

Electronic Supplementary Materials

Variation in primate decision-making under uncertainty and the roots of human economic behaviour
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Table S1: Studies examining decision-making under risk in nonhuman primates. Each study is categorized in terms of the focus species; the basic type of task used (learned association; intuitive outcomes, or exchange; see main manuscript for information about categorizations); the study’s overall sample size; whether there was a species comparison (if so, the other species and relevant study is listed for each of the species tested); whether there are relevant studies with a within-species population contrast; whether the study reported analyses examining individuals differences by age or sex; and whether the study design included either an internal state manipulation or a social context manipulation. For studies that report sex, age, or relevant condition comparisons we indicate the directionality of risk preferences. *Indicates data that was republished as part of a new comparison.

| Taxonomic group | Species | Study | Task type | Sample size | Species comparison | Sex difference | Developmental change | Internal state manipulation | Social context manipulation |
|-----------------|--|----------------------------|---------------------|-------------|-------------------------------|-------------------------|----------------------|---|--|
| Apes | Chimpanzees (<i>Pan troglodytes</i>) | Heilbronner et al. 2008 | Learned association | N = 5 | Bonobos | No effect | No effect | | |
| | | Rosati & Hare, 2011 | Intuitive outcome | N = 16 | Bonobos | | | | |
| | | Rosati & Hare, 2012 | Intuitive outcome | N = 20 | Bonobos | | | | More risk-seeking in comparative than neutral context; no effect of play context |
| | | Rosati & Hare, 2013, 2016* | Intuitive outcome | N = 24 | Bonobos, humans (adults) | No effect | No effect | More emotional responses to negative than positive outcomes | |
| | | Haun et al., 2011 | Intuitive outcome | N = 8 | Bonobos, orangutans, gorillas | | | | |
| | | Proctor et al., 2014 | Learned association | N = 9 | Humans (adults), capuchins | | | | |
| | | Krupenye et al., 2015 | Intuitive outcome | N = 23 | Bonobos | Males more sensitive to | | | |

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|--|---------------------------------|----------------------------|---------------------|--------|---|--|-----------|---|--|
| | | | | | | framing than females | | | |
| | | Calcutt et al., 2018 | Exchange | N = 8 | | All females | | | More risk-seeking for non-social than social risks |
| | | Broihanne et al., 2019 | Exchange | N = 12 | Bonobos, orangutans, gorillas, capuchin monkeys, Tonkean macaques | | | | |
| | | Leinwand et al. 2020 | Learned association | N = 4 | Gorilla, Japanese macaques | | | | |
| | Bonobos (<i>Pan paniscus</i>) | Heilbronner et al. 2008 | Learned association | N = 5 | Chimpanzees | No effect | No effect | | |
| | | Rosati & Hare, 2011 | Intuitive outcome | N = 14 | Chimpanzees | | | | |
| | | Rosati & Hare, 2012 | Intuitive outcome | N = 16 | Chimpanzees | | No effect | | More risk-seeking in comparative than neutral context; no effect of play context |
| | | Rosati & Hare, 2013, 2016* | Intuitive outcome | N = 13 | Chimpanzees, humans (adults) | No effect | No effect | More emotional responses to negative than positive outcomes | |
| | | Haun et al., 2011 | Intuitive outcome | N = 5 | Chimpanzees, orangutans, gorillas | | | | |
| | | Krupenye et al., 2015 | Intuitive outcome | N = 17 | Chimpanzees | Males more susceptible to framing than females | | | |
| | | Broihanne et al., 2019 | Exchange | N = 6 | Chimpanzees, orangutans, gorillas, capuchins, | | | | |

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|-------------------|--|--|---------------------|-------|---|-------------|--|--|--|
| | | | | | Tonkean macaques | | | | |
| | Orangutans (<i>Pongo abelii</i> ; <i>Pongo pygmaeus</i>) | Haun et al., 2011 | Intuitive outcome | N = 6 | Chimpanzees, bonobos, gorillas | | | | |
| | | Pelè et al., 2014 | Exchange | N = 4 | Long-tailed macaques, capuchins | All females | | | |
| | | Broihanne et al., 2019 | Exchange | N = 6 | Bonobos, chimpanzees, gorillas, capuchins, Tonkean macaques | | | | |
| | Gorillas (<i>Gorilla gorilla</i>) | Haun et al., 2011 | Intuitive outcome | N = 3 | Chimpanzees, bonobos, orangutans | | | | |
| | | Broihanne et al., 2019 | Exchange | N = 7 | Bonobos, chimpanzees, orangutans, capuchins, Tonkean macaques | | | | |
| | | Leinwand et al. 2020 | Learned association | N = 4 | Chimpanzees, Japanese macaques | | | | |
| Old World monkeys | Rhesus macaques (<i>Macaca mulatta</i>) | McCoy & Platt, 2005; Hayden & Platt, 2009* | Learned association | N = 2 | Humans (adults) | All males | | | |
| | | Hayden & Platt, 2007 | Learned association | N = 2 | | All males | | | |
| | | Long et al., 2009 | Learned association | N = 3 | | All males | | | |
| | | Hayden et al., 2010 | Learned association | N = 4 | | All males | | | |
| | | Yamada et al., 2013 | Learned association | N = 2 | | | | | More risk-seeking with high than low-energy budget |

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|-------------------|---|-------------------------------|---------------------|---------|---|-----------|-----------|--|--|
| | | Xu & Kralik, 2014 | Learned association | N = 2 | | All males | | | |
| | | Smith et al., 2017 | Learned association | N = 7 | | All males | | | |
| | | De Petrillo & Rosati, 2019 | Intuitive outcome | N = 160 | | No effect | No effect | | |
| | Long-tailed macaques (<i>Macaca fascicularis</i>) | Steelandt et al., 2011 | Exchange | N = 6 | Capuchins, Tonkean macaques | All males | | | |
| | | Pelè et al., 2014 | Exchange | N = 5 | Capuchins, orangutans | All males | | | |
| | Japanese macaque (<i>Macaca fuscata</i>) | Leinwand et al. 2020 | Learned association | N = 6 | Chimpanzees, gorilla | | | | |
| | Tonkean macaques (<i>Macaca tonkeana</i>) | Steelandt et al., 2011 | Exchange | N = 6 | Capuchins, long-tailed macaques | | | | |
| | | Broihanne et al., 2019 | Exchange | N = 5 | Bonobos, chimpanzees, orangutans, gorillas, capuchins | | | | |
| | Mangabeys (<i>Cercocebus torquatus torquatus</i>) | Rivière et al., 2018 | Intuitive outcome | N = 17 | Humans (children) | No effect | No effect | | |
| New World monkeys | Capuchins (<i>Sapajus apella</i>) | Chen et al., 2006 | Exchange | N = 6 | | | | | |
| | | Steelandt et al., 2011 | Exchange | N = 9 | Long-tailed macaques, Tonkean macaques | | | | |
| | | Lakshminarayanan et al., 2011 | Exchange | N = 5 | | | | | |

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|--------|---|--------------------------|---------------------|--------|--|-----------|-----------|---|--|
| | | Proctor et al., 2014 | Learned association | N = 8 | Humans (adults), chimpanzees | | | | |
| | | Pelè et al., 2014 | Exchange | N = 8 | Orangutans, Tonkean macaques | | | | |
| | | De Petrillo et al., 2015 | Learned association | N = 10 | | No effect | No effect | | |
| | | De Petrillo et al., 2017 | Learned association | N = 10 | | No effect | No effect | More emotional responses to negative than positive outcomes | |
| | | Zoratto et al., 2018 | Learned association | N = 10 | | | | | More risk-seeking alone than in social context |
| | | Rivière et al., 2019 | Intuitive outcome | N = 8 | Humans (children), mangabeys | No effect | No effect | | |
| | | Broihanne et al., 2019 | Exchange | N = 6 | Bonobos, chimpanzees, orangutans, gorillas, Tonkean macaques | | | | |
| Lemurs | Ring-tailed lemurs (<i>Lemur catta</i>) | MacLean et al., 2012 | Learned association | N = 2 | Ruffed lemurs, mongoose lemurs | All males | | | |
| | Mongoose lemurs (<i>Eulemur mongoz</i>) | MacLean et al., 2012 | Learned association | N = 2 | Ring-tailed lemurs, mongoose lemurs | All males | | | |
| | Ruffed lemurs (<i>Varecia rubra</i>) | MacLean et al., 2012 | Learned association | N = 1 | Ring-tailed lemurs, mongoose lemurs | All males | | | |

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