

Who is man's best friend and why?

Comparing social competence across companion animal species and non- traditional pets

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Summary

Social competence is the ability of individuals to optimise their social behaviour based on the available social information. This skill has mostly been studied in children and dogs. We aimed to compare the social competence of several companion animal species, hypothesising that those species which are most common in human households (dogs and cats), would demonstrate higher social competence than other species kept as pets (such as reptiles). We developed a social competence test battery consisting of 11 sub-tests designed for online administration to ensure animals remained in familiar environments and, therefore, minimise stress. We tested 62 individuals across 20 species (dogs N=10, cats N=7, parrots N=6, small mammals N=27 and reptiles N=12). In a preliminary analysis, we coded seven behavioural variables in three sub-tests: separation, greeting, and affiliation. With factor analysis, I identified three main factors: 'door', 'greet', and 'contact'. Our results indicate that dogs and cats spend more time near the door during separation than small mammals, and dogs greet their owners more enthusiastically than reptiles. However, no significant differences were found in the time spent in physical contact with the owner across groups. These findings suggest that dogs and cats exhibit higher levels of interest in the owner than small mammals and reptiles, yet most pets, independently of species, tolerate physical contact well, which seems to be a fundamental requirement from companion animals. The analysis of the remaining 8 subtests will provide a more comprehensive understanding of species-specific social competence.

Introduction

Social competence is the ability of individuals to optimise their social behaviour based on the available social information (Taborsky and Oliveira, 2012). This ability has been mainly studied in dogs and children (Miklósi and Topál, 2013; Hops, 1983). Some studies suggest that social competence is an evolvable trait of an individual (Taborsky, 2021): it is variable, has fitness consequences and is heritable. Socially competent behaviour, for example, modifying behaviour based on one's own previous fight performances (Rutte et al., 2006) or following human pointing gestures (Miklósi and Soproni, 2006) present in various taxa. Another example is the so-called “eavesdropping”, where a third individual witnesses a conflict between two other individuals and later can adjust its behaviour with the conspecifics involved in the conflict based on what it saw. These behaviours can be variable not only between taxa but also between individuals of the same species.

When talking about the consequences of social competence on fitness, we need to look at not only the benefits but also the costs. If a taxon tends to be more social, then developing and maintaining the ability to process and use social information has much more benefits than costs. A good example of this is the Norway rat (*Rattus norvegicus*). In the case of this species, it was observed that during conflicts, previously victorious rats were ready to attack other individuals and they tended to win the fights in a shorter amount of time, while previously loser individuals received much less aggression from conspecifics (Lehner et al., 2011).

Social competence is based on many lower-level cognitive traits (such as perception, encoding, storage and retrieval of information in the brain) and most of the time needs high “computing power” of the brain, which organ needs a lot of energy. In the case of cleaner wrasses (*Labroides dimidiatus*) it was observed that in more dense populations, the forebrain size of the individuals was larger, but it was compensated by the reducing size of other brain regions (Triki et al., 2020).

Regarding the genetic background, a study of same-sex monozygotic and dizygotic twins, full- siblings, half-siblings and stepsiblings showed significant heritable genetic variance of social competence in adolescence years (McGuire et al., 1999). Altogether, these studies show that social competence may be an evolvable trait.

As mentioned above, social competence has much fewer costs in case of more social taxa, and if the environment of the species favours group formation (such as high predator pressure), a positive feedback loop can happen between sociality and social competence

because as the group size becomes bigger, the cost of sociality becomes much less. Therefore, the individuals become more social, and they also need a higher degree of sociality, so the group lifestyle selects for more social competence and the costs of it drop furthermore (**Figure 1**).

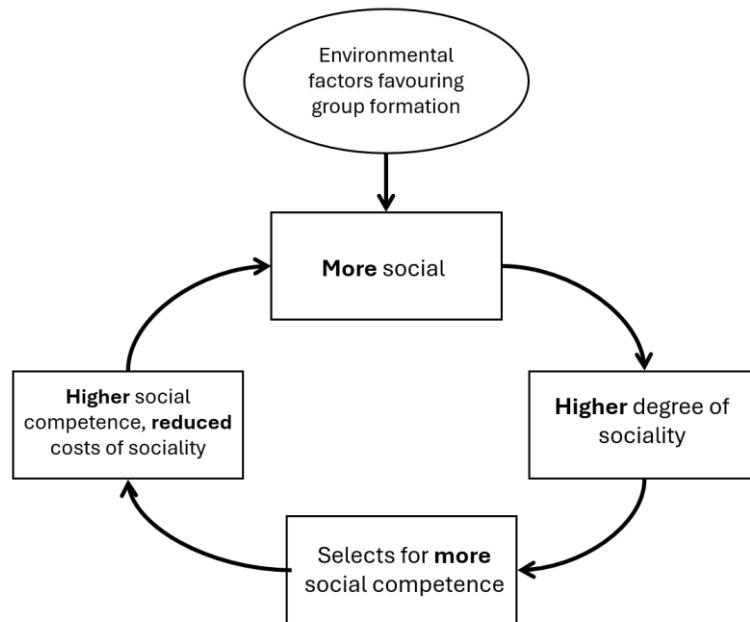


Figure 1: Positive feedback loop between sociality and social competence (Based on Taborsky, 2021)

During domestication, a lot of species were “forced” to be in higher-density populations, and most likely, this affected these species’ social competence. A good example of this is the domestic cat (*Felis catus*), because its ancestral species, the *Felis silvestris* is solitary, but the domesticated descendants form groups mostly consisting of related adult females and their offspring (Bradshaw, 2016). Another great example is the difference between domestic ferrets (*Mustela furo*) and wild *Mustela* hybrids in socio-cognitive skills: domestic ferrets tolerate eye contact for a longer time, they show a preference for their owners in a two-way choice task, and they are able to follow human directional gestures (such as pointing) in contrast to wild *Mustela* hybrids (Hernádi et al, 2012). Comparing domesticated and non-domesticated companion animal species should help us investigate trends and the effects of domestication on social competence.

But what exactly is a companion animal? There are many different definitions. Some researchers say that only domestic cats and dogs can be considered companion animals based on the mutual bond between the animal and owner (Laurent-Simpson, 2017). We use a wider

definition: “*any domesticated, domestic-bred or wild-caught animals, permanently living in a community and kept by people for company, enjoyment, work (e.g. support for blind or deaf people, police or military dogs) or psychological support – including, but not limited to dogs, cats, horses, rabbits, ferrets, guinea pigs, reptiles, birds and ornamental fish*” (Sterneberg-Van der Maaten et al., 2016).

Out of the many companion animal species, mostly dogs’ social competence was studied in detail. Maybe dogs’ high level of social competence makes them “man’s best friend”? They show attachment to their owner similarly to children to their mother: they display separation anxiety symptoms and greet the owner after being apart (Topál et al., 2005). In opposition to wolves, dogs show a positive affective response to human eye contact (Gácsi et al., 2005), even as puppies, and they are able to pick up human ostensive cues such as pointing in an object search task (Riedel et al., 2008). These human-like aspects of attachment and communication help dogs to communicate and cooperate effectively with humans. The dog-owner relationship in some aspects can be analogous to the human mother-child relationship: the owner has a "safe haven effect" (behavioural and heart rate response) on the dog when it is presented with stressful social stimuli (the presence of a threatening stranger) (Gácsi et al., 2013).

Other companion animals’ social competence was less studied in contrast to dogs, but there were a few exceptions (cats: Miklósi et al., 2005, ferrets: Hernádi et al., 2012). However, based on statistics from 2022, only in Europe, there are 129 million cats, 52 million birds and 30 million small mammals kept as companion animals in human households (Fediaf, 2022).

If we want to know more about the effects of domestication on social competence, we have to compare many domesticated species. To test these animals, we have to work together with citizens, who own them. Citizen science, broadly speaking, is the active engagement of the general public in scientific research tasks (Haklay et al., 2021). The citizens can be included in many stages of the research process: formulating hypotheses, data collection or even data analysis. Based on how much the citizens are involved in the research project, we can differentiate between several types of citizen science: the first type is called “contributory”, in these projects, the researchers “set up” the whole experiment, analyse the data, while citizens “only” provide data (either by direct contribution or through using citizen-resources). The second is the “collaborative” type. In these projects, the citizens not only

provide data but also contribute to the research with the finishing touches to the experimental design or help with the data analysis and the circulation of results. Our project can be considered a contributory type because the owners “only” provided videos, but our research group created the social competence test and I coded the videos and analysed the data.

Objectives

The objective of this study was to develop and implement a novel test battery to compare social competence across a diverse range of companion animal species with varying domestication histories. Specifically, we hypothesized that species with the longest domestication history and the most numerous companion animals (dogs and cats), would exhibit higher levels of social competence compared to "non-traditional" pet species (e.g., reptiles or small mammals) that lack similar domestication histories.

To achieve this, we designed an online test protocol that allowed animals to remain in their familiar environments, reducing stress-related responses often observed in traditional laboratory settings or outside of their “home” (Quimby et al., 2011; Cloutier et al., 2012). The test aimed to observe natural behaviors in a non-invasive and positive context for both animals and their owners. Additionally, the study included data collection on owners' perceptions of their relationship with their pets to explore potential correlations between owner-pet relationships and social competence in the animals.

By testing 20 different species categorized currently into five groups—dogs, cats, small mammals, parrots, and reptiles—the study sought to provide a comprehensive understanding of social competence across companion animals, offering insights into the impact of domestication, species-specific traits, and owner interactions on social behavior.

Methods

Ethics statement:

The procedures applied complied with national and EU legislation and institutional guidelines, and the study was performed under the recommendations of the International Society for Applied Ethology guidelines for the use of animals in research. A written statement (PE/EA/00369–4/2022) was obtained from the local ethical committee (“Pest Megyei Kormányhivatal Élelmiszerlánc-Biztonsági és Állategészségügyi Igazgatósága”, Budapest, Hungary). According to this statement, the current study is a non-invasive observational experiment and thus is allowed to be performed without any special permission according to the corresponding definition by law (‘1998. évi XXVIII. Törvény’ 3. §/9. — the Animal Protection Act). The owners who volunteered to participate in the study were informed about the procedures and data handling protocols, provided written consent for their animals’ participation, and could at any point decline to participate. Ethical approval for the study of human participants was obtained from EPKEB (2022-51).

Subjects

We ran overall 62 behavioural tests with 20 species (dogs (*Canis familiaris*) (N=10), rabbits (*Oryctolagus cuniculus*) (N=9), cats (*Felis catus*) (N=7), ferrets (*Mustela furo*) (N=5), guinea pigs (*Cavia porcellus*) (N=4), bearded dragons (*Pogona vitticeps*), mice (*Mus musculus*) and green cheek conures (*Pyrrhura molinae*) (N=3), common parakeets (*Melopsittacus undulatus*), rats (*Rattus norvegicus*), Kenyan sand boas (*Gongylophis colubrinus loveridgei*), pond sliders (*Trachemys scripta*) and Syrian hamsters (*Mesocricetus auratus*) (N=2), also common boa (*Boa constrictor*), corn snake (*Pantherophis guttatus*), four-toed hedgehog (*Atelerix albiventris*), Mongolian gerbil (*Meriones unguiculatus*), river cooter (*Pseudemys concinna*), Hermann's tortoise (*Testudo hermanni*) and blue-winged macaw (*Primolius maracana*) (N=1)). The participants were invited to the test via an online survey about human-pet relationship. We compared these species in 5 main groups: Dogs (N=10), Cats (N=7), Parrots (N=6) (including green cheek conures, common parakeets and a blue-winged macaw), Small mammals (N=27) (including rabbits, ferrets, guinea pigs, mice, rats, Syrian hamsters, a four-toed hedgehog and a Mongolian gerbil) and Reptiles (N=12) (including bearded dragons, Kenyan sand boas, pond sliders also a common boa, a corn snake, a river cooter and a Hermann’s tortoise). All animals were at least 1 year old and were in the owners’ household for more than half a year.

Behavioural test

Our test was conducted through online platforms such as Zoom or Google Meet and it consists of two main parts, with a 10-minute long break between them, so we recorded the tests in two sections. We sent the owners all the information beforehand. Most of the equipment needed for the test can be found in many households or is easily obtainable (e.g.: duct tape or yarn). We aimed to make the test situation as welcoming and as entertaining as possible, to make the experience positive not just for the animals but also for the owners. The two main parts are the “in the cage” (for species which are not kept in cages, this part is also a free-roaming period) and the “outside of the cage” part. The first section of the test contained six sub-tests, which were designed to assess different aspects of the subjects’ social competence.

Separation:

Aim:

To measure the pet’s behaviour when the owner leaves it in the room on its own.

Procedure:

The owner is asked to leave the room for 1 minute without saying any long goodbyes and not remain close to the door, where the animal can hear her/him (**Figure 2A**).

Greeting:

Aim:

To see the pet’s behaviour towards the owner and the owner’s behaviour towards the animal after being separated.

Procedure:

In this task, the owner is instructed to first stay in the door for 10 seconds after separation, after that, she/he can walk to the cage (in case of caged animals) or to the animal and put her/his hand in the cage/before it, while they are only allowed to say “Hi/Hello/Szia (“Hi” in Hungarian)”. If the pet approached the owner or they held this position for more than 10 seconds the owner was asked to greet the animal in the way she/he usually does (**Figure 2B**).

Affiliation:

Aim:

To observe friendly interactions between the owner and the pet.

Procedure:

This task consists of two parts: the active and passive part. The owner is asked to “cuddle” and talk to the pet as she or he usually does (**Figure 2C**). When the experimenter asks after 1,5 minutes, she/he needs to put the animal down/back in the cage and put her/his hand before the pet for 30 seconds without moving or speaking (**Figure 2D**).

Happy shared interaction/Spontaneous play:

Aim:

To see if the owner plays with the pet and how enthusiastic the animal is about this interaction.

Procedure

In this task, the owner is asked to play or perform any happy shared interaction with the pet for 1,5 minutes. They can use toys or any tools for this.

Name recall (Lenkei et al., 2019):

Aim:

To see if the owner is able to call the pet over.

Procedure:

This sub-test contains multiple levels: on the first level, the owner is only allowed to call the pet's name and say only commands e.g.: “Come here!” to make the pet approach them. On the second level, the owner can use commands, the pet's name and hand movements, clapping, whistling, knocking on the terrarium or cage wall etc. Finally, on the third level, the owner can use food to make the pet approach her/him. After these levels, the owner is asked to put down 3-4 pieces of food and try to call the pet after they finish eating the food and while they are eating the food. If on the first and second levels, the owner is unable to recall the pet, the fourth level is skipped.

Hold and pet (Hernádi et al., 2012):

Aim:

To observe how well the animal can handle the inhibition of its movement.

Procedure:

This sub-test consists of three main parts. In the first part, the owner is asked to pick up their pet and hold it, while inhibiting the animal's movement. In the second section, the owner needs to hold up the pet in a way that forces the animal to look at the owner's face, while in the third part, the owner puts down the pet and holds it while remaining still.

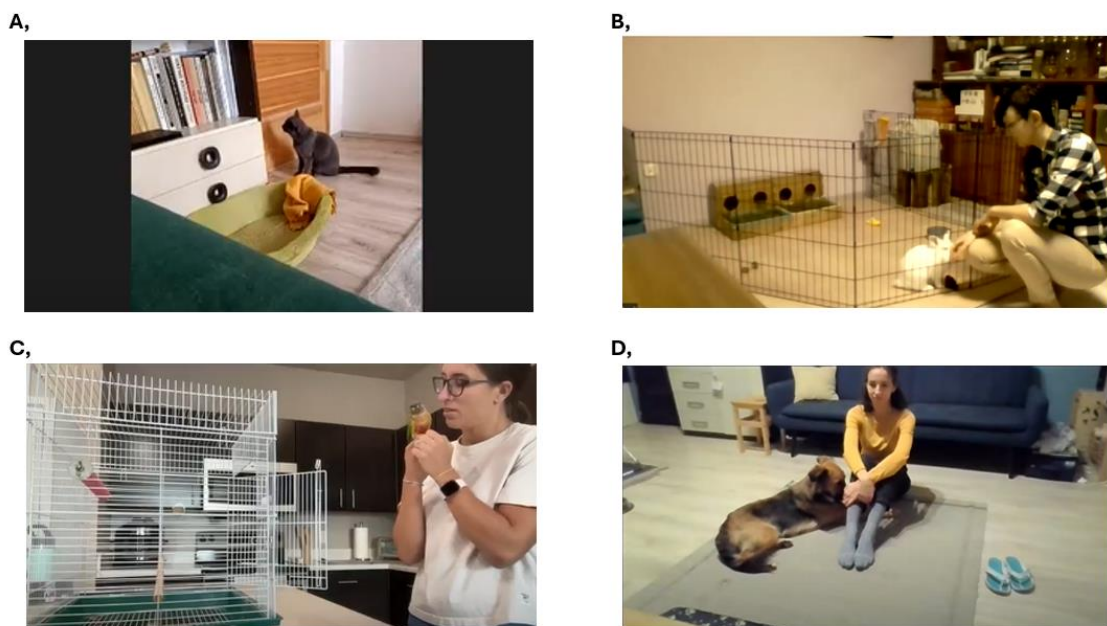


Figure 2: A, The subject being close and oriented towards the door where the owner left during separation; B, Greeting after separation; C, Owner talking to the pet during the affiliation sub-test's active phase; D, Pet being in physical contact with the owner in the passive phase of the affiliation sub-test

The second part consists of five sub-tests:

Acclimatisation:

Aim:

To make sure that the animal is acclimated to the room/outside of the cage area where the test is conducted and that it is food-motivated.

Procedure:

The owner is asked to place 3-4 pieces of food on the floor and sit in silence, or even pretend to read something. When the animal ate all the food scattered on the floor they need to offer 4 additional pieces of food from their palm one by one. If the animal refuses to eat the food from the owner's hand then she or he is asked to put it down on the floor but offer the next piece from her/his hand again. If the animal is not eating all the offered food in 5 minutes the test ends here.

Commands:

Aim:

To observe the owner's authoritarian behaviour and to see how many commands the pet knows.

Procedure:

In this part of the test, the owner is asked to show the experimenter the commands that the pet knows.

Teaching/Performing a task:

Aim:

To observe the teaching method/authoritarian behaviour of the owner and the animal's behaviour in a teaching scenario.

Procedure:

The owner is asked to teach the pet a new command in 3 minutes or 5 repetitions in this sub-test. This command needs to be novel, not similar to any command, that the animal previously knew and was/is able to perform.

Food inhibition:

Aim:

To observe the owner's authoritarian behaviour and see if the animal can be inhibited from eating a piece of food put in front of them or not.

Procedure:

In this task the owner is asked to put a piece of food in a square cornered by duct tape, whose sides are two times longer than the length of the animal, and in the first round the pet is allowed to eat it. In the second round the owner needs to put another piece of food in the middle of the duct-tape signalled area, but this time she/he is asked to make the pet inhibit the food in front of it for 30 seconds by only saying a nonrelevant word, “porkchop” (“csülök” in Hungarian), while she/he is not allowed to physically intervene (e.g.: putting her/his hand on the animal's chest).

Sudden noise test (Gácsi et al., 2013):

Aim:

To observe that the pet runs up to its owner, it is running away (the owner is a so-called safe haven or not) or even stays in place as it hears a loud, sudden noise.

Procedure:

In this sub-test, the owner is asked to play prerecorded audio of chainsaw noise on his/her phone and stay around 2 steps away from the animal and even farther away from the phone. While the audio's 30-second-long silent part ends and the 30-second-long loud part plays the owner needs to stand motionless and silent.

Data analysis

The video recordings of the behavioural tests were coded using Solomon-coder (Version: beta 19.08.02) and a scoring sheet. We collected multiple variables in the 11 sub-tests (**Table 1**).

To assess the inter-observer reliability, we randomly selected a sample of 10 animals to be coded in all tasks by two different observers. We calculated inter-observer reliability using an intraclass correlation coefficient (ICC) for all variables, and we kept all variables because all of them had at least moderate reliability ($ICC > 0.5$).

For a preliminary analysis, we have coded the animals' behaviour with seven variables in three sub-tests (**Table 1**): separation, greeting, and affiliation. In the separation task, we coded the duration of the animal being near or being oriented towards the door where the owner left and the time spent exploring the room (behaviours directed towards objects). During greeting, we coded the pet's enthusiasm (running up to the owner, showing affiliative behaviours), whether it is approaching the owner within reaching distance, starting to approach her/him, but not going

in reaching distance, or not approaching (even moving away). In the affiliation sub-test, we coded the pets' tolerance of the interaction (being picked up and petted) on a scale and measured the duration of physical contact with the owner in the passive phase.

These sub-tests were run after each other in a short time (~3 minutes), therefore they cannot be considered independent measures. First, with factor analysis, we identified three factors in the pet variables, labelled as 'door' (Cronbach's alpha: 0.84), 'greet' (Cronbach's alpha: 0.98), and 'contact' (Cronbach's alpha: 0.53).

Our data did not follow a normal distribution, so we chose to run the Kruskal-Wallis rank sum test and Dunn test as post-hoc test for each factor. We used R version 4.3.2 for the analysis.

Name of sub-test	Name of variable	Definition of variable	Type and measure
Separation	Close door	The P is in the side of the cage that is closest to the door where the O left	duration percentage
	Door orientation	The P's head is oriented towards the door	duration percentage
	Exploration	Activity directed toward physical aspects of the environment, including sniffing, visual inspection, physical interaction	duration percentage
Greeting	Approach	1 The P does not approach the O or it is even moving away	categorical
		2 The P starts to move towards the O but does not go in reaching distance (~15 cm)	
		3 The P approaches the O in reaching distance but does not initiate physical contact	
		4 The P approaches the O in reaching distance and initiates physical contact	
	Enthusiasm	1 The P does not approach and does not show interest towards O	categorical
		2 The P hesitantly approaches the O and does not initiate contact	
		3 The P immediately approaches the O, shows affiliative behaviours (initiates physical contact, jumps on the O, cuddles or vocalizes)	
Affiliation	Contact (in Phase 2 only)	The P is in physical contact with the O	duration percentage
	Interaction (in Phase 1 only measured in every 10s)	1 The P actively tries to avoid the interaction with the O (moves away, flattens, kicks or bites the O)	categorical
		2 The P passively tolerates the interaction with the O	
		3 The P actively seeks interaction with the O (moves towards the O, initiates physical interaction, cuddles)	

Table 1: Table containing the variables of the first three sub-tests, their definitions, type, and measures. P means "Pet" and O means "Owner".

Results

The KMO measure of sampling adequacy was 0.57, which is not optimal, but for preliminary analysis, it could be sufficient. Bartlett's test of sphericity was highly significant ($p < 0.001$), confirming that the sample size was adequate for the Factor Analysis.

The scree-plot suggested three factors to be retained which together explained 70% of the variance in the data. The variables close door and door orientation loaded on Factor 1, which I labelled "Door" (exploration had a moderate negative loading on this factor). Higher scores mean that the pet remained close to the door or oriented towards the door for a longer time and explored less while being separated from the owner. Another two variables formed the second factor (approach and enthusiasm during greeting), I labelled this factor as "Greet". Higher scores mean the animal was more enthusiastic (approached the owner closer, initiated interaction) during the greeting. Contact and interaction loaded on the third factor. In the case of Factor 3, higher scores mean that the animal was in physical contact with the owner for a longer time in the passive phase of the affiliation task and was tolerating or even initiating interaction during the active part. All three factors are correlated positively with each other, except factors 2 and 3 (Factor 1 and 2: $r=0.27$, Factor 1 and 3: $r=0.22$, Factor 2 and 3: $r=-0.09$), suggesting a shared common source of variance.

Kruskal-Wallis test ($\chi^2 = 14.87$, $p < 0.005$) on Factor 1 ('Door') indicated difference between at least two groups. The Dunn-test showed that dogs ($Z=2.99$, $p < 0.05$) and cats ($Z=2.95$, $p < 0.05$) had higher scores than small mammals (**Figure 3**).

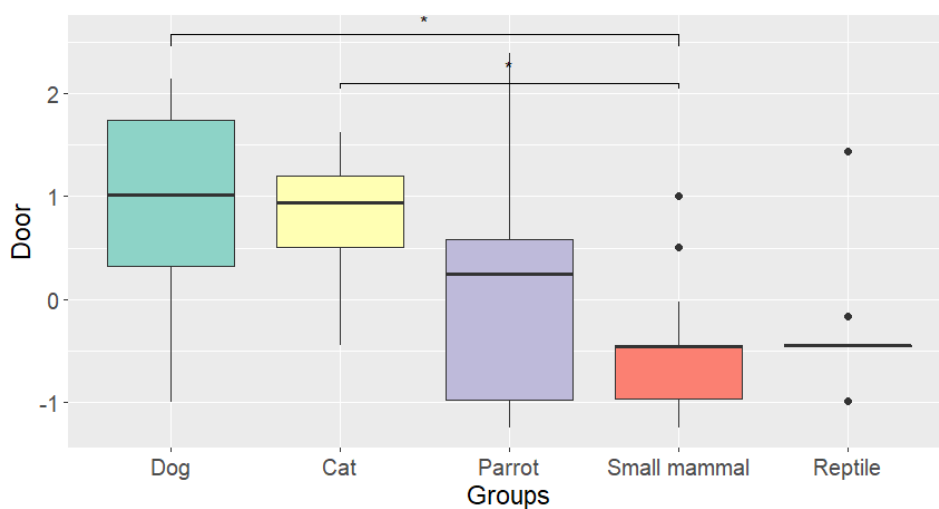


Figure 3: Boxplots showing the distribution of Factor 1 (labelled as 'Door') scores across different groups.

The Kruskal-Wallis rank sum test on factor 2 ('Greet') indicated difference between at least two groups ($\chi^2= 8.93$, $p < 0.05$). The Dunn-test showed that between dogs had higher scores than reptiles ($Z=3.09$; $p < 0.05$; **Figure 4**).

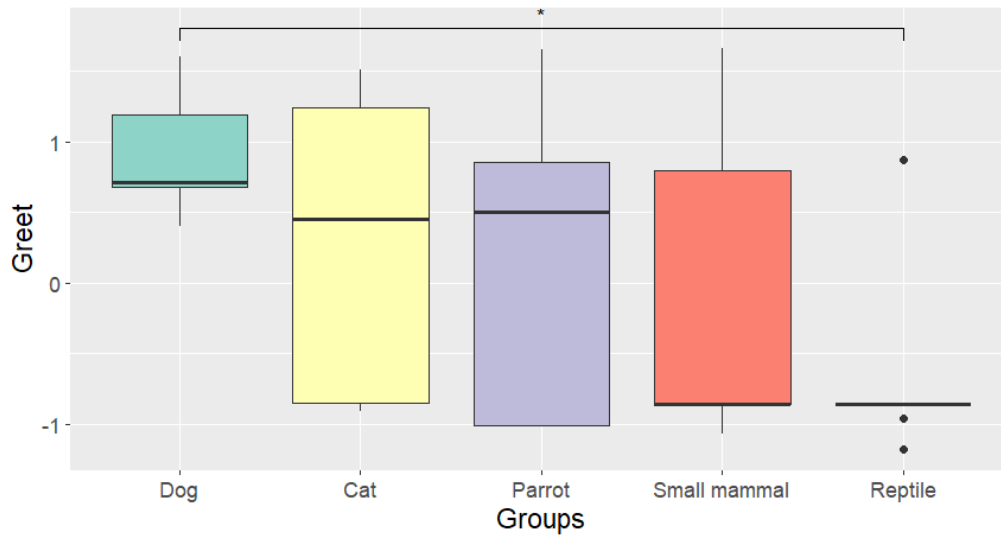


Figure 4: Boxplots showing the distribution of Factor 2 (labelled as 'Greet') scores across different species groups.

Kruskal-Wallis rank sum test on factor 3 ('Contact') revealed no significant differences between the groups ($\chi^2= 2.8$, $p=0.59$; **Figure 5**).

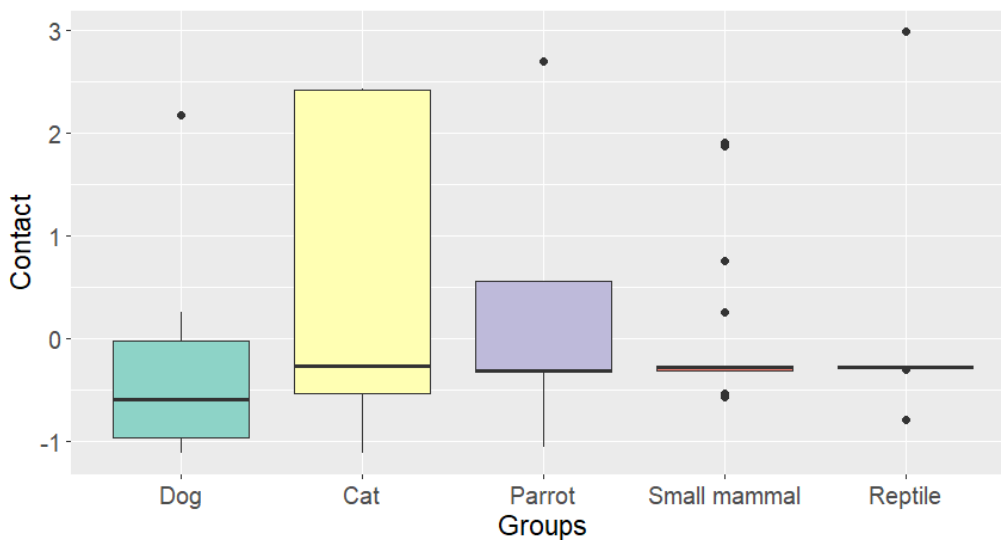


Figure 5: Boxplots showing the distribution of Factor 3 (labelled as 'Contact') scores across different species groups.

Discussion

The primary objective of our study was to compare as many companion animal species' social competence towards the owner as possible in many aspects of this ability. We anticipated significant differences between traditional (dogs and cats) and the other three groups of "non- traditional" companion animal species, in favour of the traditional groups and our findings corroborated this expectation.

We found that dogs and cats remained close and oriented towards the door where the owner left for a longer time, and they tended to explore the room less during separation compared to small mammals. Additionally, dogs greeted their owners more enthusiastically than reptiles and they tended to approach them within reaching distance, while reptiles did not. However, the lack of significant differences between the groups in the 'Contact' factor could suggest that all studied species at least tolerated the owners' affiliative behaviours, but most of them didn't initiate physical contact with the owner during the passive phase of the sub-test.

Additionally, the performance of parrots was unexpected because these non-domesticated birds did not perform significantly differently from dogs and cats in either of the examined factors. Furthermore, the results related to Factor 3 ('Contact') were also unanticipated because the absence of significant differences contradicted our original hypothesis.

Several studies investigated the effect of social isolation and there are multiple species where it was revealed that individuals show signs of distress when they are separated from their preferred conspecifics (e.g.: domestic fowl: Sufka and Hughes, 1991; sheep and goats: Lyons et al., 1993; cows: Boissy and Le Neindre, 1996; bonnet and pigtail macaques: Laudenslager et al., 1990). However, we only have reliable information on the distress caused by the separation from a non-conspecific individual (the owner) in the case of dogs and cats (Topál et al., 2005; Edwards et al., 2007). Our findings that cats and dogs remain close to the door where the owner left significantly more and explore less during separation than small mammals are consistent with previous research. The finding that dogs and enthusiastically greet their owners after separation also aligns with previous studies (e.g., Topál et al., 2005; Eriksson et al., 2017), but it is novel information that in a familiar environment, greeting is similar between dogs, cats, parrots, and small mammals and dogs show more enthusiasm compared to reptiles only.

Regarding the 'Contact' factor, it is challenging to find comparable literature as most studies

rely on surveys (Azevedo et al., 2022; Dobos et al., 2023). The fact that each group tolerated cuddling suggests that this behaviour is an important factor when owners choose their pet animals.

Several limitations of our study should be acknowledged. Our overall sample size is relatively small, consisting of just 62 subjects. The goal of having a minimum of five individuals per species proved to be very difficult to achieve, prompting us to combine species into taxonomically based groups to obtain the necessary number of subjects for the analysis. This resulted in a diverse small mammal group, which contains both social and non-social species as well as preys and their predators. However, our preliminary analysis result suggests no behavioural difference in the three tests. Nevertheless, our aim is to formulate at least two, more homogenous groups from the small mammals.

In conclusion, our preliminary analysis suggests that dogs and cats show more owner-oriented affiliative behaviours and in this regard outperform reptiles and small mammals. This indicates that during the domestication process for cooperation and integration into human households, human-controlled selection affected these species' social competence. However, in tolerating social contact, dogs and cats did not perform better than other groups of species, which indicates that most companion animal species may be able to show some aspects of social competence, even without the specific evolutionary history of domestication for living together and interacting with humans as companions. This broadens our understanding of how human-animal relationships evolve. Analysis of the other eight sub-tests of our test battery should highlight more sophisticated patterns of the evolution of social competence and its relationship with the domestication process.

Our research provides offers practical and scientific implications for both the general public and the scientific community. Understanding the behavioural tendencies of various companion animals, helps owners better interpret their pets' needs and emotional states, fostering stronger bonds and improving animal welfare. We also believe that by highlighting the affiliative behavioural capacity of non-traditional companion animal species, such as small mammals' and reptiles' ability to tolerate or seek physical contact, our findings can guide prospective pet owners in selecting a pet that aligns with their lifestyle and expectations, therefore improving the overall welfare of pets.

In conclusion, the present research is not only a step forward in understanding the complexities of human-animal relationships but it can help shaping expectations and care practices,

ultimately contributing to a more harmonious coexistence between humans and their animal companions.

Author's Contribution

I confirm my contribution to the thesis as follows:

- I took part in the making of the experimental design.
- I participated in the data collection process and ran 47 behavioural tests.
- I analysed the collected data, interpreted the results and made the figures.
- I wrote this thesis.

Contributions of the other members of the MTA-ELTE “Lendület” Momentum Companion Animal Research Group:

Contributions of Kata Mária Udvarhelyi-Tóth:

- Study conception and experimental design
- Data collection
- Assessment of inter-observer reliability

Contributions of Dr. Borbála Turcsán and Dr. Eniko Kubinyi:

- Study conception and experimental design

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