Cogs 143

Lecture 9: Social Complexity

From here on, we'll focus on how primates & cetaceans have converged, cognitively, in the Social Domain

In Primates, shift from solitary nocturnal Prosiminans to social diurnal Anthropoids led to feeding in groups
In Cetaceans, the critical role of the school & the development of collaborative foraging makes them particularly social

- Grouping offers defense against increased predator pressure, but requires developing social skills
    - i.e. Group living raises issues of food & mate competition, signals of rank, opportunities for co-op, etc.
- What are some of the cognitive demands of such a dependence on social interaction?

"The Social Function of Intellect" Humphrey (1976)

- Social domain complex & unpredictable and therefore may be most cognitively demanding
    - Physical domain highly predictable - e.g. Physical causality (drop object, it falls)
    - Natural domain somewhat more difficult to predict - e.g. Rain predict ripe fruit?
    - Social domain: Agents with complex motives; Interaction changes contingencies that apply
        (i.e. Problem alters as a consequence of trying to solve it) = most difficult to predict
- Especially demanding in Primates and Cetaceans since many show "Social Complexity"

Social Complexity - De Waal (1986) defines as a society in which "**Power not = Rank**"

- "Rank" = position in social hierarchy
    - Most social animals (including humans) have behaviorally-marked rank relationships
        - e.g. A displaces B who displaces C; C bows to B who bows to A, C salutes B who salutes A etc
- **Rank = Power** when Rank *alone* translates into priority of access to resources (food, mates etc)
    - In such a hierarchy, individuals must keep track of their own dyadic relationships
    - I am C: To act appropriately when I meet A,B,D or E, I need to know C<A, C<B, C>D, C>E
    - As when a **coalition** of lower ranked individuals can gain resources over one of dominant rank
        - Note that dyadic rank relationships still exist in this system, but do not always determine outcome
    - Significantly more cognitively demanding, since now must also track the **relationships between others**
        - Plus additional demands: assessing soc currency, debt, fairness, cheating, sanctioning, etc...

-e.g. Savanah ("Olive") Baboons – immigrant male competitive strategies change over time

- Strong young males first overt aggression (don't know animals in group well)
- Over time, develop friendships w/afemale (groom, protect) with whom they are more likely to mate and with kids (whom they use as *passport* to female, and *buffer* to inhibit aggressive males)
- Also develop trust, and in time coalitions, with other males
    - Testes-grab greeting, at first tense & asymmetrical, over time becomes symmetrical in coalitions

- e.g. Bottlenose Dolphin males form coalitions that compete for access to females
    - Coalition "herds" female (who may cooperate or be coerced) to prevent other males gaining access
    - Involves elaborate **synchronous displays** by coalition, in movement & vocalization
        - Tho species variation: *T. truncatus* in FL:2 males, *T. aduncus* in Australia:3 males In Scotland:None
    - Bottlenose Dolphins (*Tursiops aduncus*) in Shark Bay Australia, coalitions well studied
        - Trio of males can have life-long, close association (although may alternate "odd man out" re: matings)
        - Sometimes, "second-order" alliances – groups of trios – work together to fend off other coalitions, even tho only one coalition in this "**super-coalition**" ends up with access to the female
        - Some evidence of reciprocity, within both first and second order groups, & sanctioning cheaters

-e.g. *Chimpanzee Politics* (de Waal,1982) For *later* developments in this triad, see De Waal 1996

- Top 3 ranked males in a chimp troop: #1 & #3 a coalition, #3's support required to maintain #1's spot
- #2 starts challenge by bothering females; While #1 defends and calms them, #2 goes and grooms #3
- #2 then shifted to doing favors for (esp. dominant) females (groom, protect kids, share food, etc.)
- #1 aggressively broke up #2 w/#3 or w/females, but tricky since #1 too needed female support
- Eventually #2 outright challenged #1 and, w/#3's & females' support, took over as alpha!
    - NOTE: During above, #3 exploited both sides, got more matings than either other male!!

- SO, Social Complexity is distinguished by **Triadic** (or Polyadic) interactions
    - These are characteristic of MANY primate & cetacean species
        - Redirected Aggression: e.g. If A aggress B, and B redirects to C - C is liable to be ally/kin to A
        - Mediation of Reconciliation: e.g. A&B fight, C groom each until calm and A&B groom each other
        - Intervention: e.g. A&B friendly, C breaks them up (possibly to prevent coalition?)

Social Tool Use - Some Triadic interactions involve *using* a "Social Tool"...
- User interacts with Tool to influence Target
  - **Buffer**: e.g. A use B as shield from aggressive C
  - **Recruit**: e.g. A recruit B against C
  - **Passport**: e.g. A nice to (e.g. baby) B to get close to (mom) C
  - **Incite**: e.g. A nice to B to anger/incite investment from C
  - **Slander**: e.g. Juv wants attention from mom, go near innocent bystander & scream, mom rescues
- Note exploitative connotation of many of above terms: One animal is "using" another for its own ends
  - Such behavior often cited as examples of **Machiavellian Intelligence** (More on this to come!)

Knowing About the Relations Between Others

- In Socially Complex societies, **triadic** interactions require learning about **relations between others**
  - Data has begun to accumulate for primates/cetaceans attending & effecting the relationships of others

KINSHIP
- **Dasser 1988**: Long-tailed Macaques trained on Match-to-Sample
  - Sample: Photo of a mom from subject's group; Alternatives: Her offspring vs. another's offspring
  - First trial success on transfer to other familiar mother/offspring pairs : Know others' kin relations
- **Seyfarth & Cheney 1990**: - When juvenile Vervet gives alarm, others look to its mother for confirmation
  - Like Dasser experiment above, shows animals in troop know who is related to whom

RANK
- **Perry 2004**: *Cebus,* during antagonism, select coalition partners from their friends but also take into consideration the relative rank of those friends to the target
- **Cheney, Seyfarth & Silk 1995**: Recorded dominant & submissive calls from all Chacma Baboon in group
  - Fabricated combinations of two animals' calls (i.e. fake vocal interactions) for playback tests
  - When played combo of dominant call by dom animal + submissive call by subordinate, no reaction
  - But, when played dominant call from subordinate + submissive call from dominant, large reaction!
    - Reaction is evidence that latter was unexpected: So, know normal rank relations between others

IN THE LAB:
- **Johnson et al 2018**: Bottlenose dolphins presented with animated visual stimuli of "socially moving" shapes
  - Target shape lifted up (toward "surface") or caressed by "Friendly" -OR- pushed down or hit by "Unfriendly"
    - In test, all 3 shapes present, then Friendly exits in one direction & Unfriendly exits in other direction
    - Then Target moves behind occluder, and record dolphin's head move, anticipating Target's reappearance
  - Dolphins reliably turned in direction Friendly shape exited, predicting that Target would prefer to assoc w/it
    - Supports that shapes' movements were interpreted socially & dolphins assess relationships of others

(Ecological Validity of the following protocols less obvious, but may well apply in social domain)
- **Transitive Inference**
  - Subjects presented w/pairs of objects, trained to pick A when presented w/B, B when w/C, C when w/D, etc.
    - Tested: Given novel combination of B w/D, which choose? (since both, in past, as often correct as not)
      - Pigeons require reinforcement over many trails, to learn new (to them, arbitrary) response
      - Primates chose B over D, as if learned not just dyadic associations, but ordering A>B>C>D
        - (No data for dolphins, but sealions perform like primates)
  - In social life, perhaps if see B dominant over C, and C over D, can then **infer B dominant over D**?
    - May provide a useful rule-of-thumb for new immigrants to group trying to figure out group relations
- **Weigl Principle** –
  - Subjects required to classify same object per different dimensions (color, shape, size, function)
    - e.g. Group red ball w/other (non-red) balls, or alternatively w/other (non-round) red objects
      - Primates and cetaceans both successful at versions of this task
  - Cognitively, same object is ***"seen as"*** a ball, or a red thing, or a big thing, or yours, or mine etc…
    - e.g. Under various social circumstances, see other as, alternatively, a parent, friend, competitor, mate, etc.
      - Depending on which classification applied, social predictions & inferences about relations will vary