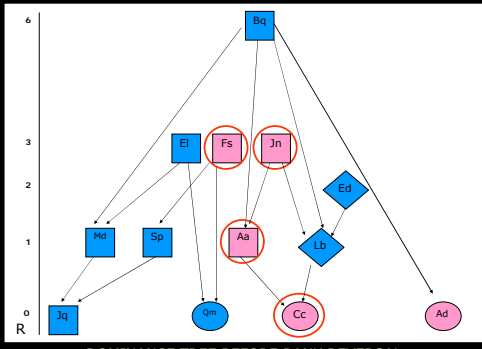


Rank reversal in females' hierarchy in semi-free ranging capuchin monkeys (*Cebus apella*)

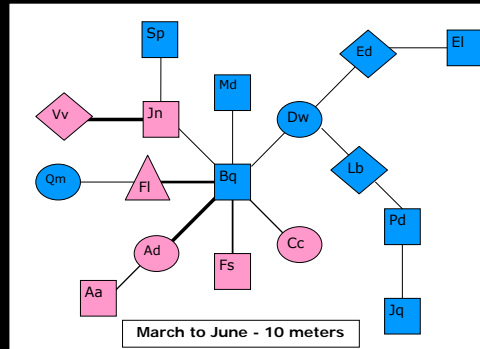
FALÓTICO, Tiago; VERDERANE, Michele P.; RESENDE, Briseida D.; OTTONI, Eduardo B. & IZAR, Patrícia

- Rank reversal was the result of a coalition among three females that defeated the alpha female
- The former alpha female (Janete) could not hold her position probably because
 - she had not established strong bonds with the alpha male and the other females, as indicated by grooming relationships (e.g. Janson, 1990, di Bitteti, 1997, Parr et al. 1997, Ferreira & Izar, in prep.)
 - she was initially supported by an adult male, Eli, who latter left the group, and so she lost her main supporter
 - she was in the end of gestation, what may have handicapped her during the fights
- One factor that may have contributed to the rank reversal process was the transition to adulthood and pregnancy of the females Cisca and Vavá
- During the period of rank reversal, high frequencies of agonism were accompanied by high rates of grooming, reinforcing the hypothesis of grooming as a reassuring behavior (Dunbar, 1991)



Janete (Jn) and Física (Fs) seemed to have the same rank. But only Janete had a direct dominance relationship with Ana (Aa). Note also that Cisca (Cc) was a low ranking individual.

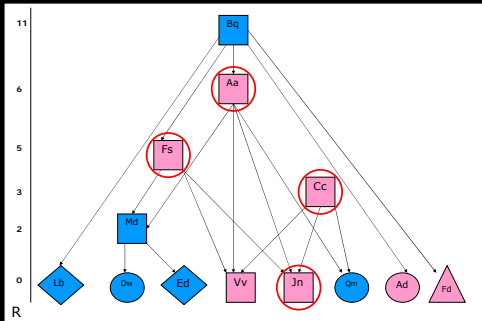
Blue= male, pink= female, =adults, ◊=subadults, ○=juvenile, △=infants. R=Ranking, represents the number of dominated individuals.



On the period before the fights and the reversion, the alpha male (Bq) was the centre of the group, with almost all females directly connected to him; the exception was Ana (Aa), who was connected to Bq through her daughter Ada (Ad).

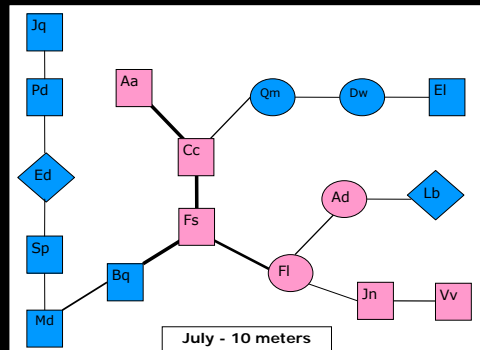
Janete's (Jn) connection to Bq was the weakest between the females that were connected to the alpha male.

Arch width is proportional to relationship strength.

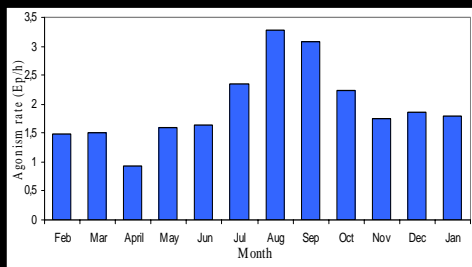


Janete (Jn) became a low ranking female, being directly dominated by Física (Fs), Ana (Aa) and Cisca (Cc). Vavá (Vv), that did not appear in the first tree, is here directly dominated by the same females as Janete.

Ana became the dominant female; however, she has not a direct dominance relationship with Fs or Cc, an adult female who rose to the top of the hierarchy, and the latter one, now an adult female, made a ride up to the hierarchy.



During the fight period, the females that formed the coalition against the alpha Jn were directly connected - Cc, Aa and Fs. Jn was connected to her daughter Vv, and they were apart of the other adult females. Jn and Vv were the target of the threatening from the coalition Cc, Aa, Fs.



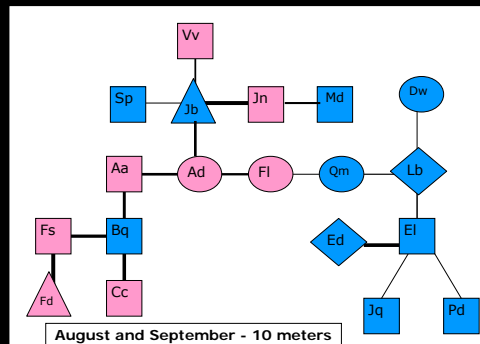
On July, 2002, there was an increase in agonism rate that lasted until October, when it lowered to the initial levels.

Frequencies of agonistic episodes varied significantly across the study period ($\chi^2 = 153.8$; $df=11$; $p<0.0001$). Standard residuals showed that there was an increase from July to October.

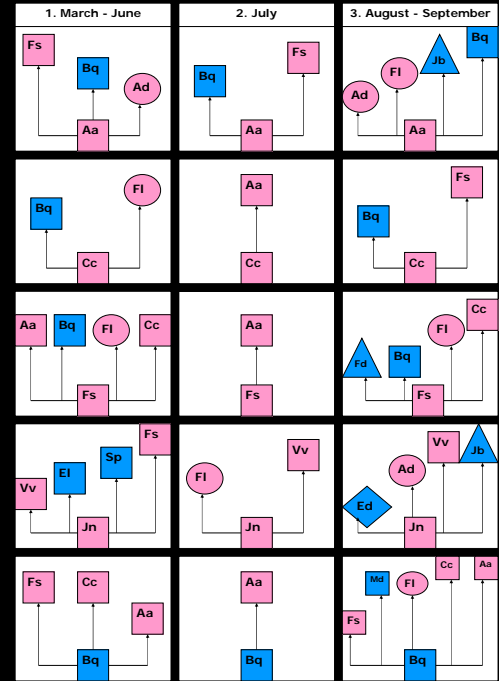
Method

We observed a group of 17-19 capuchins (*Cebus apella*) in Tietê Ecological Park at São Paulo-Brazil, between March and September/2002.

Data on grooming and interindividual distances (contact, 1, 5 and 10 meters) were collected by Focal-scan method, and on aggressive behavior were collected by All Occurrences method (Altmann, 1974).



During this period, only the females that formed the coalition are directly connected to the alpha male (Bq). The former alpha female is far from the group centre, connected only to her newborn son Jujuba (Jb) and to Medeiros (Md), a castrated adult male. Vavá (Vv) is only connected to Jb, her brother.



During the first period, all females but Janete groomed and were groomed by the alpha male. Física and Ana groomed each other. Janete groomed two other adult males.

On the second period, during the peak of agonistic behaviors, Ana was the only individual groomed by Física, Cisca and Bisqui. However, Ana groomed only Fs and Bq. Janete groomed only her daughter Vavá and Física's daughter, Filó (Fl).

The third period had two newborn infants, Jujuba (Jb) and Frida (Fd). Janete's and Física's offspring, respectively. They are groomed by their mothers and Jb was also groomed by Aa. Despite her new infant, Jn was not groomed by any other female. All females but Jn groomed and were groomed by the alpha male.

The length of the trees (L) varied significantly across the three periods (Kruskal-Wallis Test, $\chi^2=22.96$, $df=2$, $p=0.001$). On the second period (during the fights) L was significantly smaller than first period (Mann-Whitney, $U=0.001$, $p=0.001$) and third period (Mann-Whitney, $U=3.0$, $p=0.001$), showing that the grooming relationships were stronger during the period of high agonism.

The root of the branch is the individual that performs the grooming. There are only the first branch of the adults females involved in the fights and the alpha male trees, presenting only the direct interactions. The length of the arches reflects the frequency of grooming between each dyad.

The Revolution

On July/2002, the apparently stable dominance hierarchy of the capuchin group was disrupted by a series of severe fights among the adult females Janete, Ana and Física, and the young infants Vavá and Cisca.

Janete, who had been the alpha female since the death of the previous alpha female 1.5 year before, and her daughter Vavá, became the targets of aggression from Ana and Cisca. These two females, plus Física, Cisca's mother, apparently formed a coalition against Janete and Vavá. Frequently, Ana or Cisca started to threaten them, and were followed by Física.

Bisqui, the alpha male, did not interfere much, but did so in favour of Ana when other adult males tried to support Janete or Vavá.

After several episodes of conflict, Janete was not able to assure her position, and became, along with Vavá, the lowest ranking females in the group.

Ana became the alpha female, but apparently, Física and Cisca have not yet done with the revolution.

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