Cogs 143 **Lecture 11: Social Attention**

Paying attention to the attention of others

Gaze Following

- Many NHPs can **gaze follow** based on head-turning cue (Tomasello et al 1998) (Plus sheep, horses, elephants, dogs)
  - Rarely, some chimps on eyes-only cue, tho contrived laboratory setting may *underestimate* these abilities
- Can get sophisticated: Apes, like 18 mo-old humans, can use Gaze Following to search behind self; behind barrier
  - **MacLean & Hare 2012** – Tested chimps & bonobos' judgement of target of human gaze
    - Ape sees Exp see/not see Object X; Next, human looks excitedly toward X, and beyond it, Object Y
      - Result: Ape looks to Y if Exp prev. saw X, so more than current head direction taken into account
    - Ape 'attributes' familiarity/novelty to objects & novel as likely target; Requires tracking which seen when
- Dolphins: Eavesdropping data suggest may practice "beam-following" ?
  - And since also directed socially, could potentially learn lots about relationships from such shows of attention
- Currently studying spontaneous Attention-Following in dolphins, observing their "glances" pool to pool
  - If one turns head, giving it better acousti-visual access to rear pool & other sees, does other then turn to same?
    - i.e. Better access via beam & binoc (have lateral vision even w/o turn) - Results: Stand by! (Or come help!)
- So, skill here is to extrapolate primate line-of-sight, or dolphin beam-direction, from head & body orientation
  - "Perspective Taking" can be reflexive; The more flexible its use, the more higher cognition is likely involved.

Using Perspective Taking

- **Solicitous**: Asking for or offering something
  - Dolphins solicit follows from humans (point??) only when humans attending (Xitco etal 2001; 2004)
    - Although not clear if "showing" the way or just "checking if following" ??
  - **Begging** – Solicit food, attention from other

    Apes required to request food (**Beg**) from a human donor who has eyes, head, &/or body to/from subject
    - Orangutans and gorillas tended to move more with the food, or per donor's body orientation
    - Chimpanzees and bonobos chose mostly to communicate to the experimenter's face
      - e.g. Video of bonobo infant adjust position to beg to mom's face vs. body
  - **Show-to-Share Tasks** - Indicate some limitations on perspective-taking in primates
    - Experimenter attends (head turn, eyes turn, point) to baited (vs. not baited) container
      - Subject can't see reward, must select which box Experimenter should open to get it
      - Despite their gaze following skills, primates are remarkably POOR at such tasks!
    - Note Humans (and human-enculturated apes) are the only primates that "points", show, share…

- **Competitive:** Primates appear better at applying Perspective Taking Skills in competitive situations
  - **Hare et al. 2001** – Maybe show-to-share not ecologically relevant for primates!
    - i.e. Primates are competitive foragers, and above *are* "foraging" (food reward) tasks
  - Tested chimps: One treat visible to Dom & Sub; Other only to Sub; Dom confined – Sub chooses treat first
  - Results: Subordinate tends to choose the treat that dominant can not see
    - i.e. Discriminates treat based on whether it falls within other's line of sight.
  - **Machiavellian Intelligence** (Byrne & Whiten 1988; Whiten & Byrne, 1997)
    - Individuals exploit other's perception, behavior, knowledge/ignorance, etc. for own benefit
      - e.g. Many cases of **Social Tool** involve User "acting as if" Tool matters, when real concern is Target
    - Adapting to Deception selects for counter-deception, which selects for better deception, etc…
      - i.e. An evolutionary "arms' race" ("**ratchet**"); Probably played a big role in humans, esp w/telling lies
  - **Deception** –Deceiver exploits others' ability to read behavior in ways that promote mis-interpretation to its benefit
    - Note these often tend to involve assessing, manipulating GAZE
    - Can be hard-wired (e.g. eyespots on butterflies, fish; Predators mis-rep per usual predictions of size, direction)
      - When show more flexible use, suggests more complex cognitive skills involved
    - **"Tactical Deception in Primates"** (Whiten & Byrne, 1988) complied examples, esp in Old World primates
      - e.g. Move out of sight of dominant that might interfere before mating, eating etc.
      - e.g. Look/move away from object of interest ("feign" indifference) poss to distract/move competitor away
    - In lab, Exp in booth w/food on either side that chimp can reach through tunnels, before Exp snatches it away
      - Chimp will reach in opaque not transparent tunnel &, if both opaque, quiet not noisy (Melis et al 2006)
  - **Self Control** Above interactions, and others, probably selected for increased self-control
    - e.g. Stealth: Orca silently hunting other cetaceans; Chimp collaborative hunters silently into position
    - **Mitchell & Anderson 1997**: Subject watches as Exp hides a treat in 1 of 2 opaque, out-of-reach boxes
      - That Experimenter leaves, Trainer who does not know location of treat enters
      - "Friendly" Trainer will share treat when found, "Unfriendly" will eat it in front of animal
    - Some Cebus (& more Chimps) will orient & reach to baited container in presence of Friendly Trainer
      - They also soon suppress response to container in presence of Unfriendly Trainer
        - Few also come to overtly **misdirect** Unfriendly" (i.e. reach) toward unbaited container!

- Also recall Boysen's "Greedy Giveaway" task, and how symbol use can facilitate self-control
- In Cetaceans – very little research on social attention, but other evidence for Self Control
  - e.g. With what other carnivorous predator would human presume to enter cage, ride, tickle etc?!!
    - i.e. Orcas treat trainers as part of pod, even though could consume!

Fission/Fusion = subgroup membership changes; Adds considerable pressure for cognition, esp in complex society
- Establishes **differential access to information**, making attentional cues important
  - e.g. Animal present today has (I see) access to current activity; Animal absent today (I see) does not
- This can be exploited (competitive, deceptive) or redressed (e.g. inform ignorant, as with human language)

- Theory of Mind (ToM) = Attribute mental (e.g. knowledge) states to oneself and others
- Often based on attention to attention: I see you see dog, therefore I believe you know about dog
- "**False Belief**" task – considered definitive ToM test in human children
  - Sally and Ann watch as object hidden at A, Ann leaves, Sally sees object moved to hiding place B
  - Ask Subject: "Where will Ann look for object when she returns?"
    - 2 yr olds: B=where subject knows it is; 4 yr olds: A=attributes "false belief" to Ann that object still there
    - Subsequent work raises questions over interpretation, role of language, developmental trajectory, etc
  - NOTE: False Belief Task sets up differential access to information, just as in fission/fusion society!
- **Povinelli et al 1990**: "Guesser vs. Knower" ("Knower" sees, "Guesser" does not)
  - Chimps, but not macaques, learned that Knower (present & attentive during baiting) was best indicator of food
    - "Guesser" also present, but w/bucket over head (or other visual obstructions) so Guesser not see baiting
  - BUT required MANY trials (no first trial success), so not clear just what features they learned to use
    - Did not seem to come to task prepared to solve it… Subsequent tests w/primates also failed until --
- **Krupenye et al 2016** –Used eye tracking for where *Pan* looked while viewing videos of False-Belief scenarios
  - Used ecologically-valid competitive scenarios (e.g. where adversary hiding, where thief hid contested object)
  - Passed! i.e. First look (when "Sally" returned) tended to be where "Sally" (falsely) believed target located

- Problems with ToM Account:
  - **Premack & Woodruff 1978** First coined "Theory of Mind"; later drove much work in human development
    - Tested if chimpanzee Sarah could interpret tape of trainer with a problem & pick photo of solution
    - Interpret: Subject must understand trainer's goal (But may have just picked own desired outcome?)
  - Falsifiable? How rule out alternative explanations?!
    - e.g. Hide from dominant male ("Target") when have sex because you have learned to…
      a) Prevent Target from knowing, since if he knows he'll interfere? (= ToM)
      b) Prevent Target from seeing, since if he sees, he will interfere? (=Extrapolate his line of sight)
      c) Prevent yourself from seeing Target's face, since when you can, you predict he'll interferes?
      d) Avoid stress of possible eye contact with intimidating Target, so can relax for sex?
    - Is there ever any way to distinguish between these alts? To KNOW what is going on "in their heads"…?
  - Best solution to these issues is to focus on the cognition we can see - behavioral complexity & flexibility

- Triadic Attention
- Esp in complex societies, important to assess attention interactions between others
  - **Johnson 2004** - In adolescent Bonobo triad, videotaped gaze (relative head orientation) relationships
    - e.g. Animal A turns head toward B (in presence of C), subsequently either stays or rapidly turns away
      - Best predictor of A's subsequent move is not B's attentional state, but whether C is monitoring them
    - e.g. In situations when a head turn toward others brings all three into high visual access of each other, one of three will shift gaze away immediately (mean: 260ms, significantly faster than typical)
    - So, A sees not just B seeing A, but A sees C seeing A seeing B etc! (i.e. Embed 'AseeB' in 'CseeAseeB')
      - How embedded can they go??? Social Tool "Alibi" suggests perhaps multiple levels…?
  - Plus note: Assessing which of two others are knowledgeable/ignorant would also require comparing others

Self Recognition Gallup 1970 – Self recognition in mirror via "**Mark Test**"
- Primates: Subject exposed to mirror, then mirror removed. Subject anesthetized, forehead marked with paint
  - When it awakens, watch to see if detects paint (does not), then re-expose to mirror
- Results: Monkey threatens the weird "other monkey" it sees; Apes groom themselves to remove paint
- Interpretation: Only apes have "self concept" that allows them to recognize own reflection (??)
- Dolphins?! Some researchers attempted this w/Ds. While they may be good candidates, **not appropriate test**!
  - Some dolphins "make faces" at mirror, but could be testing mimicry ability of animal in mirror!?
  - In one test, d's ignored mark until trainers started to wipe it, then paid repeated visits to mirror (?)
    - What might an ecologically valid, species-appropriate test for self-concept in dolphins be??!
- What does "self-recognition" even mean???
  - See mom's hands, echoes, before your own, so perhaps wrong to presume ToM maps "self" onto "other"
  - In humans, seems to develop out of social interaction…
    - Is this related to "Perspective Taking" - Seeing yourself as a thing "seeable" by others…???