CLÁUDIA SOUSA MEMORIAL FUND FOR THE ADVANCEMENT OF PORTUGUESE PRIMATOLOGY

FINAL REPORT – 2017

FILIPA FRANCO DA SILVA BORGES

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1. INTRODUCTION

1.1. THE HISTORY OF PRIMATELOGY IN JAPAN AND THE PRIMATE RESEARCH INSTITUTE OF KYOTO UNIVERSITY

Primatology is considered to have started in Japan on the 3rd of December 1948, when the researcher Kinji Imanishi went to Koshima Island to study wild Japanese macaques (e.g. Matsuzawa and McGrew, 2008). In the present year, 2018, the 70th anniversary of the foundation of Primatology in Japan is, thus, celebrated.

Imanishi decided to start studying these primates during what may be considered a fortunate random encounter. After World War II (1939 – 1945), during which Imanishi was conducting research on wild Mongolian horses, the scientist went back to Japan and was studying horses in Cape Toi. During these studies, in 1948, Imanishi and his students came across a group of wild monkeys, which aroused his curiosity and made him question where the human society came from. In the following seven years, Imanishi and his students studied wild monkeys not only in Koshima Island, which is very close to Cape Toi, but in several different locations in Japan. They were able to recognise each monkey individually and tracked the populations’ behaviour over the years. Perhaps the most surprising detail in the history of Primatology in Japan is how it contrasts with the origin of the discipline in most western countries, where it began with studies on captive animals.

Eight years after the beginning of primatological research in Japan, in 1956, the Japan Monkey Centre (JMC) was created in Inuyama as a private foundation. Imanishi and his students played an important role in the establishment of the JMC and also began conducting research there.

Eleven years after the establishment of the JMC, in 1967, the Primate Research Institute (PRI) was founded as part of Kyoto University (https://www.pri.kyoto-u.ac.jp/), thanks to efforts of the primatologists Imanishi and Junichiro Itani. The decision was made that it should be built not in Kyoto, where the main campus of the University is located, but in Inuyama and in close proximity to the JMC.

More than 50 years after its foundation, the PRI continues to base its research on the fundamental question posed by Imanishi in 1948 – What is the origin of human nature? –, using a multi-disciplinary approach that includes behaviour, cognition, sociology, brain science, ecology, physiology, genetics, genomics, biomedicine, morphology, and
palaeontology. It trains graduate students, hosts faculty members, and postdoc researchers, and participates in countless international collaborations.

1.2. Cláudia Sousa

Cláudia Sousa (1975 – 2014) was a Portuguese primatologist that investigated the behaviour and cognition of captive and wild chimpanzees and other non-human primates. After having completed her master’s degree in Human Evolution from the University of Coimbra, in Portugal, Cláudia went to the PRI, in Japan, where she pursued her doctorate studies under the supervision of Professor Tetsuro Matsuzawa.

For her Ph.D., Cláudia focused mostly on the use of tokens by chimpanzees as rewards exchangeable for food items, a work that showed the emergence of saving behaviour (Sousa and Matsuzawa, 2001). This research was conducted with three adult female chimpanzees living at the PRI and later with an infant chimpanzee that had accompanied his mother during the experiments since his birth (Sousa et al., 2003).

In the wild, Cláudia studied populations of chimpanzees in the Republics of Guinea and of Guinea-Bissau (Figure 1), where she devoted herself to topics such as the development of tool use (e.g. Sousa et al., 2009), the sharing of plant foods (Hockings et al., 2007), and the carrying of dead infant corpses by mothers (Biro et al., 2010). Besides chimpanzees, Cláudia participated in many studies focusing on other primate species, such as colobus monkeys (Minhós et al., 2016) and also humans (Little et al., 2012).

Cláudia’s extraordinary ability to surpass the boundaries across disciplines and to bring together a broad range of interests into the passion of Primatology and into the eager of understanding and conserving nature and biodiversity is undoubtedly uplifting. Throughout my scientific and personal routes, I always strive to bear in mind all the precious lessons that Cláudia left us with. Her life, although unfortunately too short, was big enough to inspire all those who came across her path (e.g. Fernandes et al., 2016).
1.3. THE GRANT

Following Cláudia Sousa’s passing, Professor Tetsuro Matsuzawa created the Cláudia Sousa Memorial Fund for the Advancement of Portuguese Primatology (https://langint.pri.kyoto-u.ac.jp/ai/en/claudia/) in honour of her research history at the PRI. Every year, since 2015, the Fund covers all expenses and includes a stipend for a Portuguese early career student to spend one to three months in Japan taking part in research activities and seminars, and developing their knowledge and skills in the field of Primatology.

As the 2017 awardee, I have been in Japan between the 2\textsuperscript{nd} January and the 30\textsuperscript{th} March 2018. I have spent most of the time at the PRI, where I had the chance of participating in several activities, but I have also visited many other places, such as Kumamoto, Koshima, and Kyoto.
2. PRIMATE RESEARCH INSTITUTE

2.1. COGNITIVE EXPERIMENTS

The cognitive experiments on chimpanzees taking place at the PRI include several different areas of research and occur at four different laboratories (South Play Room, Lab 2, Lab 4, and Lab 5).

The 12 chimpanzees currently living at the PRI (https://shigen.nig.ac.jp/gain/index.jsp) are divided into two groups, which intend to mimic the social organisation of the species in the wild (i.e. females leave their original group when they reach the reproductive age). The routine of the individuals at the institute is organised in such a way as to include the cognitive experiments. Each chimpanzee goes to a cognitive experiment laboratory after being called at a specific time by researchers and staff only if it decides to. If the chimpanzee chooses to participate in the experiment, part of the daily diet, which is carefully tracked, is given as reward after the completion of tasks. Each laboratory has a schedule, which is repeated every day from 8:45 am to 11:00 am and from 01:15 pm to 03:30 pm, with each chimpanzee participating in individual tasks for 45 minutes always at the same time and at the same room.

Apart from cognitive experiments, chimpanzees are freely allowed to roam through their outdoor enclosure (Figure 2) and their indoor cage.
2.1.1. **SOUTH PLAY ROOM**

South Play Room (SPR) is one of the four laboratories where cognitive experiments on chimpanzees take place in the PRI. The well-known pioneer memory experiments developed by Professor Tetsuro Matsuzawa ([https://www.matsuzawa.kyoto/](https://www.matsuzawa.kyoto/)) continue to occur at this room (e.g. Inoue and Matsuzawa, 2009).

The experiments currently taking place at SPR all make use of touchscreens (Figure 3) and include, besides the ones mentioned above, the application of the rock-paper-scissors game's rules (Gao *et al.*, 2018) and the study of the body inversion effect (Gao and Tomonaga, 2017).
2.1.2. OTHER LABORATORIES

In Laboratories 2, 4, and 5, experiments are taking place that include topics such as space-based representation (Adachi, 2014), biometrics to trace individual ordering preference, and sound response.

2.2. THE BOSSOU ARCHIVE

Besides the experiments with animals kept in captive conditions, the PRI is also involved in research conducted in the wild. The outdoor laboratory of Bossou, in the Republic of Guinea (https://www.greencorridor.info/en/chimp/behavior/Nut-cracking.html), is a unique example of a long-term field study site established by Professor Tetsuro Matsuzawa and colleagues in 1988 where observational research still takes place today. It consists of a semi-open area in the forest within the distribution range of chimpanzees where investigators can more easily observe and record behaviour. It has been especially created to study the nut-cracking behaviour and its social transmission over generations (Matsuzawa et al., 2008). The hundreds of hours of recording performed for a few months each year from 1988 resulted in an
enormous archive containing many tapes of different formats (Figure 4). Over the years, the data accumulated and their organisation and listing did not follow any systematic rule. Thus, more recently, when the need arose to digitalise the files, the task was hindered by constraints such as duplicated tapes, missing dates and/or times, and damaged cassettes. A new workflow has been created by the Ph.D. student Daniel Schofield, from the University of Oxford and supervised by the Portuguese primatologists Susana Carvalho and Dora Biro, who, after verifying, organising, cataloguing, and digitalising all the files, will further analyse over two decades of the nut-cracking behaviour and its transmission in Bossou.

Figure 4. Part of the Bossou archive, which is currently being organised and catalogued (27th March 2018).

Cláudia Sousa herself also conducted research at Bossou’s outdoor laboratory, having focused on another tool-using skill: the leaf-tool use for drinking water (Sousa et al., 2009). This study was pioneer in that it provided the first detailed description of the acquisition and development of this behaviour and of its comparison with other forms of tool use within the same wild population.

2.3. SEMINARS
The PRI organises several seminars, talks, and workshops which the entire Institute’s community is welcome to attend. These include the weekly seminars arranged by the research units – Cellular and Molecular Biology, Ecology, and Psychology – and by the
Center for International Collaboration and Advanced Studies in Primatology (CICASP), as well as extraordinary sessions. As awardee of the Cláudia Sousa Memorial Fund for the Advancement of Portuguese Primatology, I was part of the Language and Intelligence Section and, as an international fellow, I was part of CICASP. As such, I attended the weekly Psychology and CICASP seminars, which are both always held in English.

2.3.1. Psychology Seminars

The Psychology seminars included a vast array of themes, such as Discrimination of friction force and behavioural biometrics for chimpanzees (by Professor Masaki Tomonaga), Individualized learning support program for children with developmental disorders using MSPA (Multi-Dimensional Scale for PDD and ADHD) (by Shino Ogawa), and Investigating the causes and consequences of feral horses disappearance and mortality in the North of Portugal (by Renata Mendonça, Ph.D.).

I also had the chance of presenting a Psychology seminar on the 30th of January 2018 together with my supervisor, Professor Misato Hayashi, with the title Implications of genetic studies on behaviour and conservation. In this talk, Professor Misato Hayashi did an introduction presenting several researches that combined genetic techniques with behaviour, culture, and conservation, and I then presented a case study on the chimpanzees from Guinea-Bissau. This is the subject that I have been working on so far and it was a great opportunity for me to present it at the PRI and to receive feedback from colleagues and researchers.

2.3.2. CICASP Seminars

The CICASP (http://www.cicasp.pri.kyoto-u.ac.jp/) weekly seminars included hot topic debates on intelligence research and de-extinction, and 90 seconds presentations of research projects. CICASP also organised two multi-day workshops during my stay in Japan – Data Analysis in R, by Christof Neumann (University of Neuchâtel, Switzerland) and Julie Dubosq (Kyoto University, Japan), and Geographic Information Systems (GIS) analysis for Environmental Conservation, by Janet Nackoney (University of Maryland, United States of America). All of these sessions have been enormously useful to develop several skills in different areas and to get to know many scientists whose work I have been admiring for a long time.
3. **JAPAN MONKEY CENTRE**

The Japan Monkey Centre (https://www.japanmonkeycentre.org/), located very close to the PRI, in Inuyama, was founded in 1956 with the aim of promoting research and conservation of primate species, as well as of familiarising the general public with these topics and supporting education. Nowadays, it houses over sixty nonhuman primate species (Figure 5, Figure 6, Figure 7), the largest number among all centres in the world.

The JMC distinguishes itself from many other centres around the world in that it provides all caretakers with field experiences. These have the purpose of assuring that the captive environment mimics to the fullest the conditions of each of the species in the wild.

*Figure 5. Japanese macaques warming themselves around a fire in the Japan Monkey Centre (5th January 2018).*
Figure 6. Chimpanzee in the Japan Monkey Centre (5th January 2018).

Figure 7. Bolivian squirrel monkeys in the Japan Monkey Centre (5th January 2018).
4. HORSEMAN KAKAMIGAHARA

The Horseman Kakamigahara (http://horseman-kakamigahara.weebly.com/) is a facility located in the Gifu prefecture, not far from the PRI, which harbours one horse and two ponies and where PRI researchers have been conducting some experiments making use of touchscreens (Figure 8; e.g. Tomonaga et al., 2015).

The study of horses in Japan dates back to the 1940s and to the origin of Primatology in the country. However, it was not until recently that the PRI started to actively conduct research on horse cognition. The way that happened is very interestingly described by Matsuzawa (2017) and involves two Portuguese researchers: Carlos Pereira, from Sorbonne University, and Cláudia Sousa, who is at the origin of the grant this report describes. In fact, Carlos Pereira specialises in horse training and came to know about computer-controlled touchscreen experiments through Cláudia Sousa at a conference. In 2014, Professor Tetsuro Matsuzawa acquired horses in Japan and the studies began.

Additionally, a new research site has been established in Serra d’Arga, northern Portugal, where feral horses are being tracked and sociological data are being collected (Ringhofer et al., 2017).
Figure 8. Pony participating in a touchscreen experiment at the Horserman Kakamigahara (16th January 2018).
5. KUMAMOTO SANCTUARY

The Kumamoto Sanctuary (Figure 9; http://www.wrc.kyoto-u.ac.jp/kumasan/indexE.html; https://langint.pri.kyoto-u.ac.jp/ai/en/kumamoto-sanctuary.html), which I had the opportunity to visit between the 6th and the 9th February 2018, is the only sanctuary for chimpanzees and bonobos in Japan. It is one of the facilities of the Wildlife Research Centre of Kyoto University and is located in Kyushu Island, southwest Japan. This sanctuary shelters all the individuals that participated in biomedical experiments before the use of primates for such type of research was forbidden in the country in the year 2011. 58 chimpanzees and six bonobos (Figure 10) presently live at the sanctuary.

Figure 9. Kumamoto Sanctuary (6th February 2018).
One core value of the Kumamoto Sanctuary is the valorisation of the participation of all members of research teams and staff in the care routine of chimpanzees and bonobos. The involvement in this routine starts from the beginning of anyone’s stay at the sanctuary, even for short visits, and encompasses feeding, cleaning booths and outside enclosures, preparing contraceptive pills for females, and collecting faeces for health analyses (Figure 11). This allows everyone who works at the facility to have a full understanding of the individuals’ needs and requirements, which, ultimately, leads to better and more accurate research.
The research activities currently taking place at the Kumamoto Sanctuary include the use of touchscreens to study subjects such as temporal discounting and the use of eye-tracking devices (e.g. Kano et al., 2017).

Figure 11. Group of researchers carrying material for the chimpanzees’ booths (6th February 2018).
6. **Koshima Field Station**

The Koshima Field Station ([http://www.wrc.kyoto-u.ac.jp/koshima_st/index_e.htm](http://www.wrc.kyoto-u.ac.jp/koshima_st/index_e.htm)) is a centre that provides support for research in the Miyazaki prefecture, southwest Japan. Similarly to the Kumamoto Sanctuary, it belongs to the Wildlife Research Centre of Kyoto University and has been established in 1968.

6.1. **Japanese Macaques in Koshima Island**

Koshima Island can be accessed by boat from the Field Station (c. ten minutes). Japanese macaques are native to the island, which has been designated as natural monument in 1934. Approximately 90 individuals currently inhabit Koshima. It is estimated that, of these, 20 are solitary and that the remaining are divided into two groups of 45 and of 25 individuals.

The Japanese macaques in the island are habituated to humans, which renders it possible to fully observe and document the characteristic behaviours of the species, such as the sweet-potato washing and the bathing (Hirata *et al.*, 2008).

![Figure 12. Japanese macaque in Koshima Island. Picture by Fumito Kawakami (21st February 2018).](image)
6.2. **Horses in Cape Toi**

Cape Toi, located at the east end of Shibushi Bay, is a 30-minute car drive from the Koshima Field Station. Although Japanese macaques also inhabit this area, they are hard to spot since they are not habituated to humans. It is, however, possible to very closely observe horses of the breed Misaki, which is native to Japan. At present, approximately 113 horses live in Cape Toi. Of the 24 hours of the day, they spend four sleeping, two walking, and 18 eating (Figure 13). Of the surprising 40 kg of food each individual ingests each day, 20 kg of faeces are produced. Although there is a visitor centre where the general public can obtain information about the location and the horses and request a guided tour of the site, staff attempts to maintain a practice of minimum human intervention in what concerns the routine of the animals.

*Figure 13. Two horses grazing in Cape Toi (20th February 2018).*
7. THE 9TH INTERNATIONAL SYMPOSIUM ON PRIMATOLOGY AND WILDLIFE SCIENCE

7.1. THE MEETING

The 9th International Symposium on Primatology and Wildlife Science (http://www.wildlife-science.org/en/symposium/) was a meeting that took place at Kyoto University between the 3rd and the 5th March 2018 (Figure 14). This International Symposium usually takes place twice a year and serves the purpose of gathering all current and prospective members of the Leading Graduate Program in Primatology and Wildlife Science (PWS; http://www.wildlife-science.org/index-en.html). Additionally, it hosts several prestigious invited speakers from different research fields. The 9th Symposium counted with the presence of the Portuguese researcher Helena Freitas, from the University of Coimbra, whose talk included topics such as sustainability and the importance of making ancient and regional scientific records accessible.

Figure 14. Closing remarks of the Symposium by Professor Tetsuro Matsuzawa (5th March 2018).

7.2. KYOTO CITY ZOO

The Kyoto City Zoo (http://www5.city.kyoto.jp/zoo/lang/en/), which I had the chance to visit during my stay in Kyoto, is the second oldest in Japan, having been established in 1903. It was very often mentioned during the Symposium, especially because of its
elephants, whose facilities were recently updated (Figure 15). More than 120 species of animals inhabit the zoo, which harbours not only mammals, but also fish, birds (Figure 16), reptiles (Figure 17), and amphibians. The primate species one can see and know more about at the zoo include chimpanzees, gorillas, rhesus monkeys, ring-tailed lemurs (Figure 18), tufted capuchins, lar gibbons, pygmy slow loris, and Senegal galagos.

Figure 15. The elephants of the Kyoto City Zoo in their new and improved facilities (6th March 2018).
Figure 16. Flamingos at the Kyoto City Zoo (6th March 2018).

Figure 17. Starred tortoises at the Kyoto City Zoo (6th March 2018).
Figure 18. Ring-tailed lemur at the Kyoto City Zoo (6th March 2018).
8. References


Kano, F., Krupenye, C., Hirata, S. and Call, J. (2017) ‘Eye tracking uncovered great apes’ ability to anticipate that other individuals will act according to false beliefs’, *Communicative and Integrative Biology*, 10(2), e1299836.


9. USEFUL URLs

Center for International Collaboration and Advanced Studies in Primatology (CICASP):
http://www.cicasp.pri.kyoto-u.ac.jp/

Cláudia Sousa Memorial Fund for the Advancement of Portuguese Primatology:
https://langint.pri.kyoto-u.ac.jp/ai/en/claudia/

Great Ape Information Network (GAIN):
https://shigen.nig.ac.jp/gain/index.jsp

Horsemant Kakamigahara:
http://horseman-kakamigahara.weebly.com/

International Symposia on Primatology and Wildlife Science:

Japan Monkey Centre:
https://www.japanmonkeycentre.org/

Koshima Field Station:
http://www.wrc.kyoto-u.ac.jp/koshima_st/index_e.htm

Kumamoto Sanctuary:
http://www.wrc.kyoto-u.ac.jp/kumasan/indexE.html;

Kyoto City Zoo:

Leading Graduate Program in Primatology and Wildlife Science:

Outdoor laboratory of Bossou, Republic of Guinea:

Primate Research Institute (PRI):
https://www.pri.kyoto-u.ac.jp/

Professor Tetsuro Matsuzawa:
https://www.matsuzawa.kyoto/