from the Aristotelian here.
  – If there is a difference in kind, the Aristotelian should say what it is.
    • Aristotle says rationality (and language)
    • Others later suggested tool-making & other criteria
  – The Darwinian's reply must be to show some analogue in animal behavior for every behavior that the Aristotelian uses to argue for human distinctiveness.
    – Darwin offers a general argument against a difference in kind
    – More recent research has looked for analogous behaviors

Darwin's General Argument

- (1) there's a great difference between lowest fish and highest ape
  - but it's still only a difference in degree
    - i.e., a difference in more or less of some feature
    - not in presence or absence of a feature
    - since it is one filled with intermediate forms
  - (2) there's also a great difference within the human race (both in character & intellect)
    - e.g., the difference between a savage & Newton or Shakespeare
    - but it's still only a difference in degree
    - since it is one filled with intermediates
  - (3) the difference between man and ape is like those listed in 1 & 2 above
    - since the gap between the two extremes is not greater
  - So, (4) the difference between man and ape also is only a difference in degree

Principles of Animal Action

- instinct
  - what it is—an elaborate version of a reflex
  - sign of its presence—the animal's ability to perform some action perfectly without having seen it done & the first time it is done
  - explanation of presence of instincts—they are inherited habits
- intelligence
  - what it is—learned activities
  - possible grounds
    - imitation
    - association of ideas, as illustrated by
      - the pike & the glass
      - the dogs & the dip in the terrain
      - the monkeys and knives
      - the monkeys and sugar packs with wasps inside
    - insight or reason (problem-solving), as illustrated by
      - the monkeys and the eggs
      - the dogs and the game birds

Aristotle & Intellect vs. Darwin & Intelligence

The Association of Ideas in Animal & Man

- Whatever differs only in speed & subtlety of association of ideas differs only in degree
  - since the difference in speed & subtlety of association of ideas that is found between higher & lower animals is only a difference in degree [by generalization]
- The difference between man & animal on this point is only a difference in speed & subtlety of association of ideas
- So, The difference between man & animal in the association of ideas is a difference only in degree
Reasoning in Animal & Man

• Contrast I
  – a cultivated man—"would probably make some general proposition on the subject"
  – a baby or a savage—"it is extremely doubtful that they would do so"
  – higher mammals (e.g., a dog)—"certainly would not do so"

• Contrast II
  – man notices slighter differences and does so more quickly

• Nevertheless (Similarity)
  – The solution to a problem "is equally an act of reason whether or not any general proposition on the subject is consciously placed before the mind"
  – "All are guided by a rude process of reasoning as surely as is a philosopher in his longest chain of deduction"

• Examples
  – Wolfgang Köhler’s work with chimpanzees in the Canary Islands
  – Bernd Heinrich’s work on ravens at the University of Vermont

Wolfgang Köhler

• Study of the problem-solving skills of chimpanzees (1914-20, Anthropoid Station of the Prussian Academy of Sciences, Tenerife). (See his The Mentality of Apes.)

Darwin’s More General Argument

• Nothing that is a more efficient version of some animal behavior requires positing a new and distinctive human power
  – cf. the criteria of goodness of explanation in argument from observed behavior to the existence of a power
  – Morgan’s canon—"No appeal to higher faculty when lower faculty is sufficient to explain animal behavior"
  – & more generally Ockham’s razor—"Entities should not be multiplied without necessity"

• All human behavior is a more efficient version of some animal behavior
• So, no human behavior requires positing a new and distinctive human power
• So, human beings don’t have any power that is altogether absent in animals
• So, man & animals differ in degree, not kind

Aristotelian Questions: Animal Reasoning

• Do animals have concepts or make judgments?
  – Irene Pepperberg’s grey parrot Alex answers “What color/shape/material?” and “What’s same/different?” (e.g., “color” or “shape”) accurately.
  – Ron Shusterman’s dolphins answer yes-no questions
  – Brendan McGonigle & Margaret Chalmers’ squirrel monkeys solve transitivity problems

Inference

• The ability to do transitivity inferences was first proposed in the early twentieth century by Cyril Burt as part of his efforts to test human intelligence (IQ).
  – Jean Piaget showed that children could do these inferences only from about age seven, though Peter Bryant & Tom Trabasso were later able to show that four-year-olds could do them for concrete cases.
  – Brendan McGonigle & Margaret Chalmers showed that squirrel monkeys could solve transitivity problems at Edinburgh in the 1977. (See “Are Monkeys Logical?” Nature 267: 694-696.)
  – Later pigeons and rats were also shown capable of doing so.
  – Five-member series are used, teaching adjacent pairs and testing non-adjacent items.
• Evaluation—Clive Wynne points out that reevaluating the value of items in the series on the basis of reward and no-reward will lead to the behavior demonstrated. (See, Do Monkeys Think? ch. 3)
Tool-Use in Animals: Chimpanzees

- There are many reports of chimpanzee tool use, including:
  - the use of blades of grass to fish for termites in Gombe National Park (Tanzania), first reported by Jane Goodall in 1960;
  - the use of stones to hammer on (& open) nuts in the Taï rain forest (Côte d'Ivoire). This is learned behavior which takes young chimpanzees about seven years to learn. Chimpanzees take rocks to specific cracking (anvil) sites.
  - the use of sticks to puncture subterranean termite mounds (& then another stick, which they specially modify, to fish the termites out) in the Congo River basin. The chimpanzees always use sticks from one tree for puncturing and from one herb for fishing. This seems to be learned behavior. (Note: multiple tools for a single task.)
- Louis Leakey on hearing from Jane Goodall that she had observed chimpanzees using and making tools:
  - “Now we must redefine tool, redefine Man, or accept chimpanzees as humans.”

Tool-Making in Animals: New Caledonian Crows

- In nature
  - New Caledonian crows make tools, trimming pandanus leaves into a form suitable for extracting bugs from crevices in trees
    - [http://www.youtube.com/watch?v=3RC-Vb-rP0I](http://www.youtube.com/watch?v=3RC-Vb-rP0I)
    - [http://www.youtube.com/watch?v=wrWG4lB_dzs](http://www.youtube.com/watch?v=wrWG4lB_dzs)
  - There are several different designs and evidence suggestive of tool evolution
    - (Research of Gavin Hunt and Russell Gray, University of Auckland)
- In the laboratory
  - Deprived of the hook she needed in order to get food out of a jar, one New Caledonian crow made a hook out of a piece of wire.
    - [http://www.youtube.com/watch?v=UDo0AKM8EY](http://www.youtube.com/watch?v=UDo0AKM8EY)

Degrees of Complexity in Tool Manufacture

- Bill Sellars distinguishes four degrees of complexity in tool manufacture.
  - Reduction
    - reduce mass of functional form
    - e.g., our chewed stick, or a flaked flint
  - Conjunction
    - combine 2 or more units to make tool
    - e.g., a flint headed spear, or a hafted axe
  - Replication
    - conjunction but with 2 or more similar units required
    - e.g., a double pronged fishing spear
  - Linkage
    - physically distinct forms in combination
    - e.g., a bow and arrow
- Animals seem limited to the first two.

Philosophical Reflection

- The general question
  - What kind of power must be inferred to account for these acts?
    - Is *image*-retention & manipulation adequate?
    - Or do these acts require *concepts* (& therefore intellect)?
  - If tool-use or manufacture requires intellect, at what stage can be inferred?
    - What does the argument look like?