The Match Between Horse and Rider

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Cover: Malin Axel-Nilsson and her horse Crazy One
(Photo: T. Viska)

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Abstract

A successful relationship between horse and rider is a partnership based on compatibility and is often referred to as a good match. In the present thesis, 'match' includes the good interaction, interplay and cooperation between horse and rider as well as the related positive experience. A good horse-rider match is important for horse welfare, rider safety and good performance. The aim of this thesis was to investigate which parameters riders consider important for a good match, if horse temperament and rider personality affect the horse-rider match, and how this can be measured.

Using a survey, the first study showed that riders consider behavioural traits as relevant to a good horse-rider match. It was shown that both age, preferred equitation discipline and to some extent level of experience had an influence on the riders' opinion of which behavioural traits in horses were most relevant.

The second study included a battery of behavioural tests designed to measure individual differences in response to challenges including human approach, isolation, handling and a novel object. The horses showed consistent responses between repetitions of the tests and could be divided in four temperamental categories.

The third and final study investigated how quality in horse-rider match is affected by the combination of rider personality and horse temperament, and how this can be measured. Horses-rider dyads with different combinations of rider personality and horse temperament underwent tests including both handling and riding. Three types of indicators to measure and evaluate match were identified and applied: A) rider perception B) horse behaviour and C) the horse-rider combination's effectiveness in accomplishing a task together. It was shown that rider personality and horse temperament have an effect on match quality, as measured with change in riders' level of positive affect.

This thesis provides a stepping stone to obtain a deeper insight into how good horse-rider match is defined, measured and realised. Harmonisation in the descriptions of match and horse behaviour and further development of appropriate measures is needed.

Keywords: Horse-Rider Match, Personality, Temperament, Behavioural tests, Questionnaire

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Dedication

To my parents, I wish you were still with us.

Contents

List of Publications

This thesis is based on the work contained in the following papers, referred to by Roman numerals in the text:

I Axel-Nilsson M., Peetz-Nielsen P., Visser E. K., Nyman S., Blokhuis H.J. (2015). Perceived relevance of selected behavioural traits in horses - A survey conducted in Sweden. *Acta Agriculturae Scandinavica, Section A-Animal Science,* DOI:10.1080/09064702.2015.1047791

II Axel-Nilsson M., van Reenen K., Visser E.K., Nyman S., Blokhuis H.J. Categorization of horses based on multidimensional results of temperament tests. (Manuscript)

III Axel-Nilsson M., Visser E. K., Nyman S., Hultgren J., Blokhuis H.J. Positive affect as a measure of horse-rider match. (Manuscript)

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The contribution of Malin Axel-Nilsson to the papers included in this thesis was as follows:

I Was involved in planning and responsible for execution of the work. Involved in analysis of the data and responsible for summarising results. Main responsibility for completing the manuscript with regular input from co-authors and support from supervisors.

II Was involved in planning and responsible for execution of the work. Involved in analysis of the data and responsibility for summarising results. Main responsibility for completing the manuscript with regular input from co-authors and support from supervisors.

III Was involved in planning and responsible for execution of the work. Involved in analysis of the data and responsible for summarising results. Main responsibility for completing the manuscript with regular input from co-authors and support from supervisors.

Abbreviations

NO1	First part of the Novel Object test (horse alone) in study II
NO2	Second part of the Novel Object test (handler catching and leading horse towards novel object) in study II
HR	Heart rate
PCA	Principal Component Analysis
Tcat1	The first temperamental factor, used in study II and III
Tcat2	The second temperamental factor, used in study II and III
H-H	The first horse temperament category defined in study II; High loading on both Tcat1 and Tcat2
H-L	The second horse temperament category defined in study II; High loading on Tcat1 and Low loading on Tcat2
L-H	The third horse temperament category defined in study II; Low loading on Tcat1 and High loading on Tcat2
L-L	The fourth horse temperament category defined in study II; Low loading on both Tcat1 and Tcat2
ES	Emotional Stability
MAP	Measuring and Assessing individual Potential
PA	Positive Affect
NA	Negative Affect
PANAS	Positive and Negative Affect Schedule

1 Background

According to archaeological findings, the domestication of horses started more than 6000 years ago when humans hunted them for meat, and our relationship has evolved through the development of riding and driving techniques (McMiken, 1990). The long history of domestication and selective breeding for different purposes has resulted in a broad variety of horse phenotypes, or breeds, looking quite different from its ancestors and with different behavioural characteristics (Lloyd *et al.*, 2008). However, although influenced by selection, the horse has still kept its species specific instincts and behaviours as a social flight animal which the rider has to accept and learn how to handle (Waring, 2003).

Over the last century, the horse's role in Western societies has changed from being used mainly for transport, warfare or agriculture, to that of a companion for leisure and equestrian sport (Visser, 2002). During the 1920s the number of horses in Sweden was approximately 720 000. Mainly due to the mechanization in agriculture, military and forestry, this number decreased dramatically and in the 1970s, the population comprised only about 60 000 horses (Hedenborg, 2013). In Sweden, horseback riding has become the second most popular sport among young people and a majority of the over 500 000 active riders are women, as reported by The Swedish Sports Confederation (2013). In 2010, the Swedish Board of Agriculture presented an estimated total number of 362 700 horses, indicating an increase with up to 20% in less than ten years.

Although the number of horses has increased during the last 25-30 years, the current use in equestrian sports and for leisure activities (instead of for traction and transport) requires lighter and versatile horses with physical abilities as well as temperaments suitable for these different tasks. At the same time as the tasks that horses are used for have changed, different types of riders and horse owners have also emerged with whom the horses should match.

Instead of having horses as a part of their occupation, the vast majority of active riders are leisure riders, not professionals, who may practice equestrian sports mostly for recreation. Most of today's leisure riders live in urban areas and those who own their own horse often rent a stable for the horse in facilities where a considerable amount of the daily management of the horse is conducted by someone else (Helgesson & Hedberg, 2001). The natural transmission of horsemanship skills that occurred between generations has to some extent been lost (Bridgeman, 2009). It can therefore be assumed that many people who handle and keep horses today lack the experience that in earlier days was handed down over generations (Helgesson & Hedberg, 2001).

2 Introduction

The experience of being “as one” with a horse is truly sensational and can give a feeling of invincibility. However, it is not just any horse-rider combination that is capable of communicating with almost invisible cues which grants a happy rider, a calm and content horse, and in the case of sports and competition will increase the chance of good performance. This requires a compatible combination; in other words ‘a good match’. The main focus of the research presented in this thesis has been to investigate if horse temperament and rider personality affect the horse-rider match, and if this potential impact is measurable.

2.1 What is horse-rider match?

As pointed out by Wipper (2000), a successful relationship between a horse and rider is a partnership dependent on compatibility, or match. The concept of a good horse-rider match includes many aspects of the interplay between horse and rider. In the present thesis, ‘match’ is used as a comprehensive term including the good interaction, interplay and cooperation between horse and rider as well as the related positive experience, which altogether may be the result when a horse-rider dyad is highly compatible.

It has been suggested that the theoretical framework presented by Hinde (1976), defining a relationship as an emerging bond based on a series of interactions, also can be used to understand horse-rider relationships (Hausberger *et al.*, 2008). Thus, the quality of the relationship between horse and rider depends on the balance between positive and negative interactions. This view of a bond developing between horse and rider is well illustrated by Wipper (2000) with a quote from Lucinda Green, the former world champion in eventing, who stated that:

> "…any success Be Fair [her horse] and I had was due to his unique ability and the firm partnership we had formed together."

However, a quote from Malin Baryard and Peder Fredricsson in a podcast from the 2015 Falsterbo Horse Show[1], indicates that there are (types of) individuals that from the beginning match better than others:

> "All riders look for a special horse. You can come far with any horse, but not all the way unless you are a good match. There is not *one* good type of horse, but a good type of horse for every rider."

This is further supported by anecdotal evidence of riders who have perceived an almost instant feeling of compatibility when first meeting a specific horse.

2.2 The importance of horse-rider match

The statements above illustrate well how important top riders consider the compatibility, or match, between horse and rider for optimal sports performance. But besides affecting sports performance, the high quality interaction facilitated by a good match is also relevant to promote horse welfare and safety of the rider (Hemsworth *et al.*, 2015; Munsters *et al.*, 2012; McLean & McGreevy, 2010; Goodwin *et al.*, 2009; Hausberger *et al.*, 2008; Visser *et al.*, 2008). For the leisure rider who is not living from performing in the competition arena, the sheer pleasure of interacting and spending time with a horse that they get along well with may indeed be another strong argument for the importance of good horse-rider match.

Conflicts due to a mismatch between horse and rider can result in impaired horse welfare through inconsistent signals and increased force being applied by the rider during the training[2]. This may lead to aversive horse behaviours that in turn jeopardize the rider's safety (McGreevy & McLean, 2005). The horse may get the reputation of being difficult and in the end it might be sold or even culled due to behavioural problems (McGreevy & McLean, 2005; Odberg & Bouissou, 1999). Horseback riding is considered a perilous sport both regarding number and severity of injuries (Hawson *et al.*, 2010a; Jagodzinski & DeMuri, 2005). In a study on hospital records of horse-related accidents, Keeling *et al.* (1999) identified misunderstandings between horse and rider as an important risk of accidents.

In advertisements of horses for sale, the given reason for selling is quite often that the horse and rider do not get along and the horse can therefore be

1. The 4th episode of the 'We love horses'-podcast can be accessed at (access date 150911): http://www.acast.com/welovehorses/avsnitt4

2. In this thesis, 'horse training' is defined as the intentional modification of the frequency and/or intensity of specific behavioural responses (Waran & Casey, 2005)

acquired at a reasonably good price. Besides impaired horse welfare and rider safety, costly investments (e.g. decrease in value of the horse, money put in training efforts etc.) are most likely also lost when the horse owner sees no other way out than to sell, or ultimately cull, a horse due to mismatch-related problems (Visser, 2002).

Besides the pure financial benefits and potential increase in sports performance, a good match could thus also have a positive effect on human safety and horse welfare by decreasing the number of dangerous situations and reducing the risk of the horse being sold repeatedly for not living up to the owner's expectations (Munsters *et al.*, 2012; Wolframm & Meulenbroek, 2012; Visser *et al.*, 2008).

2.3 Factors that affect horse-rider match

Several factors have an impact on the compatibility, or match, between horse and rider, including the following (Figure 1):

- **The rider's goal**

The rider should set a realistic goal with his or her riding with regard to what he or she expects to be achieved at present together with the horse;

- **Physical abilities**

Following the rider's individual goals with riding, the horse should have appropriate physical abilities, connected to for example breed, conformation and condition, to perform the desired tasks;

- **Level of education** (of both horse and rider)

To decrease the risk of dangerous situations and impaired horse welfare due to miscommunication, the horse should preferably have reached a higher level of education than the inexperienced rider. A less experienced rider may lack the necessary ability to properly educate a horse to respond to the aids and perform a task (McGreevy & McLean, 2005);

- **Horse temperament**
- **Rider personality**

Impaired communication and misunderstandings between horse and rider may be due to the rider's general shortcomings in experience and knowledge of horses and their behaviour, but it can be speculated that mismatch of the two individuals regarding personality and temperament also plays a role (c.f. Hausberger *et al.*, 2008; Hausberger & Richard-Yris, 2005). It has been

suggested that an optimum level of agreement between personality traits [here: rider personality and horse temperament], leaving room to complement each other may yield highest satisfaction (König von Borstel *et al.*, 2013).

After defining a realistic goal (first point above), possibly together with an experienced trainer, there are several possible sources of information that can be used to gain insight in if the horse is likely to meet the buyer's expectations according to the first three of the five factors mentioned above. The buyer may for example check pedigree, veterinary certificates, competition results and statements from the seller, as well as handle and ride the horse, preferably more than once, and ask a more experienced rider to do that as well. This can give information on the horse's physical abilities (second point), level of education (third point) as well as a hint of its temperament. However, even if horse temperament (fourth point) has been ranked by riders as more important than any other performance trait (Graf *et al.*, 2013; Buckley *et al.*, 2004), there is still a need for a harmonised methodology for temperament assessment in horses (König von Borstel *et al.*, 2013; Koenen *et al.*, 2004). Further, human personality (fifth point) can be assessed with standardised tests. Knowledge about how to measure the combined effect of rider personality and horse temperament on match quality in horse-rider combinations is very limited.

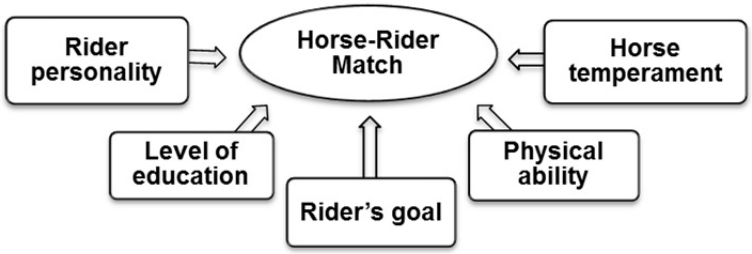

*Figure 1.*Schematic representation of factors that influence horse-rider match and should be taken into consideration when buying a horse.

2.4 Temperament and personality

The lack of definition regarding what to be included in the terms temperament and personality in horses was brought up by Mills (1998), and various descriptions are still used today (König von Borstel *et al.*, 2013; Koenen *et al.*, 2004). In psychology literature, the two terms personality and temperament are rather often used indiscriminately (Zentner & Bates, 2008). It is out of the scope of this thesis to give a detailed account of the various definitions of personality and temperament. However, to avoid confusion the terms from this context as used in this thesis are briefly described as follows.

Personality can be described as the comprehensive set of attributes characterizing a person's psychological individuality (McAdams & Pals, 2006). According to (Thomas & Chess, 1977), temperament is most clearly distinguished from personality by its formal or stylistic nature; temperament can be defined as behavioural style and refer to the *how* rather than the *what* (abilities or content) or the *why* (motivation) of behaviour which are all involved in individual expression of personality. In conclusion, temperament can be described as a consistent set of behavioural traits that influence an individual's response to external stimuli (Goldsmith *et al.*, 1987). Regarding horses, it can be argued that even though we acknowledge the relevance of a horse's complete personality profile, it is most often the *how* aspect of their behaviour that we have to relate to (e.g. *how* far do a horse run when frightened); which is in line with the predominant use of the term temperament.

2.5 Optimal horse temperament for different types of riders

Already in the fourth century BC, Xenophon, a Greek philosopher and soldier, described selection of horses as based on many parameters but in particular on temperamental characteristics (Xenophon, 1962). Also nowadays, many breeding organizations emphasize the importance of temperament in their breeding goals (von Borstel *et al.*, 2011b; Koenen *et al.*, 2004; Visser *et al.*, 2001). However, current evaluation procedures lack objective definitions and standardized routines to assess temperament and there is a clear demand for a harmonised definition and methodology (König von Borstel *et al.*, 2013; Koenen *et al.*, 2004).

The majority of the breeding organizations seek to produce high performance horses for professional riders. Since it has been suggested that particular temperamental characteristics are preferred by professionals whereas other characteristics match better with recreational riders, current breeding goals may not prioritise those temperament traits which enable a good match with a leisure rider (Graf *et al.*, 2013; König von Borstel *et al.*, 2013; Gorecka-

Bruzda *et al.*, 2011). Furthermore, some traits optimised for top sport may even make the horse dangerous to handle for the nonprofessional rider or handler. It is therefore important to investigate which temperamental traits leisure riders perceive as relevant to a good match.

Internet surveys have successfully been used in earlier studies on horse related issues like; horse welfare (Visser & van Wijk-Jansen, 2012), horse-rider interaction (Wolframm & Meulenbroek, 2012); preferences for and perceived importance of different horse characteristics (Graf *et al.*, 2013; Gorecka-Bruzda *et al.*, 2011). In the present thesis, an internet survey was used to collect Swedish riders' opinions on relevant aspects of horse temperament, as described in Paper I.

2.6 Temperament assessment in horses

As in humans, animals also show individual differences in behaviour, in responses to various stimuli and in preferences, and today there is little doubt that distinct animal personalities exist (König von Borstel *et al.*, 2013). Even if selection has created breeds with certain abilities and characteristics, there is considerable individual variation also within breeds (Visser *et al.*, 2001). Tests measuring behavioural reactions to different stimuli have been used to define individual difference in personality and its various sub traits, such as temperament, in horses (König von Borstel *et al.*, 2013). As mentioned above, the discussion of what to include or exclude in the two concepts of personality and temperament is difficult to solve. However, tests used to measure and evaluate personality and/or temperament in horses and other animals, are actually measuring the formal characteristics of temperament, such as response intensities, latencies, durations, thresholds and recovery times, identified by (Zentner & Bates, 2008). In order to be useful to support the estimation of temperamental traits, test outcomes of tests should show consistency over time (Waring, 2003; Seaman *et al.*, 2002; Visser *et al.*, 2001).

2.6.1 Behavioural tests

In the current thesis, modified versions of four behavioural tests that have been proven repeatable and valid in earlier studies were selected and conducted to assess individual differences in horse temperament in Paper II. A version of a human approach test used by Hausberger and Muller (2002) was chosen and adapted to measure immediate reactions of the horse to 1) an unknown person entering the box and 2) when halter was put on. The second test included isolation from conspecifics and humans in a novel environment. Tests to investigate horses' reactions to social separation have been used earlier by e.g.

Lansade *et al.* (2008b); Momozawa *et al.* (2003) and Wolff *et al.* (1997). The third test was a 'bridge'-test in which horse and handler should cross a novel surface. This type of handling test has earlier been used by e.g. Lesimple *et al.* (2011); von Borstel *et al.* (2011a); Visser *et al.* (2001); LeScolan *et al.* (1997) and Wolff *et al.* (1997) to measure for example horses' willingness to perform, level of fearfulness, emotionality and reactivity. Finally, a novel object test (c.f. Lansade *et al.*, 2008a; Visser *et al.*, 2001; LeScolan *et al.*, 1997) was chosen to include a combination of the challenges in the human approach, the isolation and the bridge test. In this last test, reactions elicited by challenges of social isolation from conspecifics, a novel object and the presence and interference of a human handler were assessed.

2.6.2 Heart rate

Horses have a resting heart rate (HR) of approximately between 30 to 45 beats per minute (Bpm) and maximum HR can reach over 200 Bpm, although it varies considerably between individuals. The HR is regulated by interaction between the parasympathetic (decelerating) and the sympathetic (accelerating) nervous systems, and an increase in HR can be due to increased physical activity, emotional arousal and/or both (Sjaastad *et al.*, 2003).

Physiological measures, such as changes in HR, can possibly provide even more sensitive measures of emotional states than performed behaviours, at least in species (e.g. horses) that we train to behave in certain ways in different challenging situations (Munsters *et al.*, 2012; Visser *et al.*, 2002). However, the interpretation of physiological parameters can be ambiguous since HR is connected to level of physical activity, and for instance increased HR could be associated with either positive or negative stimuli (Paul *et al.*, 2005; Beerda *et al.*, 1998). Acknowledging these complications, the horses' change in HR over their individual baseline was used as a complementary variable in the isolation, bridge and novel object tests in Paper II.

2.7 Assessment of human personality

In Paper III, rider personality was assessed with a test called Measuring and Assessing individual Potential (MAP), which is developed for Swedish respondents by (Sjöberg *et al.*, 2012). The MAP-test is based on the Big Five model (McCrae & Costa, 1997) that describes human personality as divided in five dimensions: 'Openness', 'Conscientiousness', 'Extraversion', 'Agreeability' and 'Neuroticism'. 'Neuroticism', on an inverted scale also called 'Emotional Stability' (ES), is known as the general dimension which often sets the framework for how the other four dimensions of human

personality are likely to manifest themselves (Sjöberg *et al.*, 2012). Emotional stability (ES) describes how well-adjusted and stable a person is in general, including level of self-confidence, compulsiveness and behaviour in stressful situations. Individuals with low emotional stability (or high neuroticism in case of inverse scoring systems) are often anxious, worried and easily get depressed or discouraged. Individuals with high emotional stability are usually calm in stressful situations and able to make rational and safe decisions even under strained circumstances (Sjöberg *et al.*, 2012).

2.8 Assessment of horse-rider match

Studies on how to measure and evaluate horse-rider match are scarce. In a study by Visser *et al.* (2008), it was tentatively suggested that rider personality may specifically have an impact on the cooperation in horse–rider combinations with more emotionally reactive horses. Wolframm and Meulenbroek (2012) found correlations between female riders' self-perceived personality traits, horse temperament and perception of the quality of the interaction with their horse. In a study by Munsters *et al.* (2012), horse-rider match was measured as level of harmonious communication between horse and rider, however without including personality or temperament parameters.

To our knowledge, no study has to date focused specifically on how to measure the special sensation of match that can emerge during the first encounter between a rider and horse that are unknown to each other, and how this is affected by rider personality and horse temperament.

To increase knowledge on how to measure horse-rider match, it is important to include different dimensions of match. For the purpose of the present thesis, three types of indicators to measure and evaluate match were identified and applied in Paper III: A) rider perception, B) horse behaviour, and C) the horse-rider combination's effectiveness in accomplishing a task together.

2.8.1 Type A indicator of horse-rider match: Rider perception

Rider perception has been used in earlier studies to evaluate quality of interaction between horse and rider. For example, (Visser *et al.*, 2008) included rider evaluation of both quality of cooperation and the horse's temperament during a test in which 16 riders rode 16 horses in a standardised test course. Another example is a survey conducted by Wolframm and Meulenbroek (2012), in which riders were asked to evaluate the quality of interaction between them and their own horse on a 3-point scale where 1='horse of a lifetime', 2='sometimes better, sometimes worse' and 3='never again'. In the present thesis, the riders were asked to rate their perception of quality of match

between them and the horse on a 4-point scale from ‘very poor’ to ‘very good’. The tasks they were asked to perform and evaluate included both handling and riding.

However, to our knowledge no study has included the horse-rider combination’s influence on the rider’s level of positive and negative affect. Positive affect (PA) is a dimension of mood that reflects the extent to which a person feels enthusiastic, active and alert, while negative affect (NA) reflects subjective distress and unpleasurable engagement (Watson *et al.*, 1988). In the present thesis, a psychometric tool developed by Watson *et al.* (1988) called the Positive and Negative Affect Schedule (PANAS), measuring respondents’ positive and negative affect states, was used as a second type A indicator of horse-rider match besides the riders’ evaluation.

2.8.2 Type B indicator of horse-rider match: Horse behaviour

The horse is a social flight animal that, besides locomotive behaviours, communicates with numerous visual, acoustic and tactile signals to the surrounding world (c.f. Waring, 2003). If we learn how to pick up and interpret these signals, much can be understood of how horses perceive different situations and how we can secure their welfare (Goodwin *et al.*, 2009). ‘Evasive behaviours’ is a comprehensive term including behaviours that may arise for example if the horse tries to avoid pressure during training (McGreevy *et al.*, 2005). Making the horse move away from pressure is the basis for most techniques used to train horses; hence not all evasive behaviours are unwanted. However, it is more likely for strong evasive behaviours that may lead to dangerous situations for both horse and rider to occur if the rider gives inconsistent aids (McGreevy & McLean, 2005), or if the horse-rider combination is a bad match (Visser *et al.*, 2008). In the present thesis, prevalence of evasive equine behaviours as described by Visser *et al.* (2008) represented the type B indicator of horse-rider match.

2.8.3 Type C indicator of horse-rider match: Effectiveness in accomplishing a task

During ridden tests, Visser *et al.* (2008) and (Munsters *et al.*, 2012) used observers to subjectively evaluate the quality of horse-rider interaction. In an attempt to use a more objective measure, we focused on the horse-rider combinations’ effectiveness in accomplishing different tasks. Thus, in the present thesis, the number of trials needed to complete the given tasks was recorded as type C indicator of horse-rider match.

2.9 Contents of the thesis

The preceding sections gave an insight in what horse-rider match is, why it is important, what factors may affect it and finally how we hypothesize that horse-rider match can be measured. The relevance of rider personality and horse temperament was highlighted. To shed light on the impact of rider personality and horse temperament on horse-rider match, and how this can be measured, three consecutive studies (I-III) were conducted which form the basis of this thesis. The studies are presented in the included papers marked with corresponding roman numerals (I-III). The vision was to connect empirical knowledge and needs of riders with sound objective scientific methods. The work was initiated by a survey to investigate which behavioural traits riders in general perceive as relevant to a good horse-rider match (Paper I), followed by a battery of behavioural tests set up to categorize adult horses based on individual variation in temperament (Paper II). The final study investigated how quality in horse-rider match is affected by the combination of rider personality and horse temperament, and how this can be measured (Paper III).

3 Aims of the thesis

The general aim of this thesis was to contribute to the understanding and development of tools to measure match between horse and rider. Emphasis was put on assessment of match quality and how it is affected by rider personality and horse temperament. The three studies presented in this thesis each addressed specific objectives of the broad and interdisciplinary topic horse-rider match:

- To investigate which behavioural traits in horses are perceived by riders as relevant to a good horse-rider match (Paper I)

- To categorize adult horses based on individual differences in temperament (Paper II)

- To investigate if rider personality and horse temperament affect match quality, and how this can be measured (Paper III)

4 Materials & Methods

This chapter gives an overview of materials and methods used in the three studies included in this thesis. For full descriptions and details, see Paper I-III. The first study included a survey available on the internet from June to September 2010 (Paper I). The second study was conducted in October and November 2011 at Flyinge AB, the former national stud of Sweden; now an equestrian centre for education, breeding and research (Paper II). The third and final study was conducted at Flyinge AB in October 2012 (Paper III).

4.1 Ethical statement

The respondents in Study I and participating riders in Study III were informed about the purposes and context of the data processing and that personal data would neither be shared outside of the project nor used for any other purposes. It was further stated that all results would be made anonymous prior to publication and that it would not be possible to trace back the results to any specific participating individual. The respondents provided their consent to the described processing of personal data.

The questionnaire and personality test used in Study I and III were conducted in accordance with the protocol approved by the Ethical Review Board on Research Involving Humans (EPN) in Uppsala, Sweden (Dnr 2010/160). Experiments including horses in Study II and III were approved by the Swedish Ethical Committee on animal research in Malmö/Lund, Sweden (Permit number: M166-10).

4.2 Study I

The primary aim of Study I was to investigate which aspects of horse temperament riders perceive as relevant for a good horse-rider match, as well as how riders' preferences were connected to for example age and equestrian discipline.

4.2.1 Disposition and formulation of the questionnaire

The questionnaire was written in Swedish since it aimed at only reaching riders in Sweden. To decrease the risk of confusion among the respondents due to numerous interpretations of the terms temperament and personality, 'behavioural trait' *(in Swedish: 'beteendeegenskap')* was considered more neutral and therefore used for the purpose of the questionnaire in this study. To enable investigation of possible correlations between individual characteristics of the respondents and which behavioural traits in horses they found relevant, the questionnaire was divided in two sections. The first section included questions on the respondents' age, sex, level of experience and main equitation discipline. Both closed and open-ended questions occurred, and often with possibilities for the respondents to leave additional comments. The second section consisted of yes/no-questions addressing the respondents' perception of relevance of a selection of equine behavioural traits and all questions were formulated identically, as follows (*'Alert and forward'* is here inserted as an example of a behavioural trait):

> "Do you think that a good match between you and a horse is affected by how ['*Alert and forward'*] the horse is?"

4.2.2 Selection of behavioural traits

The Big Five model of personality (McCrae & Costa, 1997) was used to give structure in the process (c.f. Morris *et al.*, 2002; Gosling & Bonnenburg, 1998) when developing the section of the questionnaire comprising questions on behavioural traits in horses. Earlier studies (Lloyd *et al.*, 2007; Morris *et al.*, 2002; Visser *et al.*, 2001) and personal communication with PhD I. Wolframm[3] were used to collect behavioural adjectives to describe and evaluate horse personality and temperament. The final criteria for a trait to be included were that it was 1) identified to be connected with one of the five dimensions of personality described by the Big Five model (McCrae & Costa, 1997), 2) considered to occur in horses, and 3) potentially relevant for horse rider match.

3. PhD I. Wolframm, personal communication on Jan 6 2010 (descriptors of horse traits later published in Wolframm & Meulenbroek, 2012)

As much as possible, care was taken to avoid anthropomorphistic interpretation and inclusion of traits that can be considered specific to humans and unlikely to occur in horses. At the same time, the (labels of) traits needed to fit riders' frame of reference. A short description of each behavioural trait was included in the questionnaire to decrease the risk of bias caused by subjective interpretation (Table 1).

Table 1. All 14 behavioural traits included in the questionnaire in study I, short descriptions of terms and classifications according to the Big Five-model of personality (McCrae & Costa, 1997).

Behavioural trait	**Short description**	**Classification**
Curious	Curious in general	Openness
Brave	Most often moves forward without hesitation and is open to different tasks	Openness
Easy to teach	Easily takes in instructions and learns new tasks, which also can mean how to avoid situations	Openness
Easy to bring to new environments	Stays calm and communicative in new environment like the vet clinic, unknown training area, competition or change of stable	Openness
Predictable	Reacts predictably to different situations and stimuli	Conscientiousness
Careful	Careful of itself, things and humans in the vicinity	Conscientiousness
Dependent on other horses	Easily stressed and tense without company of conspecifics	Extroversion
Spirited and forward	Eager to move forward without being hot	Extroversion
Affectionate	Seeks and appreciate human contact and may neigh to owner/care taker	Agreeableness
Tolerant towards horses	Appreciates contact with other horses and does not get irritated if someone e.g. rides by closely	Agreeableness
Tolerant towards humans	Reacts positively to an approaching human, does not bite or kick	Agreeableness
Fearful	Easily gets tense and nervous	Neuroticism
Hot	Frustrated and impatient if not allowed to move as fast as it wants in all gaits	Neuroticism
Temperamental	Explosive and may react violently	Neuroticism

4.2.3 Advertising and target group

The respondents voluntarily chose to participate in the web-based survey. The link (URL) was advertised through news media (radio, TV, horse magazines), in social media, by handing out leaflets on different horse events and through personal contacts in the networks of the research team. The target group of the study included individuals in Sweden active within various equitation disciplines, with main focus on riding, and with different levels of experience.

However, our conception was that highly skilled professional riders have less need for support with selecting horses for optimal match, hence the survey aimed mainly at reaching out to leisure riders on different levels.

4.3 Study II

The aim of Study II was to investigate if it was possible to use individual differences in responses to behavioural traits to divide adult horses in temperament categories.

4.3.1 Horses

A sample of 17 Swedish Warmblood horses, 12 geldings and five mares ranging from 8 to 20 years of age (mean age = 14.5 years), were included in the tests. These were experienced school horses used in education at basic to advanced levels (show jumping 140cm, dressage advanced medium). All horses were subjected to similar husbandry procedures regarding feed, training and handling, housed in stables with individual boxes and turned out daily in paddocks for at least two hours. Daily routines were not changed during the experiment, although the horses were not exercised prior to participating in the second day of testing described below.

4.3.2 Tests and facilities

Each horse was consecutively exposed to a test battery including the following tests: 1) human approach, 2) isolation, 3) bridge and 4) novel object. A schematic overview of the test battery is given in Figure 2. The test order was chosen to minimize bias in heart rate and behavioural data since physical activity and possible agitation of the horses was thought to increases from tests 1-4. The two researchers handling the horses in the tests were highly experienced (>20 years) with horses and were not familiar with the horses at the start of the study. On the evening of the first day of testing, when the stable was calm and no other people present, the human approach test was conducted. After all horses had been tested and had some time to recover, a 10 minute base line sample of each individual's heart rate was recorded. After one day pause without testing, the other three tests were carried out, which took approximately 30 minutes per horse. To check for consistency over time in the horses' responses, the battery of behavioural tests was repeated according to the exact same protocol after three weeks.

Human approach test

The aim of the human approach test was to measure the horses' initial reaction towards 1) an approaching human and 2) when the halter was put on. The test was conducted in the horses' own box with the maximum time of 10 minutes allocated to catch the horse before the test was terminated.

Isolation test

The isolation test was intended to measure the horses' level of gregariousness and reactions to being left alone in an unknown environment. The test was conducted in a, for the horses, unfamiliar box of approximately $9m^2$ situated in an empty stable where each horse was left alone for 5 minutes given no visual contact with other horses or humans.

Bridge test

The aim of the handling test was to measure the horses' reactions to being led towards and over an unknown surface that both looked different than the surrounding footing and made contact sound when stepped on. The test was conducted in a test arena situated in an empty indoor riding hall familiar to the horses. The horse's behaviour was studied when it was led towards and over a novel surface which consisted of a 2.4 x 3.6m 'bridge' built of rectangular 2 cm thick plywood plates that was placed directly on the ground. The researcher walked calmly and purposefully towards the bridge and gave no vocal or physical directions to the horse. Each horse received a maximum of three trials before the test was terminated.

Novel object test

The aim with the novel object test was to measure the horses' reactions to a combination of a novel object, social isolation and human handling. After the bridge test, the horse was led to another familiar adjacent indoor arena measuring 18x36 meters. The novel object was an opened umbrella held upright in the middle of the arena by a rope attached to the ceiling; a weight ensured that it remained in contact with the floor. Two clearly visible concentric circles were marked in the sand on the floor at 2 and 4 m respectively from the novel object.

The novel object test consisted of two consecutive events. First, the horse was led into the test arena, let loose, and left alone for five minutes with no visual contact with the researcher (NO1). The second event (NO2) began as soon as NO1 ended. The handler then re-entered the test arena, caught the horse and led it towards the novel object in an attempt to reach the inner circle. As in the handling test, the handler gave no vocal or physical directions other

than leading the horse calmly and purposefully towards the novel object. Each horse received a maximum of three trials to reach the inner circle before the test was terminated.

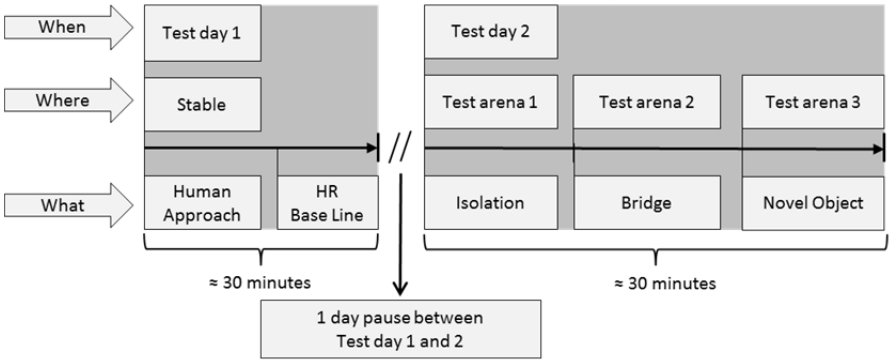

Figure 2. Schematic overview of the test battery conducted in Study II (HR= Heart rate).

4.3.3 Data collection Study II

The horses' behaviour during the human approach test was collected by direct observation according to protocols presented in Table 2 and 3. Focus of the behavioural scoring was on social signals earlier described as a part of horses' intraspecific signalling (Waring, 2003), and included whether the horse chose to decrease or increase the distance to the entering person, and what kind of ear postures or other signals (e.g. showing teeth) the horse exhibited.

From video material (SONY Handycam DCR-SR210) recorded during the isolation, handling and novel object test, a large number of behaviours was scored with Interact® (Version 9, Mangold International GMbH, 2010). The ethograms included for example various measures of locomotor activity (e.g. walking, standing, trotting, cantering), exploratory behaviours (e.g. sniffing the floor and/or interior of the test arena), vocalisations (e.g. neighing, snorting), reluctance behaviours (e.g. pawing, rearing, head shaking) as well as rolling, defecation and urination. During the handling and novel object test, exploration of bridge and novel object, reluctance behaviours such as pulling back and moving sideways, as well as number of trials needed to cross the bridge and to approach the novel object were also recorded. Based on the criteria of sufficient individual variation (variables where >75% of the horses had the same score were excluded), a reduced number of recorded variables were included in subsequent statistical analysis (Table 4).

With the exception of the human approach test (where minimal human involvement was required before the test began), the horses were equipped

with heart rate monitors (Polar RS800, Polar Oy, Finland) throughout the whole test procedure in Study II.

Table 2. *Scoring protocol for part 1 of the human approach test in Study II, measuring immediate reactions of the horse when a human enters the box (modified from Hausberger and Muller (2002)).*

Score	Behaviour	Definition
1	Ignoring	The horse does not move its limbs, neck or head but may move one or both ears towards the human.
2	Seeking contact	The horse moves its head and/or one or more legs towards the human with its ears pointing forward.
3	Threatening	The horse moves its head and/or one or more legs towards the human with its ears laid back and/or mouth open and teeth showing.
4	Avoiding	The horse moves its head and/or one or more legs away from the human, its ears can be forward or backwards.

Table 3. *Scoring protocol for part 2 of the human approach test in Study II, measuring reactions when halter was put on.*

Score	Definition
A	No evasive behaviour; the horse does not lift its head or move away from the researcher when halter is to be put on.
B	Moderate evasive behaviour; the horse lifts its head or moves away from the researcher when halter is to be put on.
C	Clear evasive behaviour; the horse shows several or all of the evasive behaviours mentioned in B when the halter is to be put on.

Table 4. *Ethogram including variables used in Study II for behavioural observations (and heart rate) during the isolation, bridge and novel object tests that showed sufficient individual variation (<75 % of tested horses had the same score,) and were subsequently included in the statistical analysis.*

Variable	**Definition**	**Scoring scale**	**Isolation**	**Bridge**	**NO1[a]**	**NO2[b]**
HRI	Mean heart rate during isolation test	Bpm[c]	X[d]			
HRBR	Mean heart rate during bridge test	Bpm		X		
HRNO total	Mean heart rate during NO1 and NO2	Bpm			X	X
Stopping	Transition to standing still from walk, trot or canter	F[e]	X			X
Standing	Standing immobile, all hooves in contact with floor	D[f]	X	X	X	
Start walking	Transition to walk from standing still	F	X	X	X	X
Walking	One or several hooves moving in four beat gait	D	X		X	
Trotting	Moving in two beat gait	D			X	
Cantering	Moving in three beat gait	D			X	
Bucking/Kicking	Leap upward arching the back and lowering the head / kick back with hind legs	F			X	
Neck wringing	A contorted swinging movement of the neck so that the head is thrown around in all directions	F			X	
Neighing	Voiced emission using the larynx	F	X			
Nose blowing	Forceful expulsion of air through nostrils (not alarm call)	F	X			
Snorting	Forceful expulsion of air through nostrils (alarm call)	F			X	X
Exploring floor	Sniffing/licking/nibbling the floor (head may not be visible but held lower than the wall of the pen)	D	X		X	
Exploring other	Sniffing/licking/nibbling/chewing on other objects than the floor	D	X			
Sniffing bridge/poles	Holding and/or moving muzzle close over the surface of the bridge or the poles	D		X		
Focus tw bridge	Neck, head and ears are turned towards the bridge	D		X		

Variable	Definition	Scoring scale	Isolation	Bridge	NO1[a]	NO2[b]
Focus tw NO	Neck, head and ears are turned towards novel object	D				X
POZ1	Horse is in zone 1[g]	D			X	
POZ2	Horse is in zone 2[h]	D			X	
Crossed first	Crossed the marking furthest away from novel object (4m) with at least one hoof	F			X	
Reached second	Reached (at least one hoof touching) the marking closest (2m) to novel object on either first, second or third trial	0-3[i]				X

[a] NO1 = first part of the novel object test, horse alone in the test arena
[b] NO2 = second part of the novel object test
[c] Bpm = Beats per minute
[d] X = indicates in which test the variable was recorded
[e] F = Frequency
[f] D = Duration
[g] Zone 1 = first half of the test arena
[h] Zone 2 = second half of the test arena
[I] 0-3 = number of attempts needed to accomplish the task

4.4 Study III

The main objective of Study III was to investigate if riders with a certain personality profile match better with horses from a certain temperament category, and if the quality of horse-rider match is possible to measure.

4.4.1 Horses and riders

Of the 17 experienced school horses tested in Study II, 16 (ages 8-20 years, 4 mares and 12 geldings) were used also in Study III. Daily routines regarding feeding or training were not changed during the experiment except that the horses were not exercised prior to participating in the test, the same way as in Study II. The horses were still kept at the same establishment and were used for the same purposes as in Study II. However, a few changes (which was unrelated to our experiments) in the day-to-day management of the horses had been implemented during the year that had passed since the previous study. Changes may have differed between horses and could include for example changes in feed ratios and time spent on pasture versus in the stable.

The participating riders included 16 female students between 20 and 30 years old who were all highly experienced with horses.

The horses were not used in the same educational program as the riders and thus were not involved in the riders' daily routines or training. Apart from occasional meetings, the riders were generally not familiar with the horses, which was strived after since the aim was to evaluate first impression of match.

4.4.2 Horse-rider combinations

The horses had previously been tested and divided in four categories based on individual differences in temperament (Paper II). The categorisation was based on the individual horses' either relatively high (H) or low (L) loading on each of two factors (Tcat1 and Tcat2) derived from principal component analysis (PCA). Hence, the four categories were named H-H, H-L, L-H and L-L.

One month prior to the riding test, 21 potentially participating riders (of which 16 later participated in the test) filled in a shortened version of the MAP test comprising 100 items (Sjöberg *et al.*, 2012). To facilitate the statistical analysis and enable a categorisation of the riders similar to the categories of horses, ES was selected as the variable to differentiate the participants' personality profiles. The riders were thus divided in two categories based on their relatively high or low ES-score (ES-H and ES-L respectively).

With horses and riders divided in four and two categories respectively, the horse-rider combinations were semi-randomly paired so that at least one ES-H and one ES-L rider was allocated to each of the four categories of horses, as presented in Table 5.

Table 5. *Distribution of horse-rider combinations per category of horse temperament and rider personality profile included in the match test in Study III.*

Horse Temperament	**Rider Personality Profile**	
	High Emotional Stability (ES-H)	Low Emotional Stability (ES-L)
H-H	2	2
H-L	2	2
L-H	3	1
L-L	2	2

4.4.3 The match test

To measure possible differences in the quality of match as affected by horse temperament and rider personality profile, a test was conducted in which the participants interacted both in the horses' home stable, outdoors and in a test arena. The test was designed to resemble the situation when a presumptive buyer tests a horse for the first time. To avoid habituation of both horses and riders to the test, each rider was only assigned one horse, each horse only one rider and the horse-rider combinations were only tested once. The test took about 90 minutes and consisted of the following consecutive parts:

1. **Stable**:
    a. Enter the box
    b. Put on halter and tie the horse to the wall with a lead rope
    c. Groom and tack up the horse for riding
2. **Outdoors**:
    a. Lead the horse outdoors, approximately 500m
3. **Handling test**:
    a. Lead the horse over a plywood bridge striped with black tape (to make the bridge differ visually from that used in Study II) measuring 2.40x3.60x0.015m, placed on the floor.

Tests while mounted:

4. **Cups**:
    a. Ride forward towards three white plastic posts (155cm high) arranged on a straight line 4m apart, and halt to the left of post #1

b. Pick up a plastic cup mounted on top of post #1 with right hand
c. Continue forward and halt to the left of, and put the cup on, post #2
d. Move forward and circle post #3
e. Halt on the right side of post #2 and pick up the plastic cup with left hand
f. Continue forward and halt on the right side of, and put the cup on, post #1

5. **Novel Object**:
    a. Circle the novel object (an open umbrella set up in the middle of the arena) once on a distance of approximately 10m
    b. Approach the novel object following the centre line with the aim to reach a marking 2m from the novel object

All parts of the test were conducted in walk. Except for directions on how to perform the tests, no instructions were given to the riders regarding handling of the horse. The handling test and the cups test were conducted in the same riding hall measuring 24x74m while the novel object test was conducted in an adjacent riding hall measuring 18x36m. A maximum of three trials was allowed to pass the bridge in step 3a, and to approach the novel object in 5b.

4.4.4 Data collection Study III

The participating riders' levels of positive (PA) and negative (NA) affect were measured before and directly after the match-test to indicate if and how the riders' mood was affected by handling and riding a certain type of horse during the test situation. The riders were asked to subjectively evaluate and rate the quality of match between them and the horse after part 1, 2, 3 and 5 of the match-test on a scale between 1 (very poor) and 4 (very good). The handling, cups and novel object tests were videotaped (SONY Handycam DCR-SR210) for later recording of the horses' behaviour according to a modified version of a protocol used by Visser *et al.* (2008) (Table 6). To evaluate how effectively the horse-rider combinations accomplished the tasks in the test, the number of trials needed to 1) cross the bridge, 2) complete the cups-test and 3) approach the novel object was recorded.

Table 6. *Horse behaviours scored from video recordings of test parts 3,4 and 5 in Study III (modified from Visser et al. (2008))*

Behaviour	Description
Head shaking	Frequency of head shakings horizontally and/or vertically
Standing still	Frequency of unintended stops; all 4 hoofs stand still on the ground
Tail Swishing	Frequency of tail swishes, horizontally and/or vertically
Moving backwards	Frequency of steps taken backwards with front legs
Shying	Frequency of times the horse gets startled and moves either sideways, forward or backwards in a quicker pace than before
Moving sideways	Frequency of steps taken sideways with front hooves while approaching or crossing the bridge
Defecating	Frequency of defecating

4.5 Statistical analyses

A summary of conducted data analyses is given here; statistical methods and models used are described in detail in each paper (I-III). In all experiments, differences were regarded as statistically significant when $P<0.05$.

4.5.1 Study I

To test the effects of the respondents' age, sex, main equitation discipline and level of experience on the probability for them to indicate an equine behavioural trait as relevant (a 'yes'-answer), a logistic regression was performed (Olsson, 2002) and the Glimmix procedure of the SAS® package (SAS Institute Inc. SAS/Stat User's Guide, Version 9.3 Cary, NC, USA) was used. Further, pairwise comparisons were conducted using the least square means output of the Glimmix procedure, including Tukey's HSD (Honest Significant Difference) test for avoidance of overestimation of significant differences.

4.5.2 Study II

Assessment of underlying dimensions of temperamental characteristics was performed using multivariate analysis, including principal component analysis (PCA) (Jolliffe, 1986). All calculations were performed with the statistical programming language GenStat (VSN-International, 2012).

Spearman Rank Correlations between the two test repetitions were calculated for the variables that had shown sufficient variation. Measures of heart rate were expressed in terms of the differences from the baseline. For each variable where a significant rank correlation was obtained, each horse's

scores in the two test repetitions were averaged and used as input variable in the multivariate analysis.

Prior to PCA, the variables were scaled, i.e. the analysis was performed on the Pearson correlation matrix. After extraction, principal components were scaled by their standard deviations (square roots of associated Eigen values) and subjected to varimax (orthogonal) rotation. The rotated components are henceforth referred to as factors.

To explore the underlying structure of the individual responses of the tested horses to the different tests, PCA was initially performed on subsets of variables from each behavioural test separately (PCA 1-4). When interpreting the outcome of PCA analysis, the two factors explaining most of the variation with Eigenvalues higher than 1 were considered relevant. Thus, the two factors from each PCA analysis conducted on variables from the separate tests were interpreted and labelled as indicators of temperamental traits. In accordance with the technique used by Visser *et al.* (2001), the labels were set on the basis of which behavioural expressions (variables) exhibited high loadings. Similar signs of the loadings within a factor indicate that the variables are positively correlated, while different signs indicate the opposite.

To enable the categorization of horses based on a temperamental profile derived from a combination of traits measured in the separate tests, a final overall PCA (PCA 5) was performed. For this, scores on the first two factors from each of the four initial PCA's constituted a new data set with eight variables.

4.5.3 Study III

The same criteria of sufficient individual variation (variables where >75% of the horses had the same score were excluded) as had earlier been applied in Study II was also used in Study III.

Multiple linear regressions were applied, using the Stata 'regress' command to analyse the impact of horse-rider combination on match quality measured as change in rider affect states (PA and NA), and on the riders' subjective evaluation of match (on a scale from 1-4). An average 'match-score' of the subjective evaluation filled in by the riders at four occasions during the match test was calculated. All one-way interactions were tested and retained if significant at $P \leq 0.05$.

Regarding the impact of horse-rider combination on the riders' level of PA, the riders' level of PA after the test (PA2) was set as dependent outcome and the model included PA before test (PA1), the riders' level of ES (Escat), the horses' loading on each of the two temperament factors (Tcat1 and Tcat2) as well as interactions between rider personality and horse temperament variables

as input variables. To avoid the risk of mass significance, a Bonferroni correction was applied.

$$PA2 = PA1 + EScat + Tcat1 + Tcat2 + Tcat1 * Tcat2 +$$

$$EScat * Tcat1 + EScat * Tcat2$$

The analysis of NA was conducted using the same model as for PA; however no interactions were included in the final model.

$$NA2 = NA1 + EScat + Tcat1 + Tcat2$$

No predictor representing before-values was included in the model used for analysis of match as evaluated by the rider and no interactions were included in the final model.

$$Match = EScat + Tcat1 + Tcat2$$

5 Summary of results

In this chapter, a summary of the main results is given, for full details, see Paper I-III.

5.1 Study I

The response on the internet survey was good; approximately 2800 respondents participated, of which almost 97% were women and a majority were between 20 and 30 years old. The skewed distribution between men and women reflects well the distribution among riders in Sweden today, but unfortunately this precluded analysis of potential differences between men and women regarding perceived relevance of behavioural traits in horses.

It was shown that both age, preferred equitation discipline and to some extent level of experience had an influence on Swedish riders' perception of which behavioural traits in horses are relevant to a good match between horse and rider. All traits included in the questionnaire were perceived as relevant (as indicated by 'Yes-answers') by more than 50% of the respondents, as shown in Figure 3. The traits perceived as most relevant (highest number of 'Yes-answers'), were 'Easy to bring to new environments' and 'Spirited and forward', while 'Hot' and 'Tolerant towards other horses' were perceived as relevant by the lowest number of respondents. In general, older respondents found behavioural traits in the horse more relevant to a good match than younger participants. Significant differences between respondents who practised different types of equitation disciplines were discovered, indicating that horses with certain temperaments are considered better suited for some disciplines than others. In the case of the behavioural trait 'Easy to teach', respondents with more than ten years of experience of horses perceived it as more relevant than less experienced respondents.

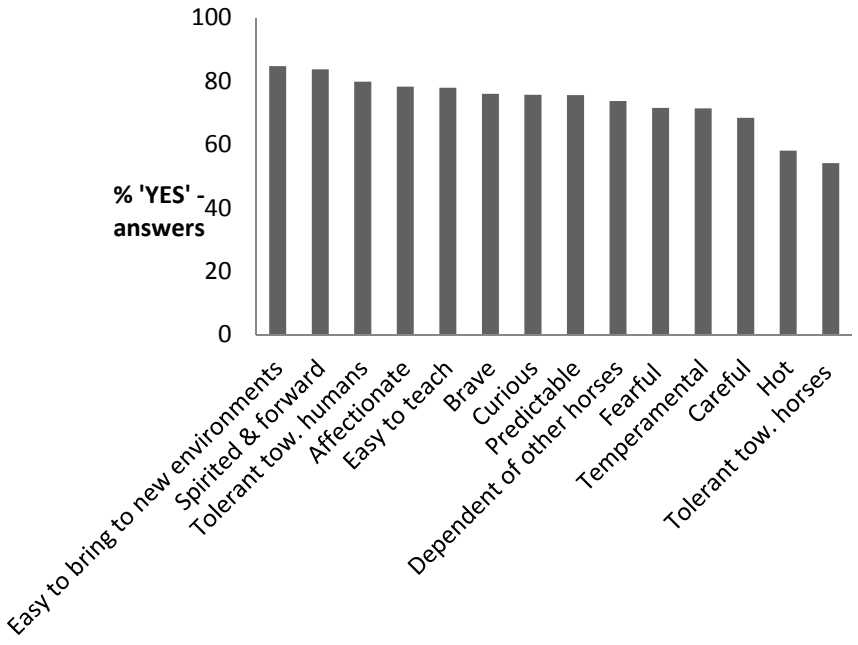

Figure 3. Proportion of respondents that indicated each of the 14 behavioural traits included in the questionnaire used in Study I as relevant (a 'yes'-answer) for a good match (n>1800).

5.2 Study II

Unfortunately, all variables from the human approach test were removed from further analysis due to lack of variation.

A reduced number of variables from the isolation, handling and novel object tests showed a significant rank correlation between the two test repetitions, and were included in the initial batch of PCA on separate tests (PCA 1-4). A total of nine variables from the isolation test and five from the bridge test were included, while the eighteen variables from the novel object test were divided into two subsets and analysed separately according to the two events in the test; NO1 (thirteen variables) and NO2 (five variables) (Table 7).

Table 7. *Spearman Rank Correlations between variables measured in Study II during first and second repetitions of temperament tests and used in further analysis, all measures ≥0.45 are statistically significant (P<0.05).*

Test	Variable	Rank correlation
HR[a] Base Line	HR BL	0,73
Isolation	HRI	0,49
Isolation	Stopping	0,71
Isolation	Standing	0,86
Isolation	Start walking	0,72
Isolation	Walking	0,57
Isolation	Exploring floor	0,62
Isolation	Exploring other	0,62
Isolation	Neighing	0,47
Isolation	Nose blowing	0,47
Bridge	HRBR	0,63
Bridge	Standing	0,74
Bridge	Start walking[b]	0,44
Bridge	Focus towards bridge	0,54
Bridge	Sniffing bridge/poles	0,45
NO1+2	HR NO total	0,57
NO1	Standing	0,79
NO1	Start walking	0,52
NO1	Walking	0,64
NO1	Trotting	0,65
NO1	Cantering	0,46
NO1	Exploring floor	0,64
NO1	Snorting	0,64
NO1	Neck wringing[b]	0,44
NO1	Bucking/Kicking	0,79
NO1	POZ1	0,62
NO1	POZ2	0,78
NO1	Crossed first	0,47
NO2	Stopping	0,49
NO2	Start walking	0,47
NO2	Focus towards NO[b]	0,44
NO2	Snorting	0,60
NO2	Reached second marking	0,45

[a]=HR= Heart rate

[b]= Three variables with P=0.0054 (r=0.44) were included based on consideration of relevance for the temperamental categorization.

When interpreting the outcome of the overall PCA (5) conducted on the combined subsets of factor scores from the isolation, bridge, NO1 and NO2 tests, it was shown that the first two factors had Eigen values over 1, explained 49% of the variation and thus were chosen for further categorization of the horses (Table 8). The first factor (later labelled Tcat1 in Study III), showed positive loading on the factor 'Activity' from the isolation test and 'Exploration' from NO1 as well as a strong negative (-0.88) loading on 'Cautiousness' from NO2. The second factor (later labelled Tcat2 in Study III) was in turn determined by negative loading on 'Activity' from the isolation test and strong positive (0.82 and 0.91 respectively) loadings on 'Excitability' and 'Willingness to follow', both from NO2. Factor scores from the bridge test were represented as high loadings in the third and fourth factor and therefore not included in further analysis.

To categorize the horses, their individual scores on the first and second factor (Tcat1 and Tcat2) of the overall PCA were calculated and ranked. The two sets of scores each underwent a median split, which resulted in four groups of horses, where each individual was labelled as having a combination of either high or low scores on the two factors (H-L, H-H, L-H, L-L).

Table 8. *Loading pattern of the first five factors from overall PCA5 conducted in Study II on factor scores from PCA1-4, loadings >0.50 are marked in bold.*

Variable	Label	Factor				
		1	2	3	4	5
Scores factor 1 Isolation	Activity[a]	**0.53**	**-0.52**	0.17	0.45	0.19
Scores factor 2 Isolation	Gregariousness[b]	0.13	0.09	0.02	0.14	**-0.93**
Scores factor 1 Bridge	Alertness[c]	0.00	0.01	0.04	**-0.94**	0.14
Scores factor 2 Bridge	Willingness to follow[d]	-0.06	0.07	**0.95**	-0.02	-0.05
Scores factor 1 NO1	Excitability[e]	0.19	**0.82**	0.26	0.22	0.00
Scores factor 2 NO1	Exploration[f]	**0.67**	-0.22	0.27	-0.11	**-0.51**
Scores factor 1 NO2	Cautiousness[g]	**-0.88**	-0.12	0.20	-0.05	0.11
Scores factor 2 NO2	Willingness to follow[h]	-0.14	**0.91**	-0.09	-0.16	-0.04
Eigen values		2.17	1.79	1.10	1.07	0.82
Variance explained		27%	22%	14%	13%	10%

[a] Activity includes stopping, standing, start walking and walking
[b] 'Gregariousness includes HRI (Heart rate during isolation test), standing and neighing
[c] Alertness includes standing and focus tw bridge
[d] Willingness to follow includes start walking
[e] Excitability includes HRNO total (mean heart rate during novel object test), standing, cantering and bucking/kicking
[f] Exploration includes start walking, walking and exploring floor
[g] Cautiousness includes stopping and snorting
[h] Willingness to follow includes reached second (the marking closest to the novel object)

5.3 Study III

Regarding the type A indicators of match (PANAS and the riders' evaluated 'match score'), it was shown that the riders' change in PA was applicable to measure rider feeling as an indicator of match quality between horse and rider. Both rider ES and horse temperament were shown to have a significant effect on this parameter. After application of the Bonferroni correction which set the significance level at 0.0042 (0.05/12), it was shown that two of the eight different types of horse-rider combinations, had a higher increase in positive affect than others (Figure 4). Riders with relatively high ES matched better with horses from one of the horse-temperament categories (category L-H) while riders with relatively low ES in turn matched better with another horse category with opposite loading on the temperament factors (category H-L). Our sample of riders did not show enough variation neither in NA nor 'match score' for these indicators to measure differences in horse-rider match.

After analysis of video material from the match test, it was further shown that the horses hardly performed any evasive behaviours (type B indicators), and measures of the horse-rider combinations' effectiveness in accomplishing a task (type C indicators) showed very low variation. These variables were therefore excluded from further analysis.

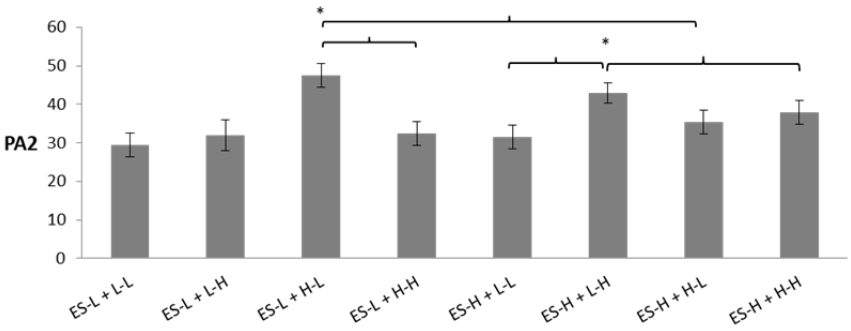

Figure 4. Predictive margins of PA2 including 95% confidence interval of PA2 (level of Positive affect after the test) for all combinations of horse and rider variables as measured in Study III. *= Significant differences of pairwise comparisons ($P<0.0042$). Start value of PA (PA1) was corrected for in the analysis.

6 Discussion

The studies presented in the current thesis have focused on the topic of horse-rider match, starting with investigating the perception of relevant temperament traits in horses according to Swedish riders (Paper I), further through categorisation of horses based on individual differences in temperament (Paper II), to finally accomplish the tests of horse-rider combinations in surge of developing methods to measure match quality (Paper III). This chapter briefly discusses some general aspects of horse-rider match, the results from the three studies (for details, see Papers I-III) and presents perspectives for application and future studies.

6.1 Horse-rider match

Almost every rider has at some time experienced that he or she matches especially well, or not at all, with a certain horse. The feeling of a perfect match is often described as the rider feeling 'as one' with the horse and only having to use minimal cues. On the other hand, a bad match can negatively affect the horse-rider communication and result in the rider getting scared, frustrated or bored (Axel-Nilsson, unpublished data). Our conception, that leisure riders are more in need of support than professional riders to find a matching horse, is supported by Graf *et al.* (2013). These authors showed that leisure riders attach more importance to personality and temperamental traits in horses and are generally more interested in improved assessment of such traits than competition riders, professional riders and breeders.

In a study by Mills and McNicholas (2005), it was suggested that the emotional content of the relationship between horse and rider is of more importance for leisure riders than the instrumental value of the horse. Mills and McNicholas (2005) further pointed out that the leisure horse seems to fulfil a psycho-social role similar to what has been reported for non-human animals that are part of other human-animal relationships (Serpell, 1981). These results

seem to agree with unpublished results from the survey conducted in Study I in the present thesis, where many respondents shared their experiences of an exceptionally good match with a certain horse. Few of the respondents to the survey expressed their experience of a good match as being connected primarily to performance, instead the positive experiences connected to riding and handling the horse were emphasized.

The respondents' statements further bear witness of relationships between horses and riders where the sensation of 'perfect match' was often said to be due to for example compatible personalities and corresponding levels of education. Many mentioned the importance of 'good chemistry' between them and a horse. Some respondents stated that the feeling of good match came after the horse first had been difficult and hard to communicate with, and after winning its trust they were closely united. They indicated that the feeling of being 'accepted' by the horse was important. Others preferred a calm and steady horse with which he or she could feel safe and secure from the start (Axel-Nilsson et al. unpublished data). This, although anecdotal, evidence corresponds to results presented by Gorecka-Bruzda *et al.* (2011), who showed that some riders prefer a challenging horse, while Buckley *et al.* (2004) pointed out that a horse with a good temperament (in that study: for children) was the one that basically obeyed the rider. From the above it can be concluded that there is no single 'good type' of horse. The aim of this thesis was in line with that conclusion: to investigate what kind of horses suit specific types of riders.

6.2 Study I

Not all respondents to the survey used in Study I were horse owners, and people were not asked to evaluate their own horse. They were instead instructed to picture a situation in which they were about to buy a horse, or to ride and care for a horse as their own and then give their perception of whether the selected behavioural traits would be relevant for a good match with the horse. It is likely that this method potentially yielded less biased results than surveys where respondents were asked to rate their own horse, which could be influenced by actual quality of match with the horse in question (Wolframm & Meulenbroek, 2012).

The high response to the survey reflects the great interest in horse related issues in our society. Earlier studies within equine science where internet surveys have been used, also reported high response figures which of course contributes to representativeness and reliability of the sample (c.f. Visser & van Wijk-Jansen, 2012; Wolframm & Meulenbroek, 2012). The skewed

distribution with often around 90% female respondents to surveys like this is not surprising since the majority of active riders are women. However, since earlier studies have reported differences in opinion between men and women regarding different aspects of horse temperament (Graf *et al.*, 2013; Gorecka-Bruzda *et al.*, 2011), it would be relevant for future studies to make an effort to communicate surveys in such a way as to interest more male respondents.

The sections below give an overview of the results from the survey showing that riders' age and preferred equestrian discipline had a profound effect on perceived relevance of behavioural traits in horses.

6.2.1 Equestrian discipline

Distribution of respondents

The representation of respondents active in different equestrian disciplines was interesting, since it did not seem to reflect the numerical distribution between disciplines in Sweden today. The highest proportion of respondents to the survey (32%) indicated that they considered themselves as allround-riders, here defined as being active in different disciplines and doing a little bit of everything. This was not surprising since Swedish riding schools, where many riders have their background, are known to provide the opportunity to get acquainted with different disciplines. The fact that Sweden has a well maintained statutory right, giving the public access to private land, also vouch for riders to exercise their horses outside of the paddock or riding hall and thereby provide opportunities for natural variation in training of horses. However, the fact that 30% (i.e. the second largest group) of the respondents indicated dressage as their main equestrian discipline, while only 17% chose show jumping was surprising. According to numbers from The Swedish Equestrian Federation, show jumping held a majority (75%) of the approximately 400 000 annual competition entries in Sweden during 2012, while dressage reached approximately 22.5%.

The overrepresentation of dressage riders in the group of respondents to our survey may be due to a higher interest in the topic of horse-rider match and especially horse temperament than among show jumping riders. This specific interest may be explained by the discrepancy between the temperament of current dressage horses that are bred for optimal sports performance, and what is coveted by leisure riders (Graf *et al.*, 2013). Since the vast majority of horses do not have enough ability for competing on absolute top level, they are often sold to leisure riders with various levels of experience who might eventually find the horse too difficult or even dangerous to handle and ride. In a study by von Borstel *et al.* (2010), it was also shown that horses bred for dressage were

more reactive and fearful than horses bred for show jumping. Another explanation to the overrepresentation of dressage riders could be that the respondents to the current survey were mainly leisure riders and not competing riders, which makes the statistics of competition entries invalid for comparison. The vast majority of leisure riders may see themselves as all round or dressage riders rather than pure show jumping riders.

Difference in perception of relevance of behavioural traits between disciplines

Comparison between respondents engaged in different equestrian disciplines showed significant differences regarding perception of relevance of specific behavioural traits. One example from the results is the trait perceived as most relevant (highest number of 'yes-answers'); 'Easy to bring to new environments', which respondents active in dressage and show jumping indicated as more relevant than those who chose 'other' as their main discipline. A potential explanation may be that horse-rider combinations active within dressage and show jumping often travel to unfamiliar facilities to participate in training sessions and/or competitions. In those situations, it is important for performance, welfare and safety of horse and rider that the horse does not react strongly to novelty and unfamiliar environments. The respondents who chose 'other' as their main discipline, stated that they mostly hacked out and conducted less challenging activities with their horses. These riders may therefore not face the same kind of strained situations as dressage and show jumping riders, which is then reflected in their appreciation of specific behavioural traits.

These results indicate that riders consider horses with certain temperaments better suited for one discipline than for another. Earlier studies also emphasize the relevance of standardised methods to measure horse temperament and behaviour to assess their suitability for different equestrian activities and in the long perspective enable breeding of horses that better match different tasks, and riders (McBride & Mills, 2012; Goodwin *et al.*, 2009).

6.2.2 Age

With the exception of 'Affectionate', the results showed that the degree of relevance (number of 'yes'-answers) of behavioural traits included in the questionnaire was positively correlated with the respondents' increasing age. The fact that the older respondents rather consistently perceived behavioural traits as being more relevant to a good match than the younger respondents, may not indicate that younger respondents perceive horses' behaviour as less relevant per se, but rather that they lack experience of and insight into what it implies. However, these results are contradictive to those reported by Buckley

et al. (2004), who interviewed members (parents and their children) of the Australian Pony Club. In that study, it was found that horse temperament, described as safe, obedient and quiet, was ranked as the most important characteristic of a Pony Club-horse also among the younger participants in the interview study. Possibly the formulation of the questionnaire used in the current study was too complicated for the youngest age classes and could have influenced the outcome.

6.3 Study II

The results from Study II are in line with earlier studies suggesting that horse temperament and personality are determined by a combination of underlying traits or characteristics (McGrogan *et al.*, 2008; Lansade *et al.*, 2004; Morris *et al.*, 2002; Visser, 2002; LeScolan *et al.*, 1997; Wolff *et al.*, 1997). In the present thesis, the outcome of PCA on variables from the isolation, NO1 and NO2 tests were used to divide the horses in four categories. Interestingly, factor scores on 'Willingness to follow' and 'Alertness' from the bridge test were represented as high loadings on different factors than the isolation, NO1 and NO2 tests, which indicates that the bridge test seems to measure a separate dimension of horse temperament.

The sections below briefly discuss what distinguished the four temperamental categories that were identified among the sample of horses used in Study II.

6.3.1 The four temperament categories

H-H

Horses in the H-H category were active during the isolation test, both explored and were excited during NO1 and willingly followed the handler towards the novel object in NO2. As a stressed or frightened horse is less prone to explore the environment (Waring, 2003), this combination of reactions were therefore interpreted as indicating a type of horse that is active, forward and not very cautious or negatively affected by the different test situations. In practice, such a horse might be well suited for competition or leisure riding and for riders with different levels of experience. However, riders who prefer a calm and less reactive horse might find this type of horse a bit too energetic and forward.

H-L

Even though horses in the H-L category also showed high activity in the isolation test and long durations of exploration during NO1, they differed from the H-H category in that they moved around mostly in walk and did not get

excited when let loose and left alone during NO1. Furthermore, they were reluctant to follow the handler towards the novel object without snorting which would have indicated a higher level of alarm (Waring, 2003). Due to its rather low level of activity, and the reaction to stop instead of getting overly excited and anxious when challenged, this type of horse may fit well with riders that prefer a calm and predictable horse.

L-H

Characteristic for horses in the L-H category was high activity during the NO1 test, and although clear signs of cautiousness (frequent stops and snorts) when approaching the novel object in NO2, they still followed the handler towards the novel object. These reactions indicated a type of horse that experienced social isolation disturbing but found support in the presence of the handler when approaching the novel object in NO2. This type of horse may be very sensitive to changes in the environment and/or training routines but if handled expertly it could function very well. It is likely that they match well with riders that like the challenge of being able to manage a nervous and sensitive horse.

L-L

The final category, L-L, was defined by high activity during the isolation test and showed high levels of cautiousness during NO2, and they were also unwilling to follow the handler towards the novel object. They neither explored nor moved around in higher gaits during NO1. This type of horse could be unsuitable for inexperienced riders and people who do not like horses that are difficult to handle without company of other horses. If only considering the low number of behaviours expressed by these horses during the tests, their inactive behaviour may make them seem calm and unaffected. However, the tensed “freezing” was in fact their response to a situation they perceived as challenging or dangerous. This type of motionless vigilance is described by (Waring, 2003) to occur in situations when horses are alarmed by a frightening stimulus. If pressed in such a situation, this type of horse may react with vigorous flight responses and can hence be difficult to control. Horses in this category that show very strong reactions may be generally unsuitable for riders with less experience.

6.4 Study III

In Study III, the same horses and facilities were used as in Study II. However, as will be shown in the next section, the horses’ level of response to the challenges included in the match-test were lower than expected compared

to results from the previous study. This decreased level of activity and reactivity may be due to changes in the day-to-day management of the horses which was unrelated to our experiments and had been implemented during the year that had passed since the previous study. Changes may have differed between horses and could include for example changes in feed supply (increased rations compared to the situation when Study II was conducted) and decreased time spent stabled. Results from a recent study on leisure horses conducted by Hockenhull and Creighton (2014) showed for example that handling issues increase if horses are stabled 13-16 h per day compared to 1-4h per day. The shorter time some of the horses spent stabled per day before and during Study III, compared to the routines practiced when Study II was conducted, may thus have resulted in less reactive horses. Harsh weather conditions with wind-forces reaching hurricane levels most likely also played a role in increasing the horses' reactivity during Study II.

The second section below addresses main results from the horse-rider match test and suggest possible explanations to why certain horse-rider combinations elicited higher increase in PA among the riders than others.

6.4.1 Indicators of horse-rider match

Three types of indicators were used to measure quality of horse-rider match: rider perception (A), horse behaviour (B) and horse-rider combinations' effectiveness in accomplishing a task (C). One of the type A indicators of match; a Swedish translation of the PANAS scales developed by Watson *et al.* (1988) was proven useful as a measure of quality of horse-rider match. It was shown that the combination of rider personality and horse temperament had a significant impact on changes in the riders' level of positive affect (PA) after performing the test.

Neither the riders' rating of match quality (the second type A indicator), horse behaviours (type B indicator), nor measures of effectiveness in accomplishing a task (type C indicator) showed sufficient variation between the different horse-rider combinations to be useful for evaluation of match quality. Other studies have used three-graded scales (Wolframm & Meulenbroek, 2012), or five separate items (Visser *et al.*, 2008) to evaluate cooperation between horse and rider. Possibly the self-evaluation scale used in the present study could be improved by including more than four categories to better distinguish potential differences between the horse-rider combinations. However, it is more likely that the tests were not enough challenging for the type of horses and highly experienced riders in this study.

The homogeneous samples of school horses and experienced riders in combination with the level of challenge kept at a rather low level, may also

have caused low variation in the outcomes of the three types of indicators (A, B, and C). Including horses of different breeds, ages and level of education as well as riders with different background, could have resulted in more variation in the data. However, it would have been difficult to interpret if differences between horse-rider combinations were due to differences in rider personality and horse temperament or other confounding aspects, such as conformation of the horse and level of education of both horse and rider.

Even though most of the A, B, and C measures were not indicating any differences in match quality of horse-rider combinations, we still believe these types of measures represent relevant dimensions of horse-rider match. However, under the conditions of the present study with homogenous horses and riders and a low level of challenge, PA was the only indicator sensitive enough to detect small yet significant differences in horse-rider combinations.

It is interesting to consider if we might have detected more variation in the horses' behaviour if we would have scored behavioural indicators of positive emotions in the horses as signs of good horse-rider match instead of evasive behaviours. There is an increased scientific interest in such positive indicators in animals (c.f. Reefmann *et al.*, 2009; Boissy *et al.*, 2007). Unfortunately, knowledge on how to objectively measure positive emotions in horses is limited and there is currently no protocol available (Hall *et al.*, 2013; Stewart *et al.*, 2011; Hawson *et al.*, 2010b).

6.4.2 Outcome of the horse-rider match test

Interestingly, the two types of rider personalities matched better with horses of opposite temperament category L-H vs H-L. Riders with relatively high emotional stability (ES-H) had a higher increase in PA after performing the test in combination with horses of the temperament-combination L-H, than with horses from the H-H and L-L categories. These results indicate that emotionally stable riders match well with horses that (during behavioural tests in the previous study) showed high levels of both excitement (elevated HR, long durations of canter and frequent bucking/kicking) during NO1 and cautiousness (frequently stopped and snorted when approaching the novel object) in NO2, but still had enough trust in an experienced handler to willingly approach the challenge. This corresponds to the definition of emotionally stable individuals as usually being calm in stressful situations and able to make rational and safe decisions even under strained circumstances (Sjöberg et al. (2012). Riders with high ES may cope better with horses that are prone to get excited and cautious, which is experienced as positive.

Further, riders with relatively low emotional stability (ES-L) showed a higher increase in PA in combination with H-L horses than H-H-horses. The

main difference between these two horse categories as measured in Study II was that H-H horses were more excited during NO1 and also more willing to follow the handler when approaching the novel object in NO2. These results indicate therefore that riders with relatively low emotional stability, implying that they are relatively anxious, worried and easily discouraged (Sjöberg *et al.*, 2012), match better with calmer and more inactive horses compared to easily excited horses.

We would have expected higher variation in type B and C indicators, especially among horse-rider combinations that according to the outcomes in PA matched less well. The outcome may be explained by the fact that highly experienced riders are able to perform with any type of horse, without affecting the indicators of bad match as measured in the current study (e.g. increase in NA, evasive horse behaviours and decrease in effectiveness in accomplishing tasks). However, the related emotional experience as measured with changes in PA differentiated the horse-rider combinations and indicated that certain individuals match better.

7 Main conclusions

- In general, the selected behavioural traits included in the survey were considered important, although differences between age groups and riders active in different equestrian disciplines were found

- It was shown possible to combine responses to a battery of behavioural tests to divide adult horses from a homogenous sample into different temperamental categories

- The hypothesis that rider personality and horse temperament have an effect on match quality, as measured with change in positive affect, was confirmed

8 Concluding remarks

This thesis provides a stepping stone to obtain a deeper insight into how good horse-rider match is defined, measured and realised.

To improve awareness of the effect of specific equine behavioural traits on the quality of horse-rider match, it is necessary to reach agreement on a common use of related terminology. In the present thesis, 'horse-rider match' was defined as covering aspects of the rider, the horse and their interaction. The concept was operationalised by using measures of rider perception, horse behaviour and their effectiveness in accomplishing a task. However, much work remains to be done to reach a common definition of horse-rider match and how to quantify it. The problem of inconsistent use of terminology when describing horse behaviour was brought up by Mills (1998) and the situation is much the same today as showed in a study by Pierard *et al.* (2015).

A complicating factor in this context is that apart from being scientifically correct, labels to describe horse temperament also need to fit the riders' frame of reference. A further harmonisation of the description of match and horse behaviour requires discussion and interaction between the different actors and stakeholders such as equine scientists, teachers and trainers, as well as riders themselves. Hopefully, this thesis can stimulate this process.

The complex development of personality and temperament in individual horses is influenced by genetic traits such as breed and sire, but also by environment and training. Thus, a study by Hausberger *et al.* (2004) found differences regarding a temperamental trait identified as emotionality between show horses and leisure horses but it remains unclear if the difference is a result of environment, training and experiences, or genes. It is therefore relevant to investigate if some behavioural traits in horses are more or less easy to enhance or diminish by training. This is probably dependent of both the

personality/temperament of the horse as well as the handler's experience and knowledge of horses. Some riders may be able to handle, or even change, the horse's behaviour and it might be easy or more difficult due to the horse's temperament and the rider's qualities. This knowledge on which traits are generally easy and/or difficult to change, is necessary to allow further identification of robust behavioural test(s) that measure horses' suitability for different riders and tasks.

My expectation is that further research on horse-rider match will help riders to purchase a horse that matches their own personality, thereby contributing to rider satisfaction and horse welfare. It is necessary to identify a few stable and robust measures of good horse-rider match and its determining variables. To make such measures of real use for riders when purchasing a horse, they should be feasible to apply without access to complicated testing facilities and equipment.

9 Populärvetenskaplig sammanfattning

De flesta ryttare har någon gång känt att de passat väldigt bra ihop med en speciell häst - att man hittat sin perfekta 'match'. Det kan kanske bäst beskrivas som att man känner sig som "ett" med hästen och att den lyder minsta vink, nästan som tankeöverföring.

En bra match mellan häst och ryttare är en förutsättning för ett gott samspel, som i sin tur har betydelse för både ryttare och häst och deras framgång tillsammans. Vi vet idag egentligen ganska lite om vilken typ av ryttare som passar bäst med olika typer av hästar. Det är därför viktigt att utveckla och fördjupa kunskapen om vad som påverkar ett gott samspel mellan häst och ryttare.

Hästens roll i vårt samhälle har ändrats i takt med att industrialiseringen minskat efterfrågan på hästar som dragkraft och transportmedel. Istället för arbetskraft hålls hästar idag främst för hobby och sport. I Sverige, som är ett av Europas hästtätaste länder räknat till antal hästar per invånare, finns drygt en halv miljon aktiva ryttare. Hästsporten är den näst populäraste sporten bland svenska ungdomar, efter fotboll, och majoriteten av utövarna är flickor och kvinnor. De flesta ryttare är aktiva inom hästsporten som hobby och fritidssysselsättning, medan en liten del försörjer sig som professionella ryttare.

I takt med att hästens användningsområden har förändrats har också typen av hästar som efterfrågas ändrats. Istället för dåtidens tunga kallblod och robusta halvblod vill ryttare idag ha kvickare och ädlare hästar med både fysik och temperament som passar för de typer av uppgifter som den moderna ryttaren ägnar sig åt. Idag bor de flesta ryttare och hästägare i städer och hyr stallplats där merparten av de dagliga sysslorna ofta sköts av personal eller andra hästägare. Det är därför troligt att många saknar en del av den hästkunskap som tidigare överfördes mellan generationer och kollegor när hästen var en naturlig del av såväl vardag som arbetsliv. Den här avhandlingen har fokuserat på att undersöka olika aspekter av samspelet mellan häst och

ryttare med målet att bidra till utvecklingen av praktiska metoder och verktyg som kan vara oerfarna ryttare till hjälp när de ska välja rätt typ av häst.

Resultat från avhandlingen visar att ryttare i allmänhet tycker att hästens temperament är mycket viktigt för ett gott samspel.. Att hästen är lätt att ta med till nya miljöer, pigg och framåt, tillgiven, lättlärd och tolerant mot människor var de egenskaper som ansågs mest relevanta. Även om de knappt 3000 ryttarna som deltog i den här studien var relativt överens om att hästens temperament är viktigt för ett gott samspel mellan häst och ryttare, så fanns det tydliga skillnader mellan olika grupper. Ryttare från olika discipliner skilde sig åt beträffande vilka egenskaper som var viktigast, och överlag tyckte de äldre ryttarna att hästens temperament var viktigare för ett gott samspel än de yngre. Det här visar att det är många faktorer som spelar in för att en häst och ryttare ska matcha varandra väl.

Om man som hästköpare har satt upp tydliga mål med vad man vill åstadkomma med just den hästen man ska köpa, kan man gå vidare och undersöka till exempel stamtavla, veterinärjournaler och tidigare tävlingsresultat för att få en uppfattning om huruvida hästen kan vara en bra match. Förutom de faktorer som man kan läsa sig till eller fråga säljare och tidigare ägare om, så menar många att kombinationen av ryttarens personlighet och hästens temperament spelar en viktig roll för om samspelet blir bra eller dåligt.

Idag finns det inte något färdigt test som kan användas för att mäta hästars temperament, eller för att utvärdera samspelet mellan häst och ryttare. Syftet med den här avhandlingen har varit att undersöka hur kombinationen av ryttarens personlighet och hästens temperament påverkar samspelet dem emellan, och hur det kan mätas.

Tre studier ligger till grund för resultaten som presenteras i avhandlingen. Först genomfördes en enkätstudie på nätet för att undersöka ryttares åsikter om hästars temperament och vilken betydelse olika egenskaper har för ett gott samspel mellan häst och ryttare. Som nämnts ovan fann vi både likheter och skillnader mellan de många ryttare som frivilligt deltog i studien. De flesta som svarade på enkäten såg sig själva som allroundryttare, något som inte är förvånande med tanke på att svenska ryttare ofta är aktiva inom olika grenar med sina hästar eller på ridskolan. Allemansrätten möjliggör också varierad träning utanför paddock och ridhus. Att dressyrryttare utgjorde den näst största gruppen efter allroundryttarna, och var fler än hoppryttarna, var oväntat med tanke på antalet tävlingsstarter i Sverige i respektive gren, där hoppning står för närmare tre fjärdedelar enligt siffror från 2012. Baserat på det höga antal deltagare i enkäten som angav att de främst red dressyr, så verkar det som att

dressyrryttare har ett särskilt stort intresse för samspelet mellan häst och ryttare i allmänhet och hästens temperament i synnerhet.

I den andra studien ville vi undersöka om det gick att använda en kombination av olika beteendetester för att dela in hästar i olika temperamentskategorier. Vi filmade och mätte hästarnas reaktioner på att en människa kom in i deras box, att bli lämnad ensam på en okänd plats, att bli ledd över en bro inne i ridhuset och till sist utmanade vi dem med ett uppspänt paraply som hängde från taket i ett annars tomt ridhus. Vi använde en grupp erfarna skolhästar, som trots att de alla var tränade, utfodrade och hanterade på samma sätt sedan länge, visade tydliga individuella skillnader i reaktionerna på testerna. Hästarna delades därefter in i fyra olika temperamentskategorier som visade att vissa av hästarna var relativt lätthanterliga och inte särskilt upphetsade av utmaningarna, medan andra blev både mer explosiva och negativt påverkade.

Den tredje och sista studien undersökte hur ryttarens personlighet och hästars temperament påverkar samspelet mellan dem. Samma hästar som vi testat i den föregående studien deltog och parades ihop med ryttare med olika personlighetsprofiler. Både ryttarna och hästarna som deltog var erfarna och hade en jämförbar utbildningsnivå, men skiljde sig i tidigare uppmätt personlighet respektive temperament. Även om testet, där ryttarna fick både hantera och rida hästarna, var utformat som ett standardiserat vetenskapligt test där alla moment var väldigt tydligt styrda och bestämda på förhand, var målet att det skulle likna en situation som kan tänkas uppstå när man provrider en häst för första gången. Resultaten visade att både hästarnas temperament och ryttarnas personlighet påverkade hur bra de passade för varandra. Vi kunde mäta tydliga skillnader i att ryttarna fick en mer positiv upplevelse tillsammans med vissa typer av hästar, vilket här tolkades som en bättre match.

Sammanfattningsvis innebär resultaten från avhandlingen att vi har funnit metoder att mäta samspelet mellan häst och ryttare och att vi med större säkerhet kan säga att ryttarens personlighet och hästens temperament har betydelse för om de blir en bra match. Förhoppningsvis kan det här arbetet ytterligare öka intresset för hur vi når en djupare kunskap om hästens temperament och samspelet mellan häst och ryttare, och hur vi kan hjälpa ryttare att hitta rätt häst.

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