

THESIS

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**Intraspecific social play behavior of adult dogs above three years of age in an outer-
social context**

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1 Introduction

Nowadays, there are many dogs living together not only in the country side but also in big cities. In the later, space is limited and dogs and their owners have to pay attention to quite a few rules and regulations e.g. walking on a leash in certain areas, dealing with several environmental influences, etc.

For that reason most dog owners like to go to places, where their dogs are able to interact and mostly play together with other dogs, to have their own social life and to be able to live under appropriate conditions. After owning dogs for several years and discussing with other dog owners whether dogs are playing together or not and how important this is for their development the question arose what distinguishes the social playing behavior of adult dogs outside their pack from inner-pack social playing behavior. Are those social interactions really just fun and a game or is it about a higher purpose? A very important requirement is to be able to understand the canine communication. For that reason the following thesis is also including an overview about the canine communication followed by the research part, which is including the evaluation of shown behaviors of foreign dogs meeting for the first time. There is a lack of serious scientific studies on dogs' behavior once they're grown up and encounter other dogs outside of their social context. The findings of this study could eventually lead to new insights into dogs' behavior and might help to more accurately interpret their meanings, which would ultimately help scientists, veterinarians and dog owners alike, leading to a more appropriate life for the dog itself. Playing is considered very important not only for young puppies but also for adult dogs in a social context. It increases their ability of communication, therefore preventing conflicts, keeping them physically and mentally agile and leading to lower stress levels for well socialized individuals.

2 Literature review

Initially the terminology and known main-aspects of play behavior and communication of dogs have to be clarified. The research question will be answered by literature, partly. There is no use of gender sensible language; the masculine spelling is used for both genders.

2.1 Playing in canids

The purpose of the following chapters is to clarify what ‘play’ means among canids and what kind of play behavior there is.

2.1.1 Definition of ‘play’

“There is no *one* definition of what play is” - there is no proof yet for the biological function of playing amongst canids (Käufer 2011, p. 14). The only thing we can do is to describe what happens during the play and which actions we can observe. “Play is repeated, incomplete functional behavior differing from more serious versions structurally, contextually, or ontogenetically, and initiated voluntarily when the animal is in a relaxed or low-stress settling” (Burghardt 2005, p. 82). “It has sometimes been suggested that play serves some general functions such as improving the motor and cognitive skills of young animals, yielding possible payoffs, for example, in the hunting, foraging, or social abilities of these animals from the time of the play throughout their entire lifespans” (Bekoff & Byers 1998, p. 99). “The play is from deep down inside unserious” (Lindner 2010, p. 65).

2.1.2 Puppy play

Play behavior is instinctive and learned. Especially puppies are learning a lot for their future lives by their play behavior like getting to know unknown objects and practicing complex social behavior skills which they will need for their adult lives (Lindner 2010, p. 65). So playing is very important for young dogs. “No play is not good. When canids are prevented from playing, they can react with delayed or interrupted cerebral development processes. Self-control and other features do not seem adequately to mature. Young dogs,

that had no opportunity for social play are not able to develop the social skills that are necessary to successfully interact with conspecifics” (Feddersen-Petersen 2013, p. 269). The breed specific differences of the socialization periods of puppies, in which they use playing as an important tool for their development, lasts from the 2nd/3rd week until the 12th/20th week of their lives. Around the 9th month there is another imprinting like period (Feddersen-Petersen 2013, p.243). A significant decline in playing at social contacts can be noticed from the 10th to 11th month in most breeds (Gansloßer and Kitchenham 2012, p. 161).

2.1.3 Communicative, social and other functions of playing

By playing together dogs are carrying certain risks like getting hurt or injured, wasting energy and not being able to notice upcoming dangers. So there has to be an evolutionary advantage in order to manifest within a dog’s behavior. The more complex the life of an animal is the more playing behavior can be observed within these species (Gansloßer and Kitchenham 2012, p.160). There is a different frequency in different breeds and litters of how often and in which manner puppies are playing (Gansloßer and Kitchenham 2012, P. 160 – 162). “When we define justice and morality as social rules and expectations that balance differences between individuals to ensure harmony in the group, we observe exactly when animals are playing together” (Käufer 2011, p. 40). “In fighting games, no serious combat is trained, or ranks/resources are disputed, but the behavioral repertoire is expanded to avoid fighting” (Käufer 2011, p. 40). The high level of playfulness during youth development is aimed at gathering relevant experiences. During the game young dogs can learn behaviors from all possible functions, playfully and without serious references in a relaxed atmosphere (Feddersen-Petersen 2013, p. 269). “They also exercise physical abilities, showing partial sequences from areas of behavior for which the inner conditions and properties not fully mature until adulthood (e.g., from prey and sexual behavior)” (Hassenstein, 1980). In particular, young dogs practice social behavior by dealing with each other in a playful manner. Studies on wild and domestic dogs show that social play leads to a significant increase in the flexibility of the social behavior of an animal. Play is essential for the normal development of a dog – if it’s not supposed to become a socially disturbed individual (Buchholtz et al. 1998). According to recent opinion, this social significance of the play behavior is to be estimated much higher than that of physical training. [...] Another very important aspect in the case of the canids is the

play for the control of the bite intensity. [...] This interaction within social behaviors in a playful form ultimately contributes to the reduction of aggression, to stabilize social hierarchies and to develop social roles. Conclusion: ‘Animals that play together tend to stay together’ (Beckoff 1972). “Playing is important for the initiation of education and the maintenance of social structures and bonds” (Feddersen-Petersen 2013, p. 269 – 270). The early experiences in the play shape demonstrable behavioral responses, behavior patterns, and certain behavioral preferences in the adult age of dogs (Feddersen-Petersen 2013, p. 271). There are different functions of play for instance: Physical training for the future, gaining the ability to react to sudden and surprising situations, emerging compassion and self-knowledge, training ethics and fairness, establishing dominant structures (Ganslöber and Kitchenham 2012, p. 165 – 170). Play also gives freedom for experimenting and passing on (Käuffer 2011, p. 126).

2.1.4 Adult play and its functions

“In many species, like wolves, play is pretty much restricted to juveniles and adolescents. Adults do not normally have the time or energy to waste in such trivial pursuits. Domestic dogs, however, seem to be enduringly suspended in a juvenile frame of mind” (Dr. Dodman N., 2014). “Domestic dogs are unique in that matter; play is routinely performed by adults, both socially [...] and also solitaire [...]. This enhanced playfulness is commonly thought to be a side effect of paedomorphosis, the perpetuation of juvenile traits into adulthood [...]” (Bradshaw *et al.*, 2014). Domestic dogs have a high level of intraspecific play even as adults (Mehrkam *et al.* 2017, p. 2).

“Dogs [...] are mammals who are learning all their lives. Therefore, some functions of the puppy play also apply to adult dogs. However, the play of the adult dog has a different focus and other functions” (Käuffer 2011, p. 126). Those functions include play as a compensation and stress reduction, sexual selection criterion, testing a partner and pairing, secondary effect of parental behavior, buffer and release for serious aggression and as a social putty (Käuffer 2011, p. 127 – 130). Regarding the sex of the dogs there is no evidence for influencing the style of the play in sexually mixed groups of dogs meeting regularly. Male dogs initiate plays more hesitantly amongst themselves than female dogs do. So it’s possible that the situation of a competition-character is developing faster amongst males than females which might lead to males avoiding play situations more often to decline the risk of a real fight (Käuffer 2011, P. 97). In domestic dogs the evolutionary

pressure is lifted and the reproductive success is taken over by anthropogenic factors, whereby these are no longer reducing factors for the dog's play motivation. The readiness to play in domestic dogs could just be a side-effect of selective breeding for specific traits like truncation of the hunting sequence to produce herding, retrieving and guarding breeds (Bradshaw *et al.*, 2014, p. 2). Based on a study of dogs aged 3 to 72 months: The level of familiarity shared by dogs did not affect the balance of their playful interactions. "The duration of the playful sessions was [...] linked to the number of players. Polyadic sessions lasted longer than dyadic interactions." (Cordoni 2016, p. 284). "Balance" in that context means a balanced play behavior in the sense that dogs are equally often "winner" and "loser" regarding their roles during the play.

2.1.5 Characteristics of playing

"According to Bekoff & Byers (1981), play includes all the physical activities that are postnatal, which may initially seem pointless and contain behavioral forms from different contexts in any order, of modified form and different temporal intervals (see Loizos 1966)" (Feddersen-Peterson 2013, p. 266 – 267). Representative for play is exaggerating mimic signals and the lack of certain signals, which are not missing in a severe situation (Feddersen-Petersen 2013, p. 273). Expressive movements are carried out in an intensively exaggerated manner and elements from different functional circles are freely shown and combined with one another. Behaviors with signal characteristics, which have a high demand character, are increasingly shown and play sequences are often incomplete (Feddersen-Petersen 2013, p. 270). "Play is just about the play itself. A neck bite is, for example, only indicated, but immediately interrupted by another action such as jumping to the side. All animals are voluntarily involved and equal. They constantly change their roles, are sometimes either predator or prey, subordinate themselves or control the opposite player" (Mathes B., 2015). Another feature of play is repetition. Play sequences are freely combinable and partly repeated in a modified form but this does not lead to the final action. A play remains flexible and variable (Käufer 2011, p. 18 – 19).

"As bullying, Klinghammer (1985) termed chasing, bumping, biting and/or wrestling down and crushing of an animal by two or more other animals" (Käufer 2011, p. 140). So these behaviors do not belong to play behaviors. The character of the play is also depending on whether or not the dogs know each other and/or live together. "In escalating situations during playing with fellow-species, a dog will weigh what behavior seems appropriate. It

also plays a role in how familiar and valuable the play partner is to it (Meyer-Holzapfel 1956). This is a crucial difference between the play of domestic dogsplay and the play within a natural pack. In the familiar pack the animal has to live with the play partner after the end of the play. It is dependent on this partner in the joint hunting and defense of prey or territory. A similar situation applies, if at all, only to dogs that live together in a household or at least have very regular contact. In the case of onetime or very irregular play meetings, other prerequisites exist. Dogs that do not live together do not depend on one another. It is clear that familiar players play differently with each other than unfamiliar animals. In a regular play the play partners get to know each other and can assess their own abilities and position in relation to the play partner. [...] There is a familiarity, one knows one another. [...] The two factors –familiarity and dependency – explain why the play of familiar dogs runs differently than the play of unfamiliar dogs. Self-handicap and changing roles are found in dogs that are familiar to one another and who regularly play together.” (Käuffer 2011, p. 134). “During a real playing situation there are neither winners nor losers. Therefore, in social play a change of roles occurs regularly, for example ‘predator’ and ‘prey’ and ‘attacker’ and ‘defender’, to ensure that all involved playmates remain in play mood” (Aldis 1975, Zimen 1982). There is also a change of roles when a stronger or higher-ranked dog imitates the subordinate. Here, we come to the self-handicap, which is characterized by the fact that adults, stronger and higher-ranked dogs e.g. lie on their backs and invite the play partner from this unfavorable position into the game. However, this requires a certain degree of trust in the play partner. There is supposed to be a 50:50 rule representing the chance of “winning” during a play, but this number is depending on how well the dogs know each other and in which environment they are playing together. (Käuffer 2011, p. 19 – 21).

2.2 Expressive behavior of the dog

The expressive behavior is used for communication. Communication is defined as the “process of transmitting messages between a sender and one or more recipients” (Kommunikation, 2017). More precise: ”Communication is therefore the reciprocal form of information transmission, which allows complex interactive behaviors, a process in which one individual affects the behavior of another by sending out signals. It contains a more or less pronounced intention of the sender, which provides information semantically with content (McFarland 1989)” (Feddersen-Petersen 2008, p. 85). To be able to understand what dogs are communicating about we have to be able to read their language. It is important to note that the auditory, visual, tactile and olfactory signals are often combined in dogs (Feddersen-Petersen 2008, p. 85). In the following chapter the expressive behavior of dogs is explained in detail.

2.2.1 Behavior in a relaxed and friendly atmosphere, comfort behavior, “smiling”

The behavior in a relaxed and friendly atmosphere includes all distance-reducing behaviors with the exception of submission, sexual behavior and play behavior, which are discussed separately (Feddersen-Petersen 2008, p. 153).

There are a variety of different shown behaviors. These include: The approach of a relaxed physical activity and the friendly approach, relaxed watching and observation, fur-scenting and fur-poking, fur-licking, nibbling and fur-biting, snout contact and snooping, head-to-head snuggling, anal and genital scenting, tasting, following, standing transversely to and above a partner with relaxed body signals, rubbing each other, shoving and barging as well as chin resting (Feddersen-Petersen 2008, p. 153 – 165).

Comfort behavior includes behaviors that represent socially motivated behavior and serves to maintain the social structure. They are performed with pleasure and with a great sense of well-being. These include: Shaking, rubbing, bathing-movements, stretching and yawning (“lolling-syndrom”), autogrooming, smacking and rolling-on-the-floor. The yawning of dogs can be shown in a variety of situations and with different intention: Tiredness, boredom, insecurity, excitation, relief, stress or dilemma (Verlegenheit) (Feddersen-Petersen 2008, p. 186-187).

Dogs also can show a “smiling”, not to be confused with the submissive grin, which is characterized by lifting the upper lip and showing teeth, especially the Incisivi and Canini,

with a short lip chap and short but high frequent repetitions (Feddersen-Petersen 2008, p. 134 – 136).

2.2.2 Play behavior

There are different kinds of play among dogs with different expressions.

2.2.2.1 Play behavior of the dog

Dogs can show solitaire and social plays. “Among the Carnivora, play behavior is usually made up of motor patterns reminiscent of predatory, agonistic and courtship behavior” (Bradshaw *et al.*, 2014). There is a significant difference in the occurrence of solitary play amongst different breeds but “in contrast, neither environmental context nor breed had a significant effect on social play levels; however, neuter status of the dyads did have a significant effect on social play, with mixed-status dyads engaging in significantly higher levels of social play than same-status dyads.” (Mehrkam *et al.*, 2017).

The play behavior itself is distinguished primarily by the fact that it has no serious consideration (Brechner E., 2001). There are more or less five criteria by which the play in dogs can be distinguished from the non-play: Play requires security, the only goal of playing is the play itself, play is self-rewarding and voluntary, play is different from reality and play is characterized by creative repetitions (Käufer 2011, p. 15). So if those characteristics can be observed one can be sure that it is a playing sequence. But there are also more detailed signs of play like the playing faces and play signals of dogs.

2.2.2.2 Playing faces

The playing faces are known facial expressions amongst predators to show the opponent that the subsequent actions are to be classified without serious consideration and to avoid misunderstandings in this respect (Dr. Dodman N., 2014). The playing face communicates the willingness to social play and include the baring of frontal teeth or wide-spread jaws [= relaxed-open-mouth-display]. Also typical are wide open eyes with a view into the emptiness and easily visible sclera and eyes rolling (Feddersen-Petersen 2008, p. 206 – 209, p. 223).

2.2.2.3 Dog specific play signals and play movements

To signal the situation of a play dogs use different play signals like the low frontal body position = play bow. “Such signals are used as play invitations, their intention is to motivate the other dog to participate and are also shown in between the play, in order to emphasize the playful situation freed from any seriousness, thus prolonging the play” (Udo Gansloßer and Kate Kitchenham 2012, p. 172 – 173). In domestic dogs bows probably serve as a form of “punctuation” to clarify the meaning of whatever actions are followed or preceded by them. “In addition to sending the message ‘I want to play’ when they are performed at the beginning of play, bows are also performed in a different context, namely during social play and might also carry the message ‘I want to play despite what I am going to do or just did – I still want to play’, in case there might be a problem in sharing of this information between the interacting animals” (Bekoff, 1995).

“Roll-change, self-handicap and play signals have the function to signal the play partner that one would like to continue to play” (Käuffer 2011, p. 19).

The self-handicap is explained in chapter 2.1.5.

The tail-wagging is an important indicator for a play situation in domestic dogs (Feddersen-Petersen 2013, p. 273). There are also a couple of other play movements that are shown during a play besides the above mentioned, like hopping/leaping (Hopsen), anterior-upspinning/tossing (Vorne-Hochschleudern), anterior-jumping (Vorne-Hochspringen), jumping-in-circles (Im-Kreis-Springen), head-tossing (Kopf-Hochwerfen), head-spinning (Kopfschleudern), foreleg-bumping (Spiel-Vorderbeinstoßen) and sudden start of running and wide opening of the mouth. The number, success and frequency of the play movements vary from breed to breed (Feddersen-Petersen 2008, p. 231). Certain elements are often repeated during a play sequence, such as the paw-raising and the bow. They are prone to repetition in dogs play (Feddersen-Petersen 2013, p. 270). New studies even revealed that the ‘rollover to supine’ was not used as submissive gestures but as tactically gestures during play fighting and soliciting playful contact (Norman 2014, p. 7).

2.2.2.4 Solitary play

Solitary play is defined by “non-reciprocal motor patterns (e.g., pawing, play bow) directed toward an inanimate object without engaging another conspecific. It may also include locomotor behaviors (e.g., inhibited running, voluntary downs) not necessarily directed toward inanimate objects, conspecifics, or people” (Mehrkam, 2017, p. 4). So there is no

need of an object for the solitary play; they consist of just one individual playing with itself or directed to an object. Solitary play also includes undirected exploration of the environment, games with the own body, but also movement or exploration games. Also they can include games of food gathering such as hunting, catching and eating games. A solitary play can animate others and so a social play can result out of it (Feddersen-Petersen, 2008, p. 222).

2.2.2.5 Social play

“Social play is that behavior, which is performed during social interactions in which there is a decrease in social distance between the interactants, and no evidence of social investigation or of agonistic (offensive or defensive) or passive-submissive behaviors on the part of the members of a dyad (triad, etc.), although these actions may occur as derived acts during play” (Bekoff 1972, p. 417). The social play can involve an object or not (Bradshaw *et al.* 2014, p. 3). There are different kinds of social plays among dogs. In addition to the contact games there are also those without direct body contact (Feddersen-Petersen 2008, p. 229). These individual varieties can blend into one another. Belonging to non-contact games: “Hunting, running, flight and chasing games include all dog games in which one or several dogs playfully follow a conspecific.” These are distinguished by the imitation of hunting a prey. This behavior, however, does not involve the search and orientation behavior like it does before a real hunt. Also the speed is diminished in contrast to a real hunting scene. It all starts with an emphasized back off, run off, jump away, jumping or hopping of one dog while appealing looking back over ones shoulder checking whether it’s getting chased or not. These racing games are characterized by short breaks. During these breaks, the change of roles can occur, which is essential, but it can also take place as a very quick change during the race. If the dog being chased is caught up and a body contact occurs, a game battle can arise. There is also the occurrence of pack-hunting-games in which more than one dog is chasing an individual that is getting encircled and stopped, being inhibited, bitten into its throat, its back and its hindlimbs (Käufer 2011, p. 47 - 51). Another non-contact game is the barking-game amongst dogs (Feddersen-Petersen 2008, p. 231).

On the other hand there is the contact social play which also involves several varieties. One of them is the fighting game, which is a ritualized scramble (Feddersen-Petersen 2008, p. 226). They are often opened by playful jumping or play-biting, and are carried out lying

down or standing on all four legs, standing on the hind legs, also in the back or side position. Fighting games are lacking of imposing and threatening behavior, which precedes a serious fight, as well as the goal-directedness. Fighting games while lying are more relaxed, while a longer fight standing on hind legs points to a higher degree of excitement (Käufer 2011, 52). There are also biting games which are “ritualized confrontations in the near field, usually with less movement, lying or sitting. The fighting or biting game does not belong to the aggressive behavior. They are having similar behavioral elements, in particular expressive elements, which, however, are subject to different factors (dynamics, valence, etc.). The intrinsic behavioral conditions have completely different functional characteristics: Dynamics, openness for all kinds of stimuli, repetitions, modification of play movements, movement-luxuries (the ability of free movement) and ‘signal exaggeration’ are typical for a play. And in the fighting or biting game there is ‘bite inhibition’, which means that the animals usually do not hurt each other. Movements regarding sexual games are mounting and friction-movements. Elements from all social plays can be blurred and are blend into each other (Feddersen-Petersen 2008, p. 226 - 228, 300 – 301).

2.2.3 Sexual/mating behavior

The following behaviors belong to this category: Presenting oneself, obtruding, summoning copulatory behavior, copulation (mounting, humping, pelvic clasps, thrusting, dismounting, hanging), walking behind to smell the genitals, nibbling (in this context: nibbling of the incisors of a male dog after smelling urine or the genitals of a female in heat) and other forms of ‘allogrooming’. During the “presenting” the female dog is showing an imposing posture while turning her rear to a male dog, bending aside her tail, enduring anal-genital-control and licking of the male dog. Also ‘standing above’ is a behavior often seen during estrus in dogs. It’s usually shown by individuals of a close relationship and opposite genders and has nothing to do with status (Feddersen-Petersen 2008, p. 189 - 191). “Puberty in dogs comes at 6 to 18 months, occurring slightly later in males than in females” (Veteriankey, 2016).

2.2.4 Calming signals

Calming signals are often confused or equated with the appeasement signals. However, they are signals, which are used to reduce stress and are therefore called calming signals (Bloch, 2015). Belonging to stress signals, also called displacement activity, is yawning, shaking, scratching and the intense sniffing on the ground (Rütter, 2015). The lip lick, also called nose lick or tongue flick, as observed and researched by Turid Rugaas, is also another calming signal (dogtime, URL: <http://dogtime.com/reference/dogspeak/3378-lip-lick-tongue-flick-dog-speak-colleen-safford>, accessed: 11.11.2017). Here, as in all other areas of behavior, the whole situation must always be observed and taken into consideration.

2.2.5 Agonistic behavior

Agonistic behavior is a collective term for all behaviors, which are affecting behavior of others in a disturbing way. It consists of two opposing parts, the attack (offensive) behavior and the defensive and the flight behavior. Aggression is also just one part of the agonistic behavior. Some define agonistic without including submission (Feddersen-Petersen 2008, p. 288 - 290). “Agonistic behavior includes all forms of intraspecific behavior related to aggression, fear, threat, fight or flight, or interspecific when competing for resources. It explicitly includes behaviors such as dominant behavior, submissive behavior, flight, pacifying, and conciliation, which are functionally and physiologically interrelated with aggressive behavior, yet fall outside the narrow definition of aggressive behavior. It excludes predatory behavior“ (Abrantes, 2015). The creation of hierarchies in social associations through agonistic behavior is compelling: It ensures stability and rules as well as free space for the individuals (Feddersen-Petersen 2008, p. 295).

2.2.5.1 Submissive behavior

Submission is commonly seen as the counterpart of the threat behavior/imposing. It is defined as the subjugation to a dominant partner, a behavior of inhibited aggression or as pacification behavior of a low-ranked dog. It is characterized by making-oneself-small, bended extremities and a low body posture with moving the ears backward. Everything moves away from the opponent: Avoiding sight, long mouth angles, ears back (even flattening ears against the head), high-frequency sounds. This behavior of the inferior is

aiming at a friendly, harmonious social integration. It usually takes place as a reaction to a distance-reducing behavior or a dominant behavior of a higher-status dog. It is supposed to inhibit aggression and avoid an escalation. Submission can pass fluently into play behavior and also in defensive aggressive behavior. There are two kinds of submission, the ‘active submission’ – also called spontaneous submission - and the ‘passive submission’, the latter is also called the reactive submission (Feddersen-Petersen 2008, p. 169 - 185).

2.2.5.1.1 Active submission

The active submission is a behavior shown during the welcoming of friendly tempered individuals and to decline social distance. With a more or less crouched head, the snout is pushed upwards towards the direction of the lip part of the other. The opening of the ears points downwards and the eyes are narrow. The forehead is tense and the gaze directed towards the partner. The lips cover the teeth and are withdrawn to the ‘submissive grin’. Typical is an upward poking against the mouth angle with the snout and licking the lips of the partner. Also typical is the wagging of the lowered or retracted tail as well as the licking intention and licking of the own snout. Active submission can pass into reactive aggression or defensive threatening behavior (Feddersen-Petersen 2008, p. 169 - 185).

2.2.5.1.2 Passive submission

Passive submission is a behavior, which is shown reactively and rarely spontaneously on imposing or threatening behavior. To this belongs rolling on the side or the back, turning away the head, avoiding eye contact, taking a subdominant posture or sitting with licking intention. The forehead is tense, the head movement tends downwards and the abducted ears are turned horizontally, but can also be worn so flat towards the back of the head that their tips are almost touching each other. This is the reactive response to the approach of a higher-ranked animal and should appease this. The lips are horizontally withdrawn to a submissive grin. The rear is pushed down, the dog takes up the ‘crouching position’, often in connection with lifting a front paw in the direction of the dominant partner. With stronger expression intensity, the dog rolls onto the side or back or even throw itself into this position. The back is arched and the hair on the back is up, the head is resting on the chest area. The tail will be worn tightly at the body or pulled between its legs. This whole

behavior can also lead to a defensive threat or is preceding it (Feddersen-Petersen 2008, p. 169 - 185).

In contrast to submissive behavior, which serves to turn off aggression already happening, canids offer appeasement behaviors to suppress aggressive behavior that might happen. “Appeasement behaviors are often associated with friendly greetings. The dog who lacks confidence might also offer pacifying behaviors to acknowledge his own social inferiority, or announce his fear. [...] Examples: Pawing, muzzle-nudge, twist movement, puppy licking, lowered body posture (groveling, wiggly approach), ears back, submissive grin, tail and hindquarters wagging. Appeasement signals represent a lack of confidence and serve to avoid hostility” (Handelman, 2012), therefore they belong to passive submission.

2.2.5.2 Aggressive behavior in dogs

The definition of aggression is: “Feelings of anger or antipathy resulting in hostile or violent behavior, readiness to attack or confront” (Aggression, 2017). Aggression is the willingness and readiness to the opposing dispute (Feddersen-Petersen 2008, p. 292). The functional categories of aggression include territorial claims, resources or position in the hierarchy. It is important to state that the play-aggression and the prey-aggression do not belong to this category. In the former, there is no real inner agonistic condition, which is always clarified by the play-signals. In the latter, the initiator’s goal is to destroy/kill the enemy/prey, which is not the case in a real aggressive combat. Activities that reduce the distance to the opponent are referred to as ‘offensive’, and with the opposite effect as ‘defensive’ (Miklósi 2011, p. 266). Aggression is influenced by the genetic disposition, the learning experience, and the psychical, physical and physiological state of an individual as well as the context of the respective situation. “In general, aggressive behavior can be seen in self-defense and descendants-defense, fear of hopelessness, sexual rivalry, territory acquisition and defense (often as a group aggression), frustration, fight about the social state and aggressive social exploration” (Benett 2013, p. 22).

“The threatening behavior is characterized by high-level/high erected body posture, erected or head facing the enemy, threat-fixation (Drohfixieren) and front-teeth-baring (Vornzähneblecken); all of the impression structures are facing the opponent, with erected tail and noisy growling” (Feddersen-Petersen 2008, p. 169).

2.2.5.2.1 Offensive threatening behavior

Offensive threatening behavior includes the bite-impend-posture (Beißdrohstellung), eye contact or fixation, hair-raising (Haaresträuben), growling, front-teeth-baring (Vorn-Zähneblecken), standing above the opponent (Über-dem-Gegner-Stehen), assault threat (Überfalldrohung) and sneaking (Anschleichen) (Feddersen-Petersen 2008, p. 301).

2.2.5.2.2 Defensive threatening behavior

To the defensive threat behavior belong defense-threatening (Abwehdrohen), looking-away (Wegsehen), hair-raising, growling, full-teeth-baring (Voll-Zähneblecken), defense snap-off (Abwehrschnappen), jaw-chattering (Gebissklappern), defense-biting (Abwehr-Beißen), defense-muzzle-grabbing (Abwehr-Schnauzgriff), anterior-body-low-position (Vorderkörper-Tief-Stellung), turning-one's-rear/backside to the other (Hinterteil-Zukehren) and playful defense (Feddersen-Petersen 2008, p. 304).

2.2.5.2.3 Inhibited/free offensive/defensive aggressive behavior

“Inhibited offensive aggressive behavior includes assault (Überfall), fighting-with-teeth (Beißerei), wrestling (Ringkampf) and wrestling with frontal bodies up high (Hochkampf), lateral mounting (Queraufreiten), pushing down (Runterdrücken), pushing (Schieben), bumping into (Anrempeeln), surrounding-the-opponent (Umstellen des Gegners), pushing-forward/protruding (Vorstoßen), biting-over-the-muzzle (Über-die-Schnauze-Beißen), jumping-at (Anspringen), frontleg-pushing-forward (Vorderbeinstoßen), chasing (Verfolgen), biting-over-the-back (Über-den-Rücken-Beißen).

Behaviors of the inhibited defensive aggressive behavior are defense-bumping (Abwehrstoßen), defense-twirl (Abwehrkreisel), defending-on-its-back (Abwehr auf dem Rücken) and defense with a bent/curved neck (Abwehr mit gekrümmtem Hals).

Free offensive aggressive behavior is shown within a pack or group only in a serious fight. According to Zimen, the free aggressive behavior is characterized by the absence of facial-threat-expression and the bite-inhibition. Feddersen-Petersen counts all gradations of biting to this behavior. These include: Biting, bite-shaking (Beißschütteln), attacking and serious fighting (Ernstkampf).

Defensive biting is called free defensive-aggressive behavior. During short protruding movements the bites are usually directed towards the neck and ears of the opponent (Feddersen-Petersen 2008, p. 306 - 311).

2.2.5.3 Escape and avoidance behavior

The escape behavior is “a response that is designed to move away from aversive stimulus by withdrawal” (Nugent, 2013). It includes the behaviors of flight, hiding and distance (Feddersen-Petersen 2008, p. 306). Avoidance behavior enables an individual to avoid unpleasant or painful situations, stimuli or events by keeping distance or withdrawal of a certain situation. (Nugent, 2013. Feddersen-Petersen 2008, p. 187).

2.2.5.4 Dominant behavior

“It’s important here to understand what dominance actually is. The definition of dominance by Drews is analogous to the original definition by Schelderup-Ebbe: The outcomes of agonistic dyadic interactions result in consistent winners being dominant and losers being subordinate. But dominance based on winning conflicts in agonistic contexts is not the only way to view it. Two more types of dominance, distinguished by primatologist de Waal, are based on either formal dominance or competitive ability. Formal dominance develops via the exchange of status information through ritualized and/or greeting signals that are independent of context. Competitive ability considers the motivation of animals to obtain or to possess resources. In canids, this has been measured using pairwise competition tests over bones or toys. Competitive orders based on priority of access to food or water, however, are not necessarily in agreement with agonistic dominance or formal dominance, although these are usually correlated” (Van der Borg et al., 2015). Dominant behavior is a quantifiable behavior displayed by an individual with the function of maintaining or gaining temporary access to a particular resource on a particular occasion, versus a particular opponent, without either party incurring injury. The behavior is not dominant anymore but aggressive, if any of the parties incur injury. Its quantitative characteristics range from slightly self-confident to overtly assertive. “Dominant behavior is situational, individual and resource related. One individual displaying dominant behavior in one specific situation does not necessarily show it on another occasion toward another individual, or toward the same individual in another

situation” (Abrantes, 2015). In case of dominance free evolvment is granted or limited or taken. This happens by means of breakup-signals ending interactions. It does not have to involve a resource. For example, in a dyadic relation, A restricts the open space of B without B effectively doing anything against it. The following behaviors can belong to dominance: Blocking the way, holding on, motion control, pushing down, pushing into a corner, pinching, beating up, crowding out, muzzle bite, humping crosswise, high/low posture (Feddersen-Petersen 2008, p. 326/327).

2.2.6 Imposing/overawing behavior

Overawing is defined as an innate special threat behavior and lure behavior which, in the case of sexual rivals is intended to exert an intimidating effect and in the meantime on the other sex a beneficial effect. In course of the phylogenetic history, the overawing (imposing) behavior has developed because it helps to avoid a real combat situation between the rivals, in a certain way by ritualization, while the weaker avoiding the upcoming conflict, thus reducing the risk of injury to both animals (Imponierverhalten, Accessed: 23.09.2017). Imposing is part of the agonistic behavior, but it is treated separately, since it does usually not trigger a flight nor combat situation, it is much more an “undirected threatening behavior”. It is intended to demonstrate social superiority, to represent one’s own rank or free space, whereby it is important that the individual distance of the other is only hesitant or not at all injured. Typically, the body is made tall, the ear points forward, the tail is carried high, sometimes even bended, it can wave stiffly in this posture when the intensity of the behavior is high and the hair on the back can be set up slightly. The gait is also stiff and an important sign of the overawing is that the gaze passes the opponent. Other signs of overawing may be: Shoving, pushing away, scraping, urinating, defecating, chasing of the other dog, T-posture, head-on-back, paw-on-back, presenting the neck.

This can be distinguished from threat behavior, since in this case teeth are bared and the opponent is gazed. The transitions to threat or combat behavior can be fluent and overlapping (Feddersen-Petersen 2008, p. 278 - 283).

2.2.7 Sounds

Acoustic signals enable extremely fine-grained intraspecific communication possibilities and extremely high signal variability. Irrespective of external circumstances such as rain, dark or unclear terrain, they reach the signal receiver and are thus superior to visual and olfactory expressions. The sounds of dogs are judged very differently and are dependent on their ontogenesis. Furthermore, they are influenced by the highly individualized social relationship to man. Hence, a descriptive specification of the different sounds of dogs follows (Feddersen-Petersen 2008, p. 397 – 405).

The patterns of these signals can be divided into two categories. On the one hand in rough, loud sounds in low frequency ranges (e.g. growling, rumbling, barking). These trigger at the recipient retreat and are linked, as seen from the transmitter, to agonistic intentions. The second category is made of clear tones, which consist of harmonic sounds in higher frequency ranges (e.g. whimpering, whining, howling). They usually signal friendly or submissive (soothing) tendencies (Miklósi 2011, p. 286).

2.2.8 Chemical communication

Chemical communication is a long-term communication, which is particularly advantageous when acoustic and optical signals are hardly perceptible, but also in the near-communication dogs directly smell and lick one another. Hence the term “social smell” for the chemical signals of the mammals was born. It consists of odors of body excretions such as urine, feces and glandular secretions.

The scent marking – Geruchsmarkierung - (odor signature) is quite typical for dogs. Frequently repeated small amounts of urine or feces are placed in specific places (usually elevated) or on objects. The chemical signals are given in conspicuous form, “the optical expression behavior belongs to the total appearance”. The males usually raise the hind-leg (differently high depending on their status and social situation), the female dogs urinate in squatting position where the hind part is also more or less raised and there are even females who are urinating with a raised hind limb as well. During the heat the frequency of the marking increases (both in the case of the male and female), the steroids in the urine can be recognized by their scent by the male dog and the time of estrus can be determined.

The odors (feces, urine, gland secretions) can also be applied to the own body or the body of a group member. Allomarking is observed in canids living in groups and it is assumed that this serves the group odor, in which all members become odor-like.

In addition to the sexual background and group consistency, marking behavior plays an important role in territoriality and social status. “If territory claim is registered or a high status is demonstrated, scent-marking is always strongly involved”. Scent-marks on the borders of the territory form a barrier that prevents intruders. They point to “possible superiority and strong combat readiness. [...] There is a correlation between the marking frequency of an animal and its dominance status (Ralls 1971).

Among wolves marking is a privilege of the animals with the highest status, which assign the subdominant again and again their status.” Furthermore, communication occurs via skin glands. For this purpose there are sebaceous and scent glands in the area of the face, at the tail and in the perineal and anal region of the dog. However, the way in which they are used is unknown. The function of the circulatory anal glands is also unknown (Feddersen-Petersen 2008, p. 433 – 440).

3. Materials and methods (research)

3.1 Selecting dogs for research

Evaluating the playing behavior amongst adult dogs above the age of three years, 36 animals were investigated. These animals have never met each other before, so no social structure existed. Subjects were recruited online in groups of people meeting for taking their dogs for walks together and in groups of dog-schools and training-clubs. The dogs were both, pure-breed and mixed-breed and male and females were balanced. Only dogs above the age of three years and not showing any severe biting behavior during social contacts were selected. Dogs meeting eligibility criteria for the study as provided by the experimenter were invited for the shooting.

3.2 Group forming

The 36 dogs were allocated in 18 dyad groups by questionnaire, containing information about gender, age, neuter-status, breed, origin (breeder, shelter, abroad), age of adoption and whether or not they live with other dogs at home (cohabitation with other dogs), which were collected beforehand (for all information see Table 1). For the dyads forming size and morphology of dogs were taken into account to avoid unintentional injuries and to ensure the dogs' safety and well-being.

3.3 Filming of dyads

To investigate their behavior the 18 dyads (see Table 1) were observed in a fenced area that was unknown for all of them in Hamm, Germany. Observations were carried out at the 8th of October 2017 from 12 a.m. to 4 p.m. on a not rainy day. To limit the influence of other people or animals, the grass-field was fenced while people and other dogs were not allowed to stand close to that fence. Data were collected by using a bridge-camera and the videotapes were analyzed using 'Filme und TV' software. The dog-owners were instructed to leave their dogs in the cars until it was their turn to avoid a premature meeting of the dogs. The dogs were taken on leash to the field and while standing in distance to each other the leashes were taken off simultaneously. Even though the owners were allowed to be present at the field, they were instructed not to disturb or interfere with the dogs; no talking

or touching on purpose was allowed and they were told to ignore the dogs whenever they would try to make contact. Also they were not allowed to have food or toys in their pockets to prevent influencing the results by any resources. The owners were allowed to walk around and talk to each other. Dyads were observed for 5 minutes and the 36 dogs were grouped in 6 mixed-gender pairs, 6 female-female pairs and 6 male-male pairs to be able to compare the influence of the gender (see Table 1 for the pairing).

3.4 Evaluation of the shown behaviors

Behavioral patterns were defined prior to the start of the study (see Table 2). Breeding differences, neuter-status and personal characters were not considered. The frequency and time the single behaviors were shown are described in chapter 4.

Table 1: Grouping of investigated dogs. Legend: m=male, f=female, breeder=all dogs coming from a planned litter moved in with 8 weeks or a bit older, shelter=any 2nd hand dog or dog coming from a shelter, in case of dogs coming from a shelter abroad the respective name of the country is being stated.

Group	Name+ gender	Neuter- status	Age	Breed	Origin	Cohabitation
Female - male	Azana f	intact	7 years	Rhodesian	breeder	Group housing
	Lennox m	intact	5 years	Ridgeback Great Dane	breeder	Group housing
	Laica f	Neutered	7 years	Mix-breed	Farm	Single-dog
	Olaf m	intact	3,5 years	mix-breed	Croatia	Single-dog
	Luna 1 f	Neutered	4 years	mix-breed	Bosnia	Group housing
	Bolle m	Intact	6 years	Krom dog	Breeder	Single-dog
	Ida f	Neutered	3,5 years	Appenzell Mountain Dog	Breeder	Single-dog
	Eddy m	Intact	9 years	Border Collie	Breeder	Group housing
	Emma 1 f	Neutered	10 years	mix-breed	Farm	Single-dog
	Titus m	Intact	6,5 years	mix-breed	Rumania	Single-dog
	Lee f	Intact	5 years	Miniature pinscher	Breeder	Group housing
	Nemo m	Intact	10 years	Miniature schnauzer	Breeder	Group housing

Female - female	Maya f	Neutered	8 years	mix-breed	Shelter	Group housing
	Frida f	Neutered	7 years	Miniature bull terrier	Breeder	Single-dog
	Shanty f	Neutered	4 years	Chinese crested dog	Shelter	Group housing
	Tess f	Neutered	7 years	Pinscher	Shelter	Group housing
	Arin f	Neutered	8 years	mix-breed	Spain	Single-dog
	Ace f	Neutered	10 years	Border Collie	Breeder	Group housing
	Berta f	Neutered	3 years	Continental Bulldog	Breeder	Single-dog
	Amber f	Neutered	8 years	Dutch shepherd	Breeder	Group housing
	Emma 2 f	Intact	4 years	Boxer	Hungary	Single-dog
	Lizi f	Neutered	9 years	mix-breed	Hungary	Single-dog
	Luna 2 f	Intact	9 years	Maltese	Breeder	Single-dog
	Bari f	Intact	3,5 years	Whippet	Breeder	Single-dog
Male - male	Flavio m	Neutered	9 years	Galgo	Spain	Group housing
	Flash m	Neutered	8 years	Espanol Dalmatian	Breeder	Group housing
	Shiro m	Neutered	5 years	Galgo	Spain	Group housing
	Sammy m	Neutered	11 years	Espanol mix-breed	2 nd hand	Group housing
	Koda m	Intact	3 years	Chinese Crested Dog	Breeder	Group housing
	Jerry m	Neutered	5 years	mix-breed	Shelter	Group housing
	Paul m	neutered	9 years	Labrador Retriever	Farm	Group housing
	Davee m	intact	3 years	Border Collie	breeder	Group housing
	Pepper m	Neutered	12 years	Beagle	2 nd hand	Group housing
	Schröder m	Neutered	3 years	mix-breed	Shelter	Group housing
	Edelbärt m	Intact	3 years	Schnauzer	Breeder	Group housing
	Snoopy m	Neutered	4 years	mix-breed	Breeder	Single-dog

Table 2: Definition of behavioral patterns used for this study

Social play	Simultaneous, reciprocal affiliation between two dogs that are not agonistic or imposing and included at least one of the following components (play markers) in each dog: Play bow, changing rolls, rollovers, self-handicapping, exaggeration of signals/open mouth display.
Calming signals	Any shaking, nose licking, running of stress, smacking, behavior out of context.
Agonistic behavior	Any active or passive submissive behavior, any aggressive behavior including offensive and defensive threatening behavior, inhibited/free offensive/defensive aggressive behavior shown by at least one dog.
Imposing	Imposing behavior of at least one of the dogs not leading to any fights or flight reaction of the opponent dog. Including one or more of the following behaviors: Stiff gait with tail up high, set up hair, urinating and defecating (only in combination with gazing at the other dog and/or scraping afterwards), scraping, chasing of the one dog, T-posture (gaze passing the opponent).

4. Results

The observed results are shown in table 3 to 5 and summarized in table 6.

Table 3: Evaluation of the video-tapes of the mixed-gender groups. Legend: n = Quantity of shown behavior, t = time of shown behavior measured in seconds

Name	Social play		Calming signals		Agonistic behavior		Imposing	
	n	t	n	t	n	t	n	t
Arzana (f)	0	0	9	16	2	7	0	0
Lennox (m)	0	0	4	8	0	0	9	80
Laica (f)	0	0	2	7	8	11	5	12
Olaf (m)	0	0	5	11	2	3	8	29
Luna (f)	0	0	1	1	7	31	1	4
Bolle (m)	0	0	2	1	0	0	9	32
Ida (f)	0	0	3	4	0	0	0	0
Eddy (m)	0	0	4	3	0	0	9	28
Emma1 (f)	0	0	9	9	0	0	1	5
Titus (m)	0	0	6	5	1	1	5	25
Lee (f)	0	0	2	4	0	0	6	36
Nemo (m)	0	0	0	0	0	0	14	50
Sum only males	0	0	21	28	3	4	54	244
Sum only females	0	0	26	41	17	49	13	57
Sum (all)	0	0	47	69	20	53	67	301

Table 4: Evaluation of the video-tapes of the female-female groups. Legend: n = Quantity of shown behavior, t = time of shown behavior measured in seconds

Name	Social play		Calming signals		Agonistic behavior		Imposing	
	n	t	n	t	n	t	n	t
Maya	0	0	0	0	3	8	0	0
Frida	0	0	0	0	3	18	0	0
Shanty	2	28	3	7	3	6	1	6
Tess	2	32	2	7	2	6	3	10
Arin	0	0	1	1	2	4	3	13
Ace	0	0	3	3	3	5	2	11
Berta	0	0	3	10	6	28	2	6
Amber	0	0	1	1	3	27	4	30
Emma2	0	0	2	2	0	0	1	3
Lizi	0	0	0	0	0	0	0	0
Luna2	0	0	0	0	3	12	3	7
Bari	0	0	1	1	2	8	0	0
Sum (all)	4	60	16	32	30	122	19	86

Table 5: Evaluation of the video-tapes of the male-male groups. Legend: n = Quantity of shown behavior, t = time of shown behavior measured in seconds

Name	Social play		Calming signals		Agonistic behavior		Imposing	
	N	T	N	T	N	T	N	T
Flavio	1	5	4	4	1	1	0	0
Flash	2	7	3	3	1	5	2	4
Shiro	0	0	4	4	1	5	0	0
Sammy	0	0	3	3	0	0	2	14
Koda	1	3	0	0	0	0	11	42
Jerry	0	0	0	0	3	3	0	0
Paul	0	0	0	0	0	0	8	43
Davee	0	0	1	1	1	1	0	0
Pepper	0	0	2	2	0	0	8	40
Schröder	0	0	2	2	0	0	6	23
Edelbärth	0	0	2	25	0	0	12	63
Snoopy	0	0	3	25	1	2	15	53
Sum (all)	4	15	24	69	8	17	64	282

Table 6: Comparative table of all groups.

Group		Social play		Calming signals		Agonistic behavior		Imposing	
		n	t	n	t	n	t	n	t
Female - male	all	0	0	47	69	20	53	67	301
	Only females	0	0	26	41	17	49	13	57
	Only males	0	0	21	28	3	4	54	244
Female - female		4	60	16	32	30	122	19	86
Male - male		4	15	24	69	8	17	64	282
Sum (all)		8	75	134	239	78	245	217	970

5 Discussion

Social play (see figure 6 to 9 in appendices) was not shown in the mixed-gender group, while one social play occurred in the female-female group and one in the male-male group. Additionally, one dog (Koda/male-male group) tried to invite once but the other dog did not respond. So conspicuously, only in the same-gender groups play could be observed. In the female-female group the, by the experimenter called, “social playing time” (ratio of playing time per dog to total time of encounter) was 1.67 %. Regarding the male-male group the percentage of “social playing time” was lower with 0.33%, so the average social playing time for all three groups is 0.67 %. This means, that the social playing time in the male group was 5 times higher than in the female group. Käufer states, that male dogs initiate plays more hesitantly amongst themselves than female dogs do - so it's possible that a competition-character is developing faster amongst males than females, which might lead to the fact that males avoid play situations more often in order to decline the risk of a real fight (Käufer 2011, P. 97 – see chapter 2.1.4), which would support the findings of this study.

Overall, it can be concluded, that the chance of a social play to occur is in general relatively small (< 1.67 %) in case adult dogs (above 3 years of age) don't know each other and thereby don't share any social structure. Considering Bradshaw's statement, that “play is routinely performed by adults, both socially [...] and also solitaire” (Bradshaw *et al.* 2014), and Mehrkam's opinion that domestic dogs have a high level of intraspecific play even as adults (Mehrkam *et al.*, 2017), this might at least not apply to intraspecific play among adult dogs that never met before and therefore don't have any social connection. Taking a closer look at Mehrkam's study, it is exactly that aspect that is posing one major limitation of his study: His subjects belonged to the same owner, so they most probably knew each other well and lived in the same home, thereby having a strong social connection and background. Besides, they were also from the same breed type. These factors could explain the different outcomes, when comparing Mehrkam's to this study.

Bradshaw states that “play is sustained for longer when the dogs have played together before. In relationships that are already well-established, the two dogs play according to sets of ‘rules’ that are specific to that dyad: the same dog may exhibit self-handicapping when playing with one dog, while always attempting to win with a different one. Thus learning appears to play a major part in determining the role play-fighting plays between any pair of dogs, and with repetition may become a non-harmful mechanism for

reinforcing established relationships” (Bradshaw *et al.* 2014, p. 4). Likewise he said “we suggest that the domestic dog’s characteristic playfulness in social contexts is an adaptive trait, selected during domestication to facilitate both training for specific purposes, and the formation of emotionally-based bonds between dog and owner” (Bradshaw *et al.* 2015, p. 1), so this playfulness might be only in human-dog and/or object related play or in inner-social contexts. There is no indication that this applies for social plays in outer-social contexts.

In terms of the calming signals (see figure 10 for an example of nose licking), the quantity was evenly distributed throughout the groups. In most cases, they were connected to a direct social contact in which they were communicating with the other dog. Dogs were licking their nose, shaking their fur or even running off the stress together with the other dog. This running off of stress was not connected to any social play, but rather helping to reduce the stress levels of the two dogs. In those situations it was clear, that only one dog was running after the other without any indication of a play situation. When they stopped running they just went their own ways. Conclusively, in these cases dogs had to reduce their own stress level, which was increased due to the direct social contact with the unfamiliar dog.

Coming to the agonistic behavior (see figures 1 and 2 as an example), significant differences can be detected. Here, the occurrence in male dogs – both in the mixed-sex and same-sex groups – is significantly lower than within the female group. The occurrence and time of the shown behavior is in all groups much higher in female than in male dogs.

Looking at the imposing behavior (see picture 3 to 5 as an example) the numbers are vice versa. Male dogs are showing this behavior throughout all groups at a higher frequency and longer than the females. Having in mind, that imposing has developed because it helps to avoid a real combat situation (Imponierverhalten, 2017), a clear connection can be established here to the male sex. Thinking about Feddersen-Petersen’s statement, that imposing is intended to represent one’s own rank or free space, whereby it is important that the individual distance of the other is only hesitant or not at all injured (Feddersen-Petersen 2008), imposing could be interpreted as the friendly way of representing the own status while meeting a new dog. This would send the message, that its private space won’t be harmed and will be respected and that no one wants to get into a fight. This interpretation is supported by previous hypotheses previously mentioned in chapter 2.2.6. It could be concluded that the more imposing behavior is shown the lower the risk for agonistic

behavior. This could mean for the everyday life that imposing behavior of dogs should neither be prevented nor punished, since it helps to prevent a true fight-and-flight situation.

Investigating the video files it can be noticed that most dogs are showing explorative behavior using the free space on the fenced area, communicating exclusively over far distances and not searching for direct contact at any time. Considering the results, it could be concluded that in case of encounter situations in everyday life, where dogs don't have the opportunity to avoid each other due to a lack of space (for example on narrow paths), they are forced by their owner to interact in a situation where they cannot react as they would like to. Imposing could be a respectful way to show the own status to the unfamiliar dog with the intention of not getting into a real combat situation, rather having a de-escalating intention. So, from this study can be concluded that imposing behavior might help to prevent escalating situations in connection with limited space. Thereby, dogs is given the opportunity to clarify the own status in a peaceful manner, while not harming the private space of the encountered dog and not being forced to interfere. To give dogs an appropriate life they should not be forced to meet unfamiliar dogs with the wrong indication of the owners, in particular to play with each other. Owners should consider precisely whether or not a seen situation is a real social play.

Further comparative studies cannot be performed since this explicit topic has not been a subject of scientific research.

6 Outlook

As a first future step, this study could be expanded by involving a higher number of subjects. In general studies with higher numbers of subjects would be desirable, since higher numbers lead to higher significances and to more reliable and representative results, which could subsequently be used for deeper statistical analyzes. However, one limiting factor might be the availability of suitable subjects, that are fulfilling all selection criteria (above 3 years of age, have never met before and gender-balanced), which made it challenging to find a number of almost 40 ($n = 36$) suitable individuals for this study already.

In the future comparative studies with a specific focus on adult dogs' playing behavior in an inner-social context might be of interest. A comparison of these two studies might enable to draw conclusions whether or not familiarity is the most important foundation for play amongst adult dogs or if social playing stops in general when reaching adulthood.

In order to get a deeper understanding of dog's social behavior a study dealing with the imposing behavior and its effects on social contact situations regarding the agonistic behavior could be of interest. It could also be interesting, to investigate the reason why male dogs showing significantly more imposing behavior than females, regardless if it's a same-gender or mixed-gender dyad.

To follow the indications of imposing behavior, which could be concluded from this study, the respective response of the receiver to the imposing could be also leading to new insights. There might also be differences regarding the breed types. For instance terriers could have different play frequencies than retrievers due to their different purposes considering their selection in breeding. It could also be related to their predatory behavior. In that context it could be interesting to investigate how this compares to other domesticated animals.

Also investigating connections related to the origin of the dogs might be of interest. Answering the questions where they came from (shelter, breeder, abroad, etc.), at what age they moved in, if they live in a social group or as single dogs and if they live in- or outside the owners house could eventually lead to a deeper understanding if and how those factors influence social play behavior of adult dogs.

Are there maybe even differences to other animals, which are also domesticated by mankind or not? Maybe the selection of dogs to work for mankind is a key for subject-related play, since this would be giving the option for a 'reward-system'.

7 Summary

A lot of literature and studies exist regarding puppy play and adults playing in a social context to strengthen their social structure. However, this thesis wanted to raise the question whether or not social play also occurs among adult dogs not knowing each other, just meeting randomly for the first time. This has not been investigated before, although this subject could reveal important information in order to avoid extra stress for dogs and their owners alike in their every-day life.

Therefore, the main aim of this thesis was to investigate whether or not adult dogs exhibit social play in an outer-social context.

Consequently, the playing behavior amongst 36 adult dogs above the age of three years were observed, investigated and evaluated. These animals have never met before, so no social structure existed. The dogs were both, pure-breed and mixed-breed and male and females were balanced. Only dogs above the age of three years and not showing any severe biting behavior during social contacts were selected.

The 36 dogs were allocated in 18 dyad groups, taken into account size and morphology of dogs to avoid unintentional injuries and to ensure the dogs' safety and well-being. To investigate their behavior the 18 dyads were observed in a fenced area that was unknown for all of them. Dyads were observed for 5 minutes and the 36 dogs were grouped in 6 mixed-gender pairs, 6 female-female pairs and 6 male-male pairs to be able to account for possible influences of gender. Subsequently the shown behaviors were evaluated and compared.

The main result of this study is that there was no significant social play shown in the mixed-gender group. In the female-female group the, by the experimenter called, "social playing time" (ratio of playing time per dog to total time of encounter) was 1.67 %. Regarding the male-male group the "social playing time" was lower with 0.33 %, so the average social playing time for all three groups is 0.67 %.

As a result of this study, several different conclusions can be drawn as well as suggestions for dog-owners can be formulated. Knowing that social play is shown in only 0.67 % on average of unfamiliar adult dogs (above the age of three years) meeting a conspecific, could change the owner's behavior in the future, not forcing their dogs into these situations too often and not calling it a "play" even though it might not be. Also the possible connection of imposing and avoiding fight and flight situations could be an interesting aspect for the daily life. It could be concluded that giving dogs sufficient space during

social contacts helps to avoid critical situations. In general, dogs are not looking for real combat situations, when they are well socialized, and try to avoid them by imposing, thus not harming the other dog's private space. Another suggestion that can be drawn as a conclusion is instead of meeting foreign dogs regularly, rather to meet with familiar dogs while taking a dog for a walk. This enables the dog to build up a social context with the other/s and the chance for a social play might increase. Also dogs will be less stressed by walking in a well-known group rather than meeting unfamiliar dogs in a regular manner, thereby forced to deal with unknown behaviors and to clarify the own status.

The findings, results and conclusions of this thesis are supposed to help scientists, veterinarians and dog owners alike to understand (their) dogs and their social lives in a more detailed way, since dogs have a complex social behavior while the single behaviors can blend into each other. This makes it crucial to know which kind of behaviors there are and most importantly, how they can be determined and distinguished from each other. With this knowledge, it is possible to evaluate situations, to draw conclusions as well as enable humans to react in a more accurate way therefore providing better and more appropriate lives for dogs.

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9 Appendices

9.1 Agonistic behavior



Picture 1: Active submission shown by the Bullterrier (Frida) on the right and offensive threatening behavior as an answer shown by the other dog (Maya).



Picture 2: Inhibited offensive aggressive behavior shown by the Border Collie (Ace) on the right and active submission as an answer shown by the other dog (Arin).

9.2 Imposing



Picture 3: Imposing behavior shown by both dogs at the same time. The one in the background (Edelbärth) is urinating gazing at the other dog, the dog in front (Snoopy) is scraping while gazing at the other dog. The tails are held up high.



Picture 4: The dog on the right (Schröder) is showing imposing behavior. He is scraping with a high up tail and gazing at the other dog.



Picture 5: This dog (Lennox) is showing imposing behavior by making itself tall, stiff gait, tail and ears up.

9.3 Social play



Picture 6: Both dogs (Shanty on the left and Tess on the right) are doing a play bow at the same time, inviting each other to a social play.



Picture 7: Chasing during a social play session. Looking over the shoulder with a playing face can be seen in the dog on the right.



Picture 8: Both dogs start a social play session (Flavio on the left and Flash on the right).



Picture 9: In both dogs a relaxed-open-mouth-display can be seen.

9.4 Calming signals



Picture 10: The dog on the right (Arzana) is showing nose licking as a calming signal and response to Lennox approaching. By this she is trying to reduce her stress level.

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