

Development of an Ecologically Valid Non-Human Primate Model of Gambling

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Token exchange paradigm

- Monkeys and great apes are able to use objects as **symbolic tools** to request specific **food rewards** from human experimenters [1,2]
- Cognitive underpinnings of **economic behavior** in non-human primates [3]




Objective of our field research

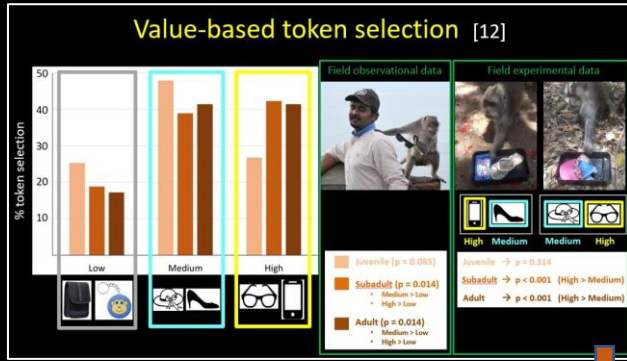
- Rectify limitations of lab studies

Spontaneously occurring token-mediated bartering system

More naturalistic and ecologically valid gambling-like situations



Value-based token selection [12]



Field observational data: Subadult (p = 0.081), Adult (p = 0.014)

Field experimental data: Subadult (p = 0.034), Adult (p < 0.001)

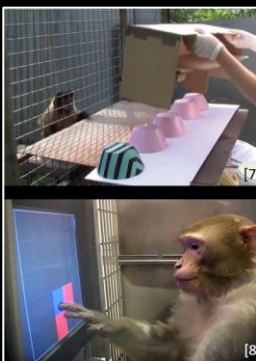
Plinko/Galton board: "Near-miss" effect?



- Strong motivation to keep on staking tokens
- Idiosyncratic strategies oriented towards the most preferred food reward slot

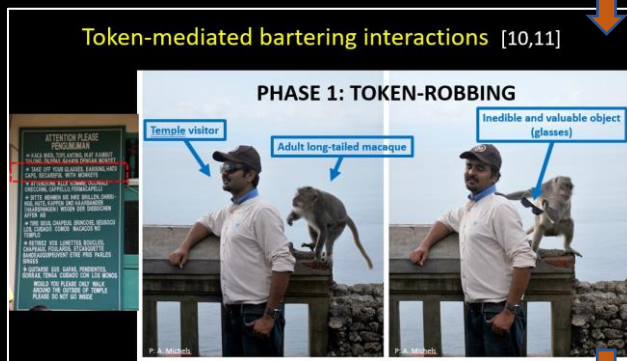
Decision-making in risky environments

- Non-human primates are subject to similar psychological dysfunctions exhibited by human problem gamblers [4-6]:
 - Increased impulsivity
 - Non-optimal cognitive biases

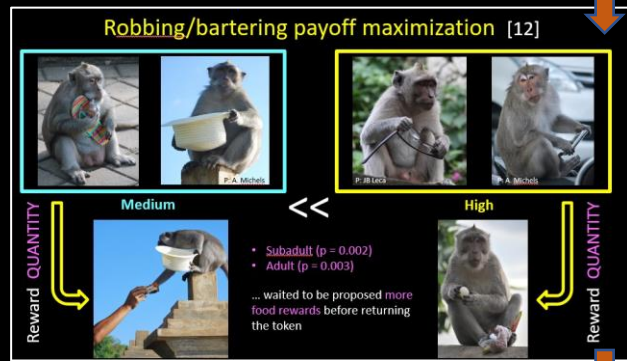


Token-mediated bartering interactions [10,11]

PHASE 1: TOKEN-ROBBERING



Robbing/bartering payoff maximization [12]



Subadult (p = 0.002), Adult (p = 0.003)

... waited to be proposed more food rewards before returning the token

Choice under risk of gain (after [7])



- Baiting Safe/Low-Reward Option
- Visual access
- Risky/High-Reward Option
- Safe/Low-Reward Option
- Baiting Risky/High-Reward Option
- No visual access
- Choice: Risky/High-Reward Option
- Outcome: Loss

Current research limitations

- Human-induced exchanges
- Small samples
- Individually trained subjects
- Laboratory-bred subjects
- Constrained environments

Ecological validity? [3, but see 9]

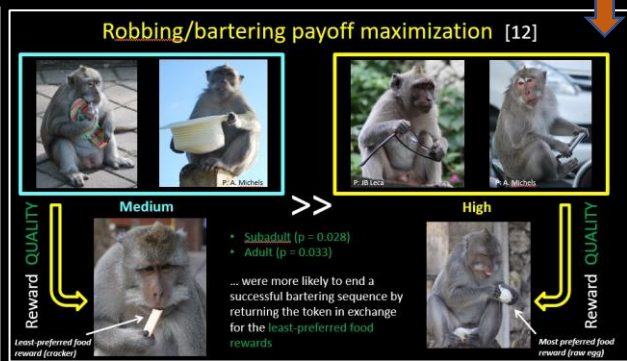


Token-mediated bartering interactions [10,11]

PHASE 2: TOKEN/REWARD-BARTERING



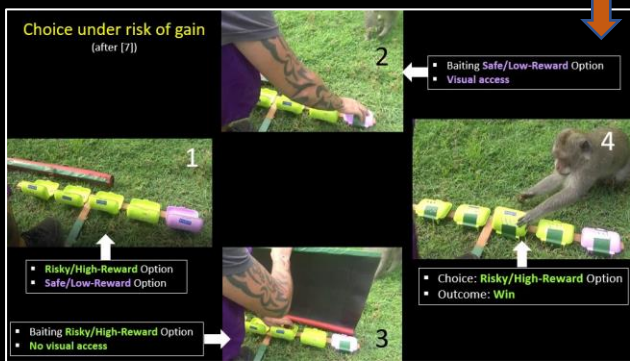
Robbing/bartering payoff maximization [12]



Subadult (p = 0.028), Adult (p = 0.033)

... were more likely to end a successful bartering sequence by returning the token in exchange for the least-preferred food rewards

Choice under risk of gain (after [7])



- Baiting Safe/Low-Reward Option
- Visual access
- Risky/High-Reward Option
- Safe/Low-Reward Option
- Baiting Risky/High-Reward Option
- No visual access
- Choice: Risky/High-Reward Option
- Outcome: Win

[1]. Brosnan & de Waal (2004). Folia Primatol 75: 317-330. [2]. Addessi et al. (2007). Proc R Soc B 274: 2579-2585. [3]. Addessi et al. (2020). Neurosci Biobehav Rev 109: 1-15. [4]. Blanchard et al. (2014). J Exp Psychol: Anim Learn Cogn 40: 280-286. [5]. Hayden & Platt (2007). Curr Biol 17:49-53. [6]. Paglieri et al. (2014). Front Behav Neurosci 8:22-60. [7]. Rivière et al. (2019). J Neurosci Psychol Econ 12: 159-168. [8]. Chen & Stuphorn (2018). Curr Biol 28: 3114-3122. [9]. Addessi et al. (2011). Int J Primatol 32: 83-98. [10]. Brodcorne et al. (2017). Primates 58: 505-516. [11]. Brodcorne et al. (2020). Anim Cogn 23: 311-326. [12]. Leca JB et al. (2021). Phil Trans R Soc B 376: 20190677.