The efficiency of routine standards in social comparison

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INTRODUCTION

Who am I? The answer to this question is of crucial importance to enable us to function successfully in our daily lives. In a world full of opportunities and with the freedom to make choices, self-knowledge, the knowledge about one's own characteristics and abilities, provides essential guidance for our actions and decisions. Some decisions may be as simple as deciding what to cook for dinner or which movie to watch on television. Conversely, other decisions have severe consequences, such as selecting a particular career or moving to another city. In the present-day world, there are plentiful choices available when making a decision, and an individual's own personality, his or her own preferences and abilities, is often decisive. Instead of taking over your father's business you make your own choice based on your interests and talents. Likewise, your decision whether to watch a love story, a thriller, or a documentary on the discovery channel is influenced by your self-perception as being to a greater or lesser extent romantic, action-seeking, or scientific.

Thus, the freedom of choice brings with it the burden of making decisions based on one's preferences, personal attributes, and abilities. The more opportunities an individual has open to him, the better he has to know himself in order to select the option that best fits his own personality. But even though self-knowledge is of crucial importance, the time and peace available to achieve this knowledge is rather limited. Often the opportunity to think carefully about different aspects of one's personality is not given. Decisions have to be made promptly and one has to get a sense of one's preferences while simultaneously thinking about many other important factors. How could people solve this problem? How could they get to know themselves without investing too much effort, time, and cognitive resources?

One primary source for self-knowledge is social comparison (Festinger, 1954). Often objective criteria for self-evaluations are not available or useful and therefore comparisons with other people play a crucial role in self-evaluations. But the question is whether social comparisons could indeed provide information about the self without consuming too much cognitive resources or time. Could people engage in social comparisons in a way that they achieve self-knowledge in a quick and easy manner? Are there, for instance, particular kinds of comparisons that ensure efficiency in self-evaluations, in contrast to other kinds of social comparisons, which demand a high degree of effort and deep involvement in the comparison process? To answer these questions it may be helpful to look at people's cognitive activities in other domains and to assign this insight to social comparison processes. If we know whether and how people achieve efficiency in general, this could be the basis for an understanding of social comparisons during self-evaluations.

THEORETICAL PART

Many people perceive the human being as a rational animal. Even though we know by now that this is an unrealistic picture, agents are still portrayed as fully rational maximizers of subjective utility (see Selten, 2001). This understanding of the human being forms the basis of many psychological theories, such as the theory of reasoned action (Fishbein & Ajzen, 1975), the VIE theory (Vroom, 1964), equity theory (Thibaut & Kelley, 1959; Walster, Berscheid , & Walster, 1973) in management (Griffeth & Gaertner, 2001; Huseman, Hatfield, & Miles, 1987) and close relationships (M. S. Clark & Reis, 1988; Sprecher & Schwarz, 1994; Van Yperen & Buunk, 1990), or utility theory in decision-making (Coleman & Farraro, 1992; Dawes, 1998; Edwards, 1954). As a general theme in all of these theories, people are expected to calculate the value or the personal gain of several options and to base their decision for future actions on this calculation. However, such theories do not take into account what Simon (1956) called the “bounded rationality”.

Simon (1956) stressed in his work that the human mind is limited in time, knowledge, attention, and cognitive resources. People are often not able to calculate the optimal solution to a decision problem (G. Klein, 2001; Nisbett & Ross, 1980). Instead of optimizing their decision, they rather “satisfice” and rely on a satisfactory alternative (Simon, 1956). Thus, even though people may wish to reach an optimal solution or make an accurate judgment, they cannot ignore the effort involved in such a process. In the attempt to balance the options in an effort-accuracy trade-off (Payne & Bettman, 2001; Payne, Bettman, & Luce, 1996), the efficiency of the process plays a crucial role. If only little effort wants to or can be invested in a process, accuracy may be neglected and efficient processes may be preferred. The influence of such efficiency concerns on people’s behavior and thinking can be observed in

domains as diverse as person perception (Bodenhausen, Macrae, & Sherman, 1999; Macrae, Milne, & Bodenhausen, 1994; Neuberg & Fiske, 1987), decision-making (Kahneman, Slovic, & Tversky, 1982; Rieskamp & Hoffrage, 1999; Tversky & Kahneman, 1988), and persuasion (Chaiken, 1980; Chaiken, Libermann, & Eagly, 1989; Petty & Cacioppo, 1984), in which people rely on stereotypes, heuristics, and peripheral cues respectively.

Despite this growing evidence of the importance of efficiency in cognitive processes, there are still domains in which the message of the "bounded rationality" seems to be unheard. In these domains the picture of the rational human being is unbroken and people are expected to behave in a strategic, goal-oriented and norm-oriented manner. Indeed, it could be claimed that social comparison theory (Festinger, 1954) is just another example of a theory with an unrealistic picture of humans as rational animals. I will outline that in this theory the agent is mostly portrayed as a strategic comparison-seeker who tries to serve several motives or goals. In research surrounding this field, efficiency concerns are vastly underrepresented. The aim of my work is the attempt to close this gap and to point out the efficiency of a particular comparison process – the comparison with a routine standard.

Social comparison theory

So far, the research on social comparison has mostly centered around motives triggering comparisons and they way how people satisfy these motives (for an overview see Suls & Wheeler, 2000a; J. V. Wood, 1996). In the original theory, Festinger (1954) focused on the need to gain self-knowledge as the main motive for comparisons between oneself and another person. Accurate self-evaluations are of the greatest importance for effective functioning and "the holding of incorrect opinions

and/or inaccurate appraisals of one's abilities can be punishing or even fatal in many situations (Festinger, 1954, p. 117)". Even though people may prefer to evaluate their abilities and opinions by reference to the physical world (for an opposite view see W. M. Klein, 1997), this is often not practical. Often there are no simple measurements or single criteria to test abilities. Think for instance of something as simple as athletic ability. How would you test it? Would you record the time it takes to run 100 meters, count sit-ups, or see whether you could stretch your hands down to your feet? Moreover, how would you interpret the results in these tests without any reference to a social standard? Only if you knew that the world record in the 100-meter sprint is 9.78 seconds (held by Tim Montgommery since 2002) could you draw the conclusion that 10.8 seconds, for instance, is a pretty good time. This example illustrates that objective criteria receive their evaluative meaning by being embedded in social reality and remain meaningless if they are taken in isolation (W. M. Klein, 1997).

Thus, social comparison is a basic tool with which people are able to get to know themselves (Festinger, 1954). It enables people to estimate their social standing, to judge their ability to achieve success in several domains, and to obtain a defined sense of themselves. In other words, social comparison helps to reduce uncertainty about the self (Jones & Gerard, 1967). Festinger (1954) concludes that there is a "drive for self evaluation and the necessity for such evaluation being based on comparison with other persons (p.138)". However, social comparison has a much wider scope than Festinger, who emphasized accurate self-evaluation as the main purpose of social comparison, suggests. An accurate knowledge of the self is not the only reason why people compare themselves with others; social comparison also serves other motives such as self-enhancement (Gruder, 1977; Hackmiller, 1966; Thornton, Arrowood, 1966; Wills, 1981) and self-improvement (R. L. Collins, 1996;

Marsh & Parker, 1984; Taylor & Lobel, 1989; Wheeler, 1966) (for an overview see e.g., J. V. Wood & Taylor, 1991; for further motives see Helgeson & Mickelson, 1995).

Motives for social comparison besides an accurate self-evaluation

People who engage in self-enhancement are attempting to achieve a positive self-evaluation (Gruder, 1977; Pyszczynski, Greenberg, & LaPrelle, 1985). Because the evaluation of the self is relative in nature, it is influenced by the standards with which it is compared (Herr, 1986; Mussweiler, 2003a). People tend to hold unrealistically positive views of themselves and strive to confirm and maintain such views with the help of biased information processing (Pyszczynski et al., 1985). Social comparisons with particular (e.g., downward) standards could be an ideal ground with which to bolster one's glossed-over self-concept (Gibbons, Lane, Gerrard, et al., 2002; Wills, 1981). If, for example, you judge your athletic ability as compared to that of the Pope, you are likely to perceive yourself as more athletic (and feel better about yourself) than if the standard is a superb athlete like Michael Jordan (Mussweiler, Rüter, & Epstude, in press). Thus, people are able to alter their self-evaluation by selecting particular standards and thereby enhancing their view of the self (J. V. Wood & Taylor, 1991). There is a large amount of empirical evidence to suggest that people engage in social comparison in an attempt to repair their threatened self-view whenever they have received negative feedback (Hackmiller, 1966; Sarnoff & Zimbardo, 1961), face a threatening situation (Darley & Aronson, 1966; Schachter, 1959), or are confronted with a severe life event (Taylor, Falke, Shoptaw, & Lichtman, 1986; J. V. Wood, Taylor, Lichtman, 1985). Thus, self-enhancement is a second major motive besides self-evaluation in social comparison.

Another prominent motive initiating social comparison is self-improvement (R. L. Collins, 1996). Festinger (1954) speaks of a “unidirectional drive upward” in the evaluation of abilities, indicating the basic drive of human beings to improve themselves. People may seek accurate self-knowledge, but in doing so they hope to discover that they are at least a little better than others. If this hope is disappointed, people could also use social comparison to improve their ability. They observe and compare themselves with superior or better-off people in order to learn (Berger, 1977) or to be inspired (Brickman & Bulman, 1977; Taylor, Aspinwall, Giuliano, Dakof et al., 1993). Although comparison with superior standards always contains a potential threat for the self-view (Tesser, 1991; Tesser, Millar, & Moore, 1988), people may nevertheless seek such comparisons (Taylor & Lobel, 1989) as they could lead to an objectively better performance (Blanton, Buunk, Gibbons, & Kuyper, 1999; Huguet, Dumas, Monteil, & Genestoux, 2001; Marsh & Parker, 1984). Thus, self-improvement is a third motive served by social comparison.

In sum, social comparison is mostly understood as a process for fulfilling fundamental needs like self-evaluation, self-enhancement, and self-improvement (Kruglanski & Mayeless, 1990; Suls, Martin, & Wheeler, 2002; J. V. Wood & Taylor, 1991). Focusing on these motives, the question raised how people achieve this. The answer seems to be a strategic standard selection. Different standards are needed for engaging in self-enhancement than for self-evaluation or self-improvement (J. V. Wood & Taylor, 1991). Only by strategically selecting the comparison standards can comparers ensure that the comparison will lead to the desired outcome. As we will see, the standard selection processes described in this research indeed present optimal standards regarding the comparison motives, however, the efficiency of these processes and thus their practicability remains undiscussed.

Strategic standard selection processes

How do people decide whom they are to compare themselves to? How do the different motives influence the criteria by which they make the choice between several possible standards? In Festinger's original (1954) publication he proposed that in order to obtain valuable and diagnostic information for an accurate self-evaluation, judges have to compare with others who are similar to themselves. Whereas Festinger focused on similarity on the comparison dimension itself, others (Goethals & Darley, 1977) claimed that standards first and foremost have to be similar on related attributes (for a discussion see D. T. Miller & Prentice, 1996). Similar standards are assumed to be preferred because otherwise the comparison may not have clear implications for self-evaluation. If, for instance, you compete with your obese cousin on a 100-meter run, even if you win you may still not feel justified to call yourself athletic. Weight and nutrition conditions are important related attributes for athletic abilities and therefore dissimilarity on these attributes provides a plausible alternative explanation for the relative performance. You would come to a more diagnostic judgment about your own ability by comparing yourself with a more equal opponent. The significance of similarity on both the critical dimension and related attributes for selecting a diagnostic standard is supported by considerable empirical evidence (e.g., Gruder, 1971; Suls, Gastorf, & Lawhon, 1978; Wheeler, 1966; Zanna, Goethals, & Hill, 1975).

If people's motives for comparison are different from achieving an accurate self-evaluation, they may forgo the most similar and thus most diagnostic standard (Gruder, 1977; Taylor & Lobel, 1989; J. V. Wood & Taylor, 1991). However, to satisfy other motives, again particular standards have to be strategically selected. Hackmiller (1966) and Wills (1981) were among the first to demonstrate that people compare

themselves with others who are inferior or less advantaged in an attempt to feel better about themselves or their situation. Likewise, self-improvement involves a deliberate selection of standards from which one can learn (Bandura, 1986). Only if the other person is better, but maybe not unattainable (Lockwood & Kunda, 1997) could one improve oneself by a comparison with this person. Thus people prefer standards who are slightly better than themselves (e.g., Arrowood & Friend, 1969; Wheeler & Koestner, 1984). Taken together, in the attempt to gratify self-enhancement or self-improvement motives, people have to engage in aimed downward or upward comparison.

The costs of a strategic standard selection

Whether one is searching for a standard for a self-evaluation, a self-enhancement, or a self-improvement, only one particular standard seems to be most suitable and should therefore be selected. Before this selection is made, an infinite number of potential standards could be considered (D. T. Miller & Prentice, 1996). If you wish to evaluate your athletic ability, you could compare yourself with your best friend, with the prototypical social psychologist, with Jan Ullrich, with your office colleague, with the average German of your age, or with numerous other persons or norms. Which standard would you use? Even if we assume that people use more than one standard (Rüter & Mussweiler, 2004), they would never be able to make comparisons with all of them. Instead, comparers have to select and base their self-evaluation on a limited number of comparisons with a limited number of standards.

However, trying to select the most suitable standard strategically will bring with it a high price. When examining strategic selection processes in social comparison, the complexity and effort of the selection becomes obvious. Take, for example, the

standard selection based on related attributes (Goethals & Darley, 1977). According to this assumption, people select a standard that is not only similar on the comparison dimension itself, but also on attributes known to influence one's standing on the dimension. Thus people first have to decide which attributes are related to the comparison dimension or are otherwise perceived as important for the standard selection (see C. T. Miller, 1982, 1984; Wheeler, Koestner, & Driver, 1982). These attributes may be obvious with regard to some dimensions. Clearly you would consider age, health, and level of fitness when judging your athletic abilities. However, the attributes related to other comparison dimensions may not be so palpable. For instance, what attributes are related to being ambitious? Do they include social status, intelligence, number of siblings, gender, or maybe none of these? There could be many attributes related to any comparison dimension and judges will most likely end up with more than one related attribute (Goethals & Darley, 1977). Indeed, people do not even restrict themselves to attributes closely associated with the comparison dimension (Gruder, 1977; C. T. Miller, 1984) - on the contrary, they sometimes pay attention to attributes clearly unrelated to the critical comparison dimension (J. V. Wood, 1989). C. T. Miller (1984) found a preference for same-sex comparison standards in spite of the information that men and women do not differ concerning the attribute on which participants evaluated themselves. Furthermore, choosing the relevant attributes is only the first step in the assumed selection process. Afterwards one has to judge all possible standards on those attributes to select the most suitable one (Goethals & Darley, 1977; J. V. Wood, 1989; Zanna, Goethals, & Hills, 1975). Obviously, the selection process itself involves numerous comparison processes (J. V. Wood, 1996) and is an arduous, capacity consuming, task.

The same applies if it is not self-evaluation but rather self-enhancement or self-improvement that forms the focus of comparison process. A strategic selection of a suitable upward or downward comparison standard is only possible if one has previously judged the precise standing of potential standards accurately. Again, such a selection involves several precedent comparisons (J. V. Wood, 1996). In addition, the comparison results with an upward or downward standard vary depending on factors other than the relative standing on the comparison dimension (Mussweiler, 2003a; Tesser, 1991; J. V. Wood & Taylor, 1991). These factors include category membership (Blanton, Crocker, & Miller, 2000; Major, Sciacchitano, & Crocker, 1993), closeness to the standard (Tesser, Millar, & Moore, 1988), attainability of the standard's position (Lookwood & Kunda, 1997), or controllability over the comparison dimension (Major, Testa, & Bylsma, 1991). Take, for example, controllability. Most of the time a comparison with a downward standard may be self-enhancing (Wills, 1981). However, if one believes oneself to have little control over the dimension, the confrontation and comparison with an inferior standard may rather be threatening (Major et al., 1991). In this sense, J. V. Wood and colleagues (1985) found a negative effect for breast cancer patients if they compared themselves with patients whose disease is even more progressive. Thus, in the attempt to self-enhance or self-improve, people not only have to consider the relative standing of themselves and the standard on the comparison dimension (which may be complex enough), but they also have to pay attention to further attributes of the standard or the dimension.

Taken together, a strategic standard selection is a rather elaborate and effortful process. The assumption that people engage in these processes in order to satisfy their different motives in social comparison may seem rational, but it ignores the constraints in humans' cognitive capacity.

The need for efficiency

In the strategic standard selection processes described above, the efficiency of the selection or of the comparison with the selected standard is not mentioned as an influencing factor. The comparer is portrayed as capable of selecting the optimal standard depending on the salient comparison motive (J. V. Wood & Taylor, 1991), even though people are limited with regard to time, knowledge, and computational power (Gigerenzer & Todd, 1999; Simon, 1956). This neglect of cognitive constraints stands in marked contrast to a tendency in social cognition research to view the person as a cognitive miser (Taylor, 1981). For the sake of efficiency, people rely, for instance, on heuristics in decision-making (e.g., Tversky & Kahneman, 1973, 1974), apply stereotypes in person perception (e.g., Macrae et al., 1994), and fall back upon habits in their own actions (e.g., Aarts & Dijksterhuis, 2000). In all of these domains, a more elaborate route seems to be more rational. It appears to be wiser to weigh up and average out all the pros and cons before making a decision or taking action. It seems to be more rational to pay attention to every individuating cue provided by a person before making any inferences. However, such visions of rationality often conflict with reality (Gigerenzer & Todd, 1999).

Especially when processes are conducted frequently (and therefore processing time and resources are limited), the need for efficiency is high (Bargh, 1997; E. R. Smith, 1994; Taylor, 1981). Some decisions are quite unique and only have to be made rarely. An example of this would be the question of whether or not you want to get married. For such a decision you may take your time and actually try to make a rational decision by considering all the advantages and disadvantages of marriage (whether this is possible remains debatable; see Gigerenzer & Todd, 1999). How-

ever, generally speaking, comparative self-evaluations and thereby decisions regarding the comparison standard are not such rare events.

Social comparison enables people to satisfy needs that are fundamental for the human being - needs such as feeling good about yourself and knowing who you are (see Baumeister, 1998, for a review). For this reason, people may rather frequently engage in social comparison during their daily life. In all, self-reflective thoughts make up a large portion of people's mental activity and many of these thoughts are likely to be comparative in nature (Festinger, 1954; Mussweiler, 2003b; see also Masters & Keil, 1987). Csikszentmihalyi and Figurski (1982), for example, found that their participants spent about eight per cent of all thoughts in the course of the day on the self. In addition, it needs to be taken into account that comparison is not always actively searched for. People often engage in social comparison because it is forced onto them even against their will (Brickman & Bulman, 1977; Goethals, 1986; J. V. Wood, 1989, 1996). Seeing a very attractive person in a nightclub or watching a former classmate appear on a television talk show will most likely initiate a social comparison process whether this is desired or not. Social comparisons occur so naturally that people are influenced in their self-evaluation even by standards that are clearly irrelevant for an accurate judgment (Gilbert, Giesler & Morris, 1995) or which are not perceived consciously (Mussweiler et al., in press). Social comparisons triggered by external stimuli may therefore increase the rate of comparison processes substantially.

The high frequency of social comparison processes has influenced my thoughts on efficiency in two fundamental regards. First, it stresses the demand for social comparisons to be efficient. This demand also involves the standard selection process. If one had to begin every single comparison with a complex, strategic stan-

dard selection, efficiency would appear to be out of reach. There has to be an alternative to a standard selection guided by goals and motives – a kind of short-cut or alternative process through which people select standards in a quick and easy manner. Second, the frequency of social comparison also provides the premise for efficiency to occur. Research on practice effects shows that people become increasingly efficient the more often they engage in a particular activity (Newell & Rosenbloom, 1981; E. R. Smith, 1994). In social comparison, an increase in efficiency may thus occur either in the decision process during the standard selection and/or in the comparison process with a given or selected standard.

Routines in social comparison

Since people engage frequently in social comparison processes, they also frequently have to decide with whom they want to compare. The need for efficiency may urge people to overcome the strategically useful but effortful selection of the most suitable standard and to take a short cut in the decision process. In other words, people may establish a routine in selecting social comparison standards.

Routines in decision-making

Implementing routines is a common method to substantially simplify complex decision processes (e.g., Aarts & Dijksterhuis, 2000; Betsch, Haberstroh, & Höhle, 2002; Betsch, Haberstroh, Glöckner, Haar, & Fiedler, 2001; Verplanken, Aarts, van Knippenberg, & van Knippenberg, 1994) [1]. Betsch, Haberstroh and Höhle (2002) define a routine as an “option that comes to mind as a solution when the decision

maker recognizes a particular decision problem". In other words, a routine is based on a strong association between a decision problem and a particular solution to this problem. Rather than engaging in a rational decision process and weighing up all information relevant for the decision in question, one simply takes the solution at hand. For example, instead of making a deliberate decision every single morning as to whether you want to walk to work, ride your bike, or drive your car depending on the weather, the weight of your bag or the distance, you may simply decide to go by bike as that is what you usually do (Aarts & Dijksterhuis, 2000). And in making this decision, the routine of riding your bike to work becomes even stronger with repetition and reinforcement (Aarts, Verplanken, & van Knippenberg, 1998; Verplanken & Aarts, 1999). Frequently pursuing the same choice in a decision process strengthens the association between the problem and the solution (Aarts & Dijksterhuis, 2000; Bargh, 1990). With every additional day on which you decide to bike to work, the likelihood of going by bike the following day increases. In the end, the biking option comes to mind without you even thinking about the specific conditions on a particular day (Aarts et al., 1998; Verplanken & Aarts, 1999) and thus a short cut in the decision process is established. Instead of repeatedly solving the decision problem anew, one simply falls back on the solution most closely associated with the problem (Aarts & Dijksterhuis, 2000).

[1] To outline the concepts of routine I partly refer to research on habits. Habits can be considered a special case of routinized behavior (Betsch et al., 2002), but the overall mechanisms are the same (for a more detailed discussion see Betsch, Fiedler, & Brinkmann, 1998). I choose to use the term "routine", since habit is associated with overt behavior more strongly than with cognitive activities.

Routines in standard selection

In much the same way, one may also routinely choose comparison standards in self-evaluations. Likewise, in social comparison, the selection of the comparison standard is a complex decision process and a short cut is needed. In the strategic standard selection process (e.g., Festinger, 1954; Goethals & Darley, 1977), the comparer, as any decision maker, is expected to choose the best alternative out of a set of applicable options. However, if one were exhaustively consider all alternatives plus their possible consequences before making a decision, one would soon be overwhelmed (Selten, 2001).

Transferring the concepts of routines to social comparison may provide an alternative to a strategic standard selection process. Just as a particular mode of transport becomes associated with a particular destination (Aarts & Dijksterhuis, 2000), a particular standard may become associated with the task to evaluate the self. With such a routine people could then forego the arduous and often impossible task of finding the most suitable standard by simply comparing themselves repeatedly with the same persons. As in decision processes about behavioral choices (Aarts & Dijksterhuis, 2000), the creation of such a routine would thereby depend on the frequency of prior use of the routine standard. The more often a particular standard has been used, the stronger it should be associated with the self-evaluation task and the more likely one engages in further comparisons with this standard. The use of a routine standard would therefore enable people to skip a standard selection process. Instead of calculating the suitability of a standard depending on the standard's similarity to the self on the comparison dimension itself (Festinger, 1954) or on related attributes (Goethals & Darley, 1977), people would compare themselves with the same standards regardless of the demands of the actual comparison task. A

comparison with a routine standard would therefore be much less effortful and more efficient than a comparison with a strategically selected standard.

Skipping an elaborate standard selection process is just one efficiency advantage of routine standards - the advantages may go even further. Since a routine standard is created by repeatedly selecting the same standard, the comparison with this particular standard is also highly practiced. Thus, the comparison process itself may profit from the use of routine standards and become more efficient. The mechanism by which practice may affect the efficiency of comparison in general and comparison with routine standards in particular will be described next.

Practice in social comparison

Practice effects are expected because people frequently engage in social comparison processes. However, the efficiency increase caused by practice does not only depend on the number of repetitions (E. R. Smith, 1989, 1994). It may, for example, make a difference whether people frequently compare themselves with the same standards (i.e., a routine standard) or with varying standards. To be able to forecast practice effects in social comparison more precisely, it is first necessary to gain an understanding of the occurrence of practice effects.

Practice effects in cognitive processes

One of the basic assumptions in cognitive research on practice effects is the distinction between declarative and procedural knowledge (Gupta & Cohen, 2002; E. R. Smith, 1994; Sun, Merrill, & Peterson, 2001; Winograd, 1975). Whereas declarative knowledge refers to content and facts, including constructs like schemas, prototypes, scripts, and stereotypes, procedural knowledge describes intellectual or motor

skills. Clearly, these two types of knowledge are closely intertwined with each other. Whenever one uses declarative knowledge there is a process and whenever one conducts a particular process, content is involved. Nonetheless, the distinction between procedural and declarative knowledge helps to describe cognitive processes in more detail and to understand the mechanisms through which the efficiency of processes increases with practice.

Based on this distinction it is possible to differentiate between general and specific practice effects (E. R. Smith, 1989, 1994; E. R. Smith, Branscombe, & Bormann, 1988; see also Gupta & Cohen, 2002; B. L. Schwarz & Hashtroudi, 1991). If a practice effect occurs with repeated processing of the same content (i.e., declarative knowledge), it is called a specific practice effect. However, if an increase in efficiency is observed, even though the process is repeatedly applied to different contents, it is called a general practice effect. Specific practice effects would explain why participants are able to read an inverted text faster if they have read it once before even though they do not recognize it as old (Kolers, 1976). A general practice effect, on the other hand, may explain why people speed up in typing five-digit strings, even though all items were unique (Poldrack, Selco, Field, & Cohen, 1999).

One prominent model describing practice effects in cognitive processes is Logan's instance theory (1988). This theory is especially suited to explaining specific practice effects because Logan proposed a memory-based automatism specifically for practiced stimuli. He assumes that people who encounter a stimulus, which they have previously processed, have two alternatives for coming up with a response: either they re-process the stimulus, or they retrieve the response from memory. The likelihood of people engaging in the latter alternative, which is much more efficient than the former, increases with repetition. Thus, Logan assumes that repetition en-

ables people to switch to a basically different mechanism. It is therefore not the memory process itself that becomes faster, but rather it is skipped and substituted by memory retrieval. However, if the same process is conducted with a new stimulus, retrieval from memory would be impossible and thus no speed-up would be expected. Because of this limitation, instance theory cannot be used to explain general practice effects. In order to understand how such general practice effects arise with the repeated execution of a process, one has to turn instead to another theory on procedural knowledge.

This theory is the ACT* model by Anderson (1987). Anderson describes processes as production systems like if-then or condition-action pairs. Whenever the active information (declarative knowledge) matches the defined condition, the action (the process) will be performed. With repetition, several changes occur. First, with each execution a production is strengthened. This means that the production could be executed faster even when new information is processed. Production strengthening would therefore account for a general practice effect. Second, Anderson also assumed a production compilation process. When two productions serving the same processing goal are executed in sequence, a new, combined production is created. This new production could then process information more quickly than the original two component productions. In addition, processing the same content (or declarative knowledge) repeatedly with the same production leads to an inclusion of this content into the production and the production becomes more specific. Again, specific productions are executed faster than general productions. The emergence of these stimulus-specific productions could therefore explain specific practice effects. Taken together, the ACT* Model (Aderson, 1987) could thus provide a theoretical base from

which to understand specific as well as general practice effects in cognitive processes.

Both models described so far were developed and tested primarily with non-social materials and tasks such as lexical decision tasks and alphabet arithmetics (Logan, 1988) or programming skills (Anderson, 1987). However, these models could also be applied to social stimuli and tasks.

Practice effects in social judgments

In their research on practice effects in social judgments, E. R. Smith and colleagues (E. R. Smith, 1989; E. R. Smith & Lerner, 1986; E. R. Smith et al., 1988) observed general as well as specific practice effects. As a typical task in this research, participants made repeated behavior trait implication judgments (E. R. Smith, 1989; E. R. Smith et al. 1988). In such a task a behavior word is presented on the computer screen and participants indicate by pressing a key whether this behavior does or does not imply a particular target trait. Participants judged, for example, whether or not behaviors like giving advice, asking for something, being charming, or whipping somebody indicate that a person is friendly (E. R. Smith, 1989). With repeated judgments, the behavior could be either new or practiced and the target trait could be changed or not. Thus, after judging whether giving advice implies friendliness, one either makes the same judgment again, or judges whether the behavior of asking for something likewise implies friendliness, or whether giving advice also implies intelligence, or, finally, whether asking for something implies intelligence. If an acceleration in making judgments with the same behavior is observed, this is interpreted as a specific practice effect, since in these trials, participants had to process the same content (i.e., the same behavior) to make an inference from the behavior to the im-

plied trait. Conversely, an acceleration in trials with different behavior is referred to as general practice effect, since in these trials, the same process (i.e., making a behavior-trait implication judgment) has to be applied to a new content. Whether or not the target trait has changed during the repetition is not important for this basic differentiation, since the content of the process is defined by the behavior. Nevertheless, keeping both the target trait and the behavior constant would make the practice even more specific, while changing both trait and behavior would reduce the practice to the most general level.

In his research, E. R. Smith found evidence for both kinds of practice effects. He concluded that both general and specific practice effects were long-lasting and facilitated the reaction time for behavior-trait inferences even after a lag of 24 hours (E. R. Smith, 1989). However, the specific practice effect (same behavior – same trait) was much larger (approx. 100 ms per trial) than the general practice effect (different behavior – same trait; approx. 1 ms per trial). The repeated execution of an identical task profits substantially from practice, whereas frequently executing the same process with different content speeds up the judgment process to a much lesser extent. E. R. Smith (1989) also observed a general practice effect if, in addition to the behavior, the target also changed (approx. 0.5 ms per trial), thus reducing the practice to the most general level. In these trials the pure process of making behavior trait implications was practiced. Even though an increase of efficiency was observable, this general practice effect was much smaller than the general practice effect with a constant target trait.

E. R. Smith (1989) concluded that the ACT* model provided the best fit to the data he observed. The general practice effects could be explained by the strengthening of production. Even if different content, here behavior, is processed, the strength-

ened productions lead to faster responses. On the other hand, if the behavior is kept constant over repeated judgments, the creation of stimulus-specific production could take place. Obviously, if both the behavior and the target are the same in the repeated judgment, the facilitation is expected to be at its greatest level, because all mechanisms involved in practice are able contribute to this effect. In this particular case, Logan's instance theory (1988) would also provide a sufficient explanation, but this theory would fail to explain a facilitation when either the behavior or the trait has changed.

How could Smith's conclusion be used to explain practice in social comparison? What are the general and the specific practice effects if one repeatedly compares oneself with a standard?

Practice effects in social comparison processes

With social comparison the issue is somewhat more complex than with behavior trait inferences. With behavior trait inferences, two elements are involved, one of which, the behavior, constitutes the stimulus (and the content of the process) and the other, the trait, is the target. A social comparison, on the other hand, is comprised of three elements: the self, the standard and the comparison dimension (J. V. Wood, 1996). To make a comparative judgment, comparison relevant self-knowledge and standard-knowledge have to be activated and judged in relation to one another (Dunning & Hayes, 1996; Mussweiler, 2001b, 2003b; J. V. Wood, 1996). Thus, in social comparison the activated knowledge is the content and the comparison is the process.

Based on this definition, it is possible to distinguish between general and specific practice effects in social comparison. In repeated social comparison a general,

content-free practice effect would imply that no comparison relevant self-knowledge or standard-knowledge was used in prior trials. This is the case whenever the comparison dimensions vary between trials. Note that it is not necessary to change all elements (the comparison dimension, the standard, and the self as the target) in each trial. As long as different standard-knowledge and self-knowledge is needed to make the comparison, the repetition would be content-free. This consideration concurs with E. R. Smith (1989), who speaks of general practice if the stimulus (i.e., behavior) changes, whether the target (i.e., trait) differs or remains the same in the repetition. However, Smith's research also indicates that the increase in efficiency is smaller if the trait is changed than if it is held constant. Thus, the two kinds of general practice alter the efficiency of the process to differing extents. This fact may be significant for my research on the efficiency advantages of comparisons with routine standards. The general practice effect when the self is repeatedly compared with the same standard on different dimensions may be larger than the general practice effects due to frequent comparisons with different standards.

In order to provoke specific practice effects in social comparison, content, which means comparison relevant knowledge, has to be used repeatedly during the repeated trials. This could either be comparison relevant self-knowledge, comparison relevant standard-knowledge, or both. In all cases the dimension on which the comparison should be conducted has to be held constant. If one repeatedly judges oneself on a particular dimension in relation to different standards, the same self-knowledge could always be used during the comparisons. The content, or at least part of it, is thus processed again and again. Likewise, one would also speak of a specific practice if the same standard were used repeatedly in repeated social comparisons on a constant dimension. In this case, the same standard-knowledge would

be comparison relevant in all comparisons. Comparing the same target (e.g., the self) repeatedly with the same standard on a particular dimension would constitute the most specific practice. All three elements of the comparison would be repeated there and the comparison process would be applied to the identical content.

In sum, it seems likely that social comparison, as with other social judgments, becomes more efficient with practice. Both general as well as specific practice effects are possible in this regard. These effects could occur whether one frequently compares with different standards or whether one compares oneself repeatedly with the same standard, i.e. a routine standard. However, there are reasons to assume that comparisons with routine standards are especially efficient.

Routine standards are chosen out of a routine and are not selected specifically for a comparison on a particular dimension. Self-comparisons with routine standards are therefore likely to occur on a variety of dimensions. Thus, the supposed efficiency advantage of comparison with routine standards is expected to be at least in part a general practice effect. However, as outlined above, this particular general practice may increase the efficiency of the process more than the general practice effect involved in comparison with changing standards (see E. R. Smith, 1989). Even if one has to process new content in the attempt to compare oneself with one's routine standard on a new dimension, the comparison process itself is practiced. Because of the frequent use of the routine standard in previous comparisons, one is used to relating knowledge about this particular standard to self-knowledge. Conversely, in a comparison with a new standard, only the comparison process in its purest form is repeated and thus the efficiency will not profit to the same extent from this kind of general practice.

In addition, one would also assume that specific practice takes place in comparisons with routine standards. The repeated use of the same person as standard would increase the accessibility of standard-knowledge (Higgins, 1996), which is the content in the comparison process. Even though different standard-knowledge is needed for comparisons on different dimensions, the content could be partly overlapping. Evaluating your athletic abilities might lead to the processing of knowledge that your routine standard runs laps every day. However, you may use the same content to judge your ambition relative to him or her, since this particular behavior is exemplary for both personal attributes. Thus, higher efficiency of comparisons with routine standards in contrast to other standards may also partly be due to content-specific practice effects.

In sum, the theories on practice effects in cognitive processes (Anderson, 1987; Logan, 1988; E. R. Smith, 1989; E. R. Smith & Lerner, 1986) seem to justify the assumption that the efficiency of social comparison processes increase with the use of routine standards. In consequence, comparing with a routine standard would not only liberate people from an arduous standard selection process, it would also facilitate the comparison process itself. If efficiency concerns do indeed play a role in social comparison, then the use of routine standards seems to be very likely. Routine standards would not be strategically selected to satisfy specific needs in social comparison, but they may enable people to make efficient self-evaluations. In an attempt to find first evidence for the influence and importance of efficiency in comparison processes, Thomas Mussweiler and I conducted a series of experiments to show the existence of routine standards in social comparison.

Prior research

In our first line of research (Mussweiler & Rüter, 2003), our primary aim was to demonstrate that people compare themselves with routine standards in self-evaluation. We used two different research strategies in order to achieve this, which differed with regard to the nature of the potential routine standard. On the one hand, we examined whether participants compared themselves with those natural standards that we thought likely to be routine standards for our particular participant population. On the other hand, we created routine standards experimentally by engaging participants in repeated comparisons with previously unknown fictitious persons. This second research strategy is based on the assumption that any standard that is repeatedly used for comparison may become a routine standard. If this is the case, it means that routine standards can be created experimentally if one engages in a series of comparisons with the same standard.

Natural routine standards could be a variety of persons, depending on the individual who is engaging in self-evaluation. However, because a routine standard is defined by its frequent use in the past, some people are more likely to become a routine standard than others. There are more opportunities to compare oneself with people who are close by than with those who are psychologically or spatially distant. Typical routine standards would therefore be partners, siblings, colleagues, or friends. Since our participants were mostly university students, we proposed that a student's best friend would be very likely to be a routine standard. The first couple of years at university constitute an important life transition (Compas, Wagner, Slavin, & Vannatta, 1986) and are a time in which peers with similar experiences become particularly important for self-evaluation (Hays & Oxley, 1986; Hirsch, 1980). Students' best friends are thus likely to be used often for social comparisons and may conse-

quently become important routine standards. Thus, in our first studies (Mussweiler & Rüter, 2003, Study 1-3) we set out to demonstrate that participants compare themselves with their best friend during self-evaluation.

To do so, we examined whether college students spontaneously activate information about their best friends during self-evaluation. This indicator for standard use is based on the recency effect in concept accessibility (see e.g., Higgins, 1996). As is true for other concepts (Higgins, Rholes & Jones, 1977; Srull & Wyer, 1980), the accessibility of a standard increases if it has been used recently. Therefore, after the participants have compared themselves with the routine standard during a self-evaluation, this particular standard should be more accessible than a standard that has not been used. Since the use of the routine standard should be restricted to self-evaluation, we did not expect such a difference in a second condition, in which we asked the participants to evaluate another person. Instead of comparing with the routine standard, people engaging in other-evaluation typically use the self as a comparison standard (Dunning & Hayes, 1996). Therefore, contrary to the self-evaluation condition, in the other-evaluation condition the best friend should not be rendered more accessible than the control standard. In these studies we used a good school friend, with whom participants had lost contact (exfriend), as control standard.

To assess the accessibility of the routine standard and the control standard subsequent to a self-evaluation or an other-evaluation, in the first study (Mussweiler & Rüter, 2003) we conducted a lexical decision task (Neely, 1977). In this task, the participants decided whether or not a letter string constituted a name. The response latencies for these decisions depend on the accessibility of the persons identified with the names. The names of highly accessible persons can be classified faster than the names of less accessible persons. The results in Study 1 confirmed our hypothe-

sis that people activate their best friends during self-evaluations. As expected, we found that participants reacted faster to the name of their best friend than to the name of the exfriend, if they had previously evaluated themselves with regard to several personal attributes, but not if they had previously evaluated somebody else.

In the second study (Mussweiler & Rüter, 2003), we set out to demonstrate that it is not only the routine standard's name that is rendered accessible but also the knowledge about his or her standing on the critical dimension. For this purpose, we used an evaluation task instead of a lexical decision task subsequent to the self-evaluation and the other-evaluation respectively. If people compare with the routine standards to evaluate themselves, the activated standard-knowledge should facilitate the subsequent evaluation of the routine standard on the comparison dimension. The results confirmed the hypothesis. The participants did indeed evaluate their best friend on the critical dimension faster than the exfriend subsequent to evaluating themselves but not subsequent to evaluating another person.

In Study 3 (Mussweiler & Rüter, 2003) we then tested whether the routine standard is indeed preferred to a strategically more suitable standard. A strategic standard selection would predict that people evaluate themselves by comparing with the most similar standard (Festinger, 1954; Goethals & Darley, 1977). Only standards similar to the comparer on the comparison dimension itself (Festinger, 1954) or on related attributes (Goethals & Darley, 1977) provide a high diagnosticity. To assure the undiagnosticity of the routine standard, we therefore asked participants to evaluate themselves on a dimension on which they perceive their best friend as very dissimilar to themselves. Conversely, the control standard was a person identified by the participants as very similar to themselves on that particular dimension and on related attributes. Thus, in this study we compared the routine standard to a strategi-

cally very suitable standard. However, the response latencies in the evaluation task subsequent to the self-evaluation and the other-evaluation again indicated the use of the routine standard and not the control standard during the self-evaluation. Thus, people seem to use the routine standard even though this person is not an adequate standard from a strategic point of view. One could therefore conclude that participants skip an elaborate selection process and instead fall back on a standard with which they are used to comparing themselves.

In contrast to Studies 1-3, in our final study (Mussweiler & Rüter, 2003, Study 4) we examined the use of experimentally created routine standards in social comparison. If our reasoning about routine standards is correct, then judges should tend to select those standards for comparison with whom they had frequently compared themselves on previous occasions. In this study, we therefore introduced two fictitious persons, with the participants comparing themselves with one of them (the routine standard), but not with the other (the control standard). After the routine standard had been established in this way, the participants engaged in a self-evaluation. To test which of the two standards people use to evaluate themselves, we observed the judgmental consequences of comparison (i.e., assimilation). Since the two standards differ with regard to their relative standing (high versus low) on the dimension on which the participants had to evaluate themselves, participants' self-evaluation indicated whether they had compared and assimilated to the high or to the low standard. If participants preferred to evaluate themselves with the routine standard, then their self-evaluation should turn out to be higher in the case in which the routine standard was described as the high standard. Conversely, if the routine standard was described as the low standard, assimilating participants should judge themselves as low on the dimension. This is precisely what we found. Participants' self-evaluation thus

indicated once again that people compare themselves with the routine standard during self-evaluations.

Based on the results in these four studies, Mussweiler and I (2003) concluded that people indeed use routine standards such as their best friend as comparison standards in self-evaluations. This evidence challenges the claim that people engage in strategic standard selection processes in social comparison. It seems to be rather unlikely that the participants in our studies had strategically picked their best friends to evaluate themselves. A strategic selection would presuppose that the best friend was always perceived as the most suitable standard for evaluations, which is rather implausible due to the variety of comparison dimensions in the different studies. Furthermore, in Study 3 we explicitly chose a comparison dimension on which the best friend has a low diagnostic value and the participant still used him or her as comparison standard. Thus, our conclusion that people rely on routine standards in self-evaluations indirectly implies that they skip a strategic standard selection.

On the whole, our data suggest that the use of routine standards in social comparison constitutes a rather general and stable effect. Evidence for routine standard use was obtained in the four studies with different types of routine standards and for self-evaluations on a multitude of different dimensions, and was apparent in measures that are quite different in nature. Nevertheless, there remains some ambiguity. Particularly if one critically re-examines the manipulations in Studies 1 and 2, one could question the interpretation of our data. We concluded in these studies that participants' best friends were more accessible than the exfriend after the self-evaluation because participants had engaged in a comparison with the routine standard. However, in retrospect, we have to acknowledge at least one further plausible explanation for these results.

Limitations of prior research

This alternative explanation is based on the assumption that, firstly, people (e.g., the self, the best friend, and the exfriend) are represented as knots in an associative network and that, secondly, the activation of one knot in the network spreads to further associated knots (e.g., Anderson, 1983; Anderson & Pirolli, 1984; A. M. Collins & Loftus, 1975). The amount of activation reaching a second knot depends on (a) the amount of activation of the initial knot, (b) the number of knots associated with the initial knot, and (c) the strength of the association between the initial and the second knot. The strength of an association thereby increases with repeated simultaneous activation of two knots (A. M. Collins & Loftus, 1975). The two standards used in Studies 1 and 2 (Mussweiler & Rüter, 2003) may therefore differ concerning the association strength to the target person, i.e. the self. One of the standards, the routine standard, was the best friend. A best friend is a person to whom people feel especially close, with whom they interact frequently, and with whom they share time, activities, and thoughts. The other standard, the control standard, was an exfriend. Exfriends do not play as important a role in people's present lives as the best friend. Even if people know their exfriends well based on past experiences, by definition they have not interacted with them recently. This differing frequency of interactions should cause a difference in the association strength between the self and these two friends: relative to the association between the self and an exfriend, the association between the self and the best friend should be stronger.

Based on these thoughts, it is possible to re-interpret our data (Mussweiler & Rüter, 2003, Studies 1 & 2). We concluded that the best friend is more activated than the exfriend subsequent to a self-evaluation relative to an other-evaluation because participants had compared themselves with the best friend during the self-evaluation.

However, an alternative explanation would be spreading activation. Since the best friend is more closely associated to the self than the exfriend, activating the self in the self-evaluation condition may lead to a higher activation and accessibility of the best friend relative to the exfriend. On the other hand, in the other-evaluation condition the self is not activated, or at least is activated to a much lesser extent, and therefore no difference in the activation of the associated standards is expected. Thus, one can explain our results without assuming any comparison. It is possible that the accessibility of the routine standard subsequent to the self-evaluation was increased because participants had compared themselves with this standard, but it is also possible that spreading activation caused this effect. In the present research I will provide new evidence that supports our initial interpretation that the best friend was used as comparison standard in the self-evaluation.

The present research

In my research I wish to demonstrate that efficiency concerns play an important role in social comparison. Since people may not be able to engage in a strategic standard selection whenever they engage in social comparison processes, there has to be a more efficient alternative. Using routine standards would be such an alternative. The efficiency advantage of routine standards may thereby be founded not only in the abandonment of a strategic but arduous standard selection process, but also in a higher efficiency of the comparison process itself. I therefore set out in the present research to show how the use of routine standards facilitates the social comparison processes. This will be done in three steps. First, I will replicate and improve our former research indicating that people really do use their best friends as routine standards to evaluate themselves. Second, I will demonstrate that it is more efficient to

compare with a routine standard than with another standard. Finally, I will look at the underlying mechanism of the efficiency advantage of routine standards.

In Study 1, I will show that a participant's best friend is more accessible than another friend after comparative self-evaluation and that this higher accessibility is not due to spreading activation. Thus, the conclusion drawn in our prior research (Mussweiler & Rüter, 2003), that the best friend becomes accessible because he or she was used as a routine standard during the self-evaluation, would be supported. After confirming this, I will then go on to look at the efficiency of using a routine standard.

In Studies 2 and 3 I will demonstrate the phenomenon that comparisons between the self and a routine standard are faster and more efficient than comparisons with other standards. In Study 2 I will again contrast the best friend as routine standard with an exfriend as control standard. However, in Study 3 I will establish a routine standard within the experiment. In doing this it is possible to reduce the differences between the routine standard and the control standard with regard to the fact that previously the one was used more frequently than the other. Since high frequency of comparison is the core aspect of a routine standard, such a manipulation should be sufficient to elicit the efficiency advantage of routine standards.

With Study 4, I will then start to look at the mechanism causing the efficiency of comparisons with routine standards. In other words, I will study practice effects in social comparison and in doing so will differentiate between general and specific practice effects. Whereas a specific practice effect implies the repeated processing of the same content (i.e., self-knowledge and standard-knowledge), general practice effects occur content-free. To explain the efficiency advantage of routine standards, a

general, content-free practice effect would be especially useful and I will focus on this effect in Study 5.

In sum, the present research sets out to demonstrate that people use routine standards in self-evaluation and that comparisons with routine standards are especially efficient because of particular practice effects in social comparison.

EMPIRICAL PART

Study 1

In this first study, my aim is to conceptually replicate and improve the previous studies from Mussweiler and myself (2003) indicating that people use their best friend as routine standard during self-evaluations. To achieve this I therefore have to disprove the alternative explanation that spreading activation caused the increased accessibility of the best friend in the self-evaluation condition relative to the other-evaluation condition. The spreading activation hypothesis could explain our prior results since the routine standard is more strongly associated with the self than the control standards and at the same time the self is more activated in the self-evaluation condition than in the other-evaluation condition. These specific circumstances could cause a higher activation of the routine standard subsequent to a self-evaluation than subsequent to an other-evaluation (see Anderson, 1983; A. M. Collins & Loftus, 1975). To be able to reject the spreading-activation hypothesis, in the present study two self-evaluation conditions in which the self is activated to a similar extent will be compared. However, in one condition the task implies comparison processes between the self and a standard, whereas in the other condition comparisons are less likely to occur. Thus, if the routine standard relative to the control standard shows a higher accessibility in the comparison but not in the control condition, my original conclusion would be supported. The data would provide strong evidence that people do indeed compare themselves with their routine standards during self-evaluations.

To meet the demands described above, the present study is designed to compare the accessibility of the best friend relative to the control standard (exfriend) sub-

sequent to a comparative self-evaluation and an absolute self-evaluation. Absolute self-evaluations are evaluations on absolute scales such as height in centimeters, speed in seconds per meter, or frequency of habits (e.g., going to the movies) in number of incidences per period of time. Comparative self-evaluations, on the other hand, are made on relative rating scales anchored such as small – tall, slow – fast, or rarely – often. The peculiarity of evaluations on relative rating scales is that they have to be adjusted to social reality by comparison processes (Biernat & Manis, 1994; Biernat, Manis & Nelson 1991; Mussweiler & Strack, 2000a). Since the adjectives anchoring the scale have no absolute meaning, they have to be defined in relation to a standard (Huttenlocher & Higgins, 1971). This necessity has been widely studied in research on "shifting standards" (e.g., Biernat & Fuegen, 2001; Biernat & Manis, 1994; Biernat, Manis & Kobrynowicz, 1997; Biernat et al., 1991). In these studies Biernat and her colleagues point out that the social category of the target, which is evaluated on relative rating scales, shifts the standards with which the target is compared. Therefore, even though a man and woman are of the same height, the woman is evaluated as tall on a scale from small to tall, since she was compared with the average woman, while the man is judged as small (relative to the average man) (Biernat et al., 1991). This bias thus indicates that evaluating a target on relative rating scales makes us engage in comparisons (here with the average social category member). Transferring this to self-evaluations, I expect participants to compare themselves with their routine standards when evaluating themselves. In this sense, in the present study I labeled the condition in which the participants have to evaluate themselves on relative rating scales as the comparative self-evaluation condition.

Conversely, participants engaging in absolute self-evaluation can make their judgments without a reference to a social standard. Absolute scales are externally

anchored and consist of judgment units that maintain a constant meaning across contexts. If you want to know your height you can simply take a tape measure and measure yourself and if you want to know how often you go the movies per month, you could count the amount of times you have been in the past – no comparison with a standard is necessary. For this reason, judgments on absolute scales are also less influenced by the standards in the shifting standard paradigm and approximate reality more closely (Biernat et al., 1991).

Whether participants engage in absolute or in comparative self-evaluation thus influences the extent of their social comparison activities. At the same time, I cannot entirely rule out any social comparison processes when participants give their answers on absolute scales (see e.g., Biernat et al., 1997; Mussweiler & Strack, 2000a). However, the likelihood and the extent of such processes should be significantly reduced for participants in the absolute self-evaluation condition compared to participants who give their answers on relative scales. In contrast, what I kept constant between both conditions was the activation of the self. The self has to be activated regardless of whether participants engage in absolute or in comparative self-evaluations. Therefore, if the activation of the routine standard is due to spreading activation from the self to the best friend, the activation should be the same whether participants evaluate themselves on relative or on absolute scales. Conversely, if I assess higher accessibility of the best friends exclusively subsequent to comparative self-evaluations, this would indicate that the accessibility is due to comparison processes. Such a data pattern would thus strengthen the hypothesis that the best friend was indeed used as a routine standard during self-evaluation. To assess the accessibility of possible standards, as in our previous research (Mussweiler & Rüter, 2003, Study 1), I implemented a lexical decision task with names and no-names as stimuli.

If the routine standard is more accessible than the control standard, participants should be able to categorize the best friend's name faster the name of the exfriend.

Hypotheses

The dependent variables are the response latencies in the lexical decision task. The reasoning presented above can be translated in the following hypotheses:

H 1: The response latency toward the name of the best friend (i.e., the routine standard) relative to the response latency toward the name of the exfriend (i.e., the control standard) depends on whether participants previously engaged in comparative or absolute self-evaluation.

H 1.1: Subsequent to comparative self-evaluation, the response latency toward the name of the best friend is shorter than the response latency toward the name of the exfriend.

H 1.2: Subsequent to an absolute self-evaluation, the response latency toward the name of the best friend does not differ to the response latency toward the name of the exfriend.

Design

Study 1 is based on a 2 (self-evaluation: comparative vs. absolute) X 2 (lexical decision: best friend vs. exfriend) mixed-factorial design. The answer format of the self-evaluation was varied between participants. Half of the participants evaluated themselves on relative rating scales, whereas the other half answered in an absolute format. Subsequently, all participants classified the name of their best friend and the name of their exfriend in the lexical decision task. Hence, this variable was varied within participants.

Method

Participants. Sixty-three students of the University of Würzburg were recruited to participate in this study as part of a 1-hour experimental session. All participants received € 6.00 for taking part in the study.

Materials and Procedure. The 1-hour session began with the first block of the present study. In this block, I collected the name of the routine standard (the participant's best friend) and the name of a good school friend with whom the participants had lost contact (exfriend). To find out this information, I pretended to be interested in the influence of names on the occurrence and the duration of friendships. The participants listed the names of five friends and then rated these names together with three additional names with regard to their likeability. Subsequently, they worked on further, unrelated experiments, which lasted for approximately 15 minutes.

In the second block of the experiment, the participants engaged in a series of self-evaluations before I assessed the accessibility of the two standards. In the instructions I informed the participants that I wanted to examine the influence of habits on cognitive abilities. Participants would first answer some questions about several habits and then work on a reaction-time task evaluating their ability to concentrate. In the self-evaluation task, the participants considered and judged the frequencies of eight habits such as doing sports, watching television, or going to the movies. The wording of the questions was, for example, "How often do you go to the movies?". To manipulate the extent to which participants engaged in social comparison processes during this self-evaluation, I used two different answer formats. Approximately half of the participants gave their answers on 9-point rating scales ranging from 1 (e.g., *very rarely*) to 9 (e.g., *very often*). As outlined above, an evaluation on such a relative scale requires social comparisons, because the scales have to be anchored in social

reality. To judge oneself as a person who goes to the movies very rarely means going very rarely compared to other people. Therefore, I hypothesized that judgments on these relative scales in the comparative self-evaluation condition would evoke the activation of the best friend if participants indeed based their judgments on comparisons with their routine standard.

The other half of the participants received the same questions, but used an absolute answer format such as number of incidences per month. To judge the frequency of the habit “going to the movies” the answer was, for example, posted as “_____ *times per month*”. Participants are able to evaluate themselves on such absolute scales without comparing the self with other people. To decide how often one goes to the movies per month, only one’s self-observation, and no comparison, is necessary. Therefore, the extent to which the participants engage in social comparison processes should be lower in the group using the absolute answer format compared to the group using the relative answer format. Consequently, I expected that the best friend as a routine standard would not be rendered accessible during those absolute self-evaluations.

Subsequent to the self-evaluations the participants worked on a lexical decision task in which they had to decide as quickly as possible whether or not a letter string constitutes a name. The stimuli included the name of the current best friend (i.e., the routine standard) and the name of an exfriend. If the best friend was rendered accessible in the preceding self-evaluation task, participants should be able to classify his or her name faster than the name of the exfriend.

In the lexical decision task, the letter strings appeared on a computer screen immediately following a one-second presentation of a fixation point (“X”). The participants responded by pressing either the “Y” key with the left index finger or the “-” key

with the right index finger. The assignment of the keys (left = name, right = no name) was indicated on the screen throughout the whole task. In all, the participants responded to fifteen letter strings. Five of those were same-sex names, five opposite-sex names, and five no names. The names of participants' best friends and exfriends appeared at the fourth and the seventh position and the order was counterbalanced. I randomized the presentation of the remaining stimuli with the limitation that no other same-sex name appeared before the two critical trials.

After completing the lexical decision task the participants continued to work on further, unrelated experiments. At the end of the 1-hour session they were thanked for their participation, fully debriefed, paid, and dismissed.

Results

My dependent variables are the response latencies in the lexical decision task. I hypothesized that participants would react faster toward the name of the best friend than toward the name of the exfriend only if they had previously evaluated themselves on relative scales but not on absolute scales. Such relative scales require comparative self-evaluations and I expect participants to use their best friend as a routine standard in these social comparison processes. Doing so would render the best friend's name accessible so that it could be classified faster in the lexical decision task. On the other hand, the best friend is less likely to be activated during self-evaluations on absolute scales, since these can take place without any comparisons.

I excluded five response latencies from the analyses because they deviated by more than two standard deviations from the group mean (Ratcliff, 1993). To reduce the skewness of the data, I further performed logarithmic transformations (ln) of the response latencies (Fazio, 1990a). My analyses are based on these transformed la-

tencies, but for ease of interpretation I will report the untransformed means (in milliseconds).

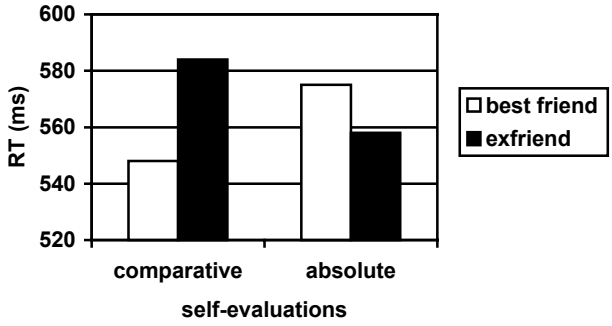

Figure 1. Response latencies for the lexical decisions (best friend vs. exfriend) subsequent to comparative versus absolute self-evaluations (Study 1). RT = response time.

As is apparent from Figure 1, the participants reacted faster toward the name of the best friend (*M* = 548 ms) than toward the name of the exfriend (*M* = 584 ms) subsequent to comparative self-evaluations, $t(26) = 1.97$, $p < .05$. However, if the participants had previously evaluated themselves on absolute scales where social comparison processes are less likely, no such difference in the response latencies occurred (best friend: *M* = 575 ms, exfriend: *M* = 558 ms, $t(30) = -1.25$, *ns*). This pattern of means produces a significant interaction effect in a 2 (self-evaluation: comparative vs. absolute) X 2 (lexical decision: best friend vs. exfriend) mixed-model analysis of variance (ANOVA) using the logarithmic transformations of response latencies in the lexical decision task as the dependent measure, $F(1, 56) = 5.27$, $p < .03$. None of the main effects proves to be significant in this analysis, all *F*s < 1. Taken together the above analyses of the response latencies support the Hypotheses 1, 1.1, and 1.2.

Discussion

The results of Study 1 are consistent with my hypothesis that people activate their best friend as a routine standard while evaluating themselves. As expected, participants were faster in responding to the name of their best friend than to the name of an exfriend subsequent to comparative self-evaluations. Because faster lexical decisions typically indicate higher levels of accessibility (Neely, 1977), these findings demonstrate that evaluating oneself in a comparative manner does indeed bring one's best friend to the forefront of one's mind. Importantly, this effect did not occur subsequent to absolute self-evaluations. This pattern contradicts the spreading-activation hypothesis. The difference in the response latencies subsequent to comparative self-evaluations could be explained by spreading activation from the self to the friends under the assumption of a stronger association between the self and the best friend than between the self and the exfriend. However, spreading-activation would cause a similar effect after absolute self-evaluations, since the self should be comparably activated in both conditions. This was clearly not the case. Consequently, the effect has to be caused by other factors. The main difference between the comparative and the absolute self-evaluation condition is the likelihood of comparison processes during the evaluation. Whereas evaluations on relative rating scales are based on comparison, this is not the case for evaluations on absolute scales (Biernat et al., 1991). Therefore, the observed interaction effect strongly supports the interpretation that the higher accessibility of the best friend subsequent to comparative self-evaluation is actually caused by comparison processes with the best friend as a routine standard.

With this study, I found unequivocal evidence for the use of routine standards during self-evaluations, which confirms the conclusions drawn in my prior research

together with Mussweiler (Mussweiler & Rüter, 2003). Across all these studies, participants compared themselves with their best friend as a routine standard in the attempt to evaluate themselves on a variety of different dimensions. Instead of strategically selecting different standards for self-evaluations on different dimensions, people use the same standard again and again. More importantly, we have also shown that the best friend was used as comparison standard even if this person was perceived as clearly dissimilar to the self on the comparison dimension (Mussweiler & Rüter, 2003, Study 3). Since similarity should breed diagnosticity of standards for self-evaluation (Festinger, 1954), this study emphasizes the incompatibility of routine standards with strategic considerations in standard selection. The best friend was used as standard in spite of the fact that this comparison may provide only weak diagnostic information. This indicates that participants compare themselves with their routine standards without strategically selecting them. Thus, routine standards enable people to engage in efficient self-evaluations independently from an arduous standard selection.

However, the efficiency of routine standards may not only be based on skipping a strategic standard selection process. Furthermore, the comparison process itself may be more efficient if people compare themselves with a standard that they have used frequently in prior comparisons. This additional efficiency advantage of routine standards is explored in the next studies.

Study 2

The use of routine standards implies that people frequently compare themselves with the same standard. Due to this frequent execution of the same process, practice effects can emerge (see Gupta & Cohen, 2002; Newell & Rosenbloom,

1981; E. R. Smith, 1994). In the case of routine standards one would expect an increase in efficiency due to general, content-free as well as specific practice effects. In a general practice effect, the process itself becomes more efficient with repetition even though different content is processed (E. R. Smith, 1989; E. R. Smith et al., 1988). The content in social comparison is the self-knowledge and the standard-knowledge, which are relevant for the comparison on a particular dimension. Since routine standards are used in comparisons on all kinds of different dimensions, different self-knowledge and standard-knowledge may be relevant in the repeated comparisons. A general practice effect would therefore be most reasonable to explain an increase in the efficiency of social comparison with practice.

In addition to the general practice effect I would also assume that specific practice effects speed up the comparison process with routine standards. The specific knowledge about a standard for a particular comparison may never have been processed before, but because of the repeated prior comparisons with this standard, the knowledge may nevertheless be more accessible than knowledge about another, less often used standard. The knowledge about a person is stored in an associative network (Wyer & Carlston, 1994) and a frequent activation of a person facilitates the accessibility of associated knowledge (A. M. Collins & Loftus, 1975; Higgins, 1996). Since a specific practice effect may partly depend on an increasing accessibility of content (see Anderson & Pirolli, 1984; Higgins, 1989, 1996; Wyer & Srull, 1989), knowledge about a routine standard could thus be processed faster than knowledge about other standards. Furthermore, the same standard-knowledge may be relevant for comparisons on different dimensions. Comparing oneself with a routine standard on a new dimension may partly involve the processing of content that was processed in a prior comparison on a different dimension. In this case, knowledge compilation

processes as proposed by Anderson (1987) in the ACT* model could facilitate the comparison. If the same content is processed repeatedly, a more specific version of the production is created, which could be executed faster than a general production. Repeatedly comparing with the same standard increases the likelihood that specific productions created in prior comparisons could be used again. Such specific practice effects are less likely if people compare themselves with different standards repeatedly.

Taken together, general and specific practice effects in social comparison lead to the hypothesis that comparisons with routine standards are more efficient than comparisons with other standards. Consequently, I expect participants to compare themselves with their best friend faster than with an exfriend, since prior research identified the best friend as a routine standard for the student population participating in this study.

Hypotheses

The response latencies in a comparison task form the dependent variables in this experiment. The higher efficiency of comparisons with a routine standard leads to the following hypothesis:

H 1: The response latencies of comparisons between the self and the best friend (i.e., the routine standard) are shorter than the response latencies of comparisons between the self and an exfriend (i.e., the control standard).

Design

This study is based on a two-cells design with standard (best friend vs. ex-friend) as within-subject factor.

Method

Participants. Seventy-four students were approached in the dining hall of the University of Würzburg and, after giving their agreement, were led into a separate room. Following the approximately fifteen-minute experiment, all participants were thanked, fully debriefed and received a chocolate bar as compensation.

Materials and Procedure. This experiment was conducted on portable notebooks. The cover story informed participants that the study was about their perception of their social environment. Therefore, they were asked to name several friends to whom they possess specified relationships. Among others they should name their current same-sex best friend (routine standard) and a good school friend with whom they had lost contact (exfriend). All together participants specified eight friends.

Subsequently participants received the instructions concerning the comparison task. I explained that they would compare their friends on several personal attributes. Their task would be to decide which of two persons possessed a particular attribute to a greater extent. The comparison task was compiled of 25 trials. Five of these trials were comparisons between the self and the best friend and five between the self and the exfriend. The order of these comparisons and the comparison dimensions were counterbalanced. In the remaining trials participants compared the remaining friends with each other. In each trial, the comparison question (e.g., Who is more athletic?) appeared on the computer screen together with the target and the standard (e.g., self or best friend) and remained there until participants indicated their decision

by pressing either the left or the right “Strg” key. Participants were instructed to make their decisions as fast and spontaneously as possible. They were therefore asked to keep their index fingers on the two response keys throughout the whole comparison task. I expected participants to compare themselves faster with the routine standard (i.e., their best friend) than with the control standard (i.e., the exfriend).

After the comparison task, participants rated the best friend and the exfriend on the three dimensions likeability, closeness to the self, and similarity to the self. All these ratings were given on nine-point scales ranging from 1 (*not at all*) to 9 (*very much*). These judgments were included for two reasons. On the one hand, they are a manipulation check: a best friend should be perceived as more likeable, closer to the self, and maybe also more similar to the self (see e.g., Byrne & Nelson, 1965) than an exfriend. On the other hand, these judgments enabled me to statistically control for these differences between the standards in the analysis of the response latencies. The speed of the comparisons should not be determined by the dimensions likeability, closeness, or similarity, but by the unique characteristic of the best friend as being a natural routine standard. The best friend may not only be frequently used as standard in prior comparisons but may differ to the control standard on many dimensions. Therefore I had to ensure that an observed effect is not caused by these confounding differences.

Results

Evaluations. As expected, the best friend was perceived as significantly more likeable, closer to the self, and more similar to the self than the exfriend. The means of these evaluations are summarized in Table 1.

Table 1
Mean evaluations of perceived likeability of, closeness to, and similarity between the self and the two standards

	Likeability	Closeness	Similarity
Best friend (routine standard)	8.31	7.61	5.49
Exfriend (control standard)	6.16	3.77	3.84

Note. All evaluations were given on nine-point scales ranging from 1 (*not at all*) to 9 (*very much*), the means in each column differ significantly from each other, $p < .001$.

Response latencies. My main hypothesis in this study states that comparisons with routine standards are more efficient than comparisons with other standards. The efficiency should accelerate in faster comparisons. Therefore, participants should be able to compare themselves faster with their best friend than with an exfriend.

Prior to the analysis of the response latencies I excluded extreme outliers. Participants were instructed to react as fast as possible and very long response latencies indicate either nonconformity to the instructions or unusual difficulty with that specific comparison. To define extreme outliers I looked not only at the response latencies in this study, but also at Studies 3 and 4 where participants engaged in equivalent comparison tasks. Across these three studies a cut-off point of 6000 ms (approx. 2 x median + 1000 ms) seemed to be reasonable (see Appendix A1). Since the participants made five comparisons between the self and the best friend and five comparisons between the self and the exfriend, I computed the mean of these two sets of comparisons. Finally, I excluded participants who deviated by more than two standard deviations from the group mean (Ratcliff, 1993).

The mean response latencies of the comparison between the self and the best friend and between the self and the exfriend reflect the expected advantage of comparisons with a routine standard. Participants were indeed faster when comparing

themselves with their best friend (M = 2,594 ms) than with an exfriend (M = 2,767 ms), $t(68) = 2.20$, $p < .04$. This effect supports Hypothesis 1.

To test whether the difference between the best friend and the exfriend in one of the dimensions likeability, closeness, or similarity causes this effect, I regressed the difference in the response latencies on the differences in the evaluations. If, for example, the participants compared themselves faster with their best friend than with the exfriend because they perceive themselves to be closer to the best friend than to the exfriend, this should result in a negative regression coefficient. However, this was not the case. There was no effect of the perceived likeability or closeness on the difference in comparisons, both Fs < 1, and only a tendency for similarity, $\beta = 0.23$, $F(1, 68) = 3.66$, $p < .06$. Additionally, I conducted an ANCOVA to control for perceived similarity with the targets while testing the effect of the routine standard versus the control standard on the speed in self-comparisons. In this analysis, the main effect (standard) remains significant even if the similarity was kept constant, $F(1,67) = 8.64$, $p < .01$.

Discussion

In this study, I used the speed of a process as an indicator for its efficiency. The shorter response latencies for self-comparisons with the best friend compared to self-comparisons with a former school friend lead to the conclusion that comparisons with a routine standard are especially efficient. Since the participants in this experiment did not select the standard but compared themselves with a given standard, the faster comparisons with the routine standard have to be due to an increased efficiency of the comparison process itself. Thus, the efficiency advantage of the routine standard is not limited to the selection process where a routine circumvents an ardu-

ous standard selection. On top of this, comparisons with routine standards may also have the advantage of implying particular practice effects for the comparison process.

In the present study, I assessed the efficiency of a routine standard naturally occurring in the student population: the participant's best friend. This routine standard was contrasted to an exfriend. In this particular contrast, I cannot assume that the two standards differ exclusively in terms of quality whether or not they are routine standards. In fact, on all three dimensions on which the participants rated the two standards (i.e., likeability, closeness, and similarity), they appeared to differ. These differences, however, were expected. A best friend should be perceived as closer and should be more liked than an exfriend. People also prefer to choose friends who in general are similar to themselves (e.g., Byrne & Nelson, 1965). The important question is whether these differences caused the faster comparisons with the best friend relative to the comparisons with the exfriend. This seems not to be the case. Only the perceived difference in similarity between the self and the two friends showed a tendency to explain differences in response latencies. However, this relationship between the difference in similarity and the difference in response latencies was positive. Thus, there is a tendency of being able to decide faster which of two persons expresses several attributes to a greater extent if the two persons are generally perceived as less similar. However, this tendency cannot explain why participants compared themselves faster with their best friend than with their exfriend, even though they perceived the former as more similar to themselves than the latter. Besides, keeping the difference in similarity statistically constant did not eliminate the observed effect of the routine standard. Thus, these analyses support the assumption that people compare themselves faster with their best friend than with an ex-

friend because the best friend is a routine standard and not because they perceive him or her as a closer friend or as more similar to themselves.

Study 3

So far, I have gathered evidence that students use their best friend as a routine standard in comparative self-evaluations and that these comparisons are especially fast. The best friend is a likely routine standard for the student population participating in my experiments. However, the best friend is not only a person whom students may use repeatedly as comparison standard. The best friend may differ from other friends on many dimensions (e.g., sympathy, time spent together, extent of disclosure). If one compares the best friend as the routine standard with another friend as a control standard, one could at best control for some of these distinguishing factors. In Study 2, I asked participants to indicate how likeable, close, and similar they perceive the two standards to themselves. None of these dimensions could explain why participants compared themselves faster with their best friend than with an exfriend. However, there might be other factors playing a role which I have not yet taken into account. It would be impossible to include in one single study all confounding dimensions that may differ between a natural routine standard and a control standard. To overcome these difficulties, it is necessary to experimentally create a routine standard. The efficiency of routine standards would be confirmed if comparisons with any practiced standard were more efficient than comparisons with a less practiced standard.

In the following study, I will establish a routine standard experimentally and then measure the speed of the comparison with this standard compared to a control standard. To do so, I will ask participants to repeatedly compare themselves with the

one but not with the other standard before engaging in the critical comparison. Since the routine standard and the control standard are both randomly selected, the only difference between these two standards would be the experimental manipulation.

I already used a similar technique to establish a routine standard in my prior work together with Mussweiler (Mussweiler & Rüter, 2003, Study 4). In this study, we showed that in a self-evaluation participants prefer a frequently used standard to one, which they had not used in the past. Thus, there is evidence that frequently comparing oneself with the same person is sufficient to generate a routine in the standard selection process. However, are frequent comparisons in the past also sufficient to facilitate subsequent comparisons? Or are other, confounding qualities of a routine standard necessary to make the comparison process efficient? If the efficiency of routine standards in the comparison process is indeed based on general and specific practice effects, a difference in the speed of comparison should occur between standards that exclusively differ in the amount of prior comparisons with the self. More precisely, I hypothesize that participants compare themselves with a standard whom they used previously, faster than with a standard with whom they had not compared themselves before.

Hypotheses

As in Study 2 the response latencies of self-comparisons are the dependent variables. I will test the following hypotheses:

H 1: The response latency of a comparison between the self and a particular standard depends on the frequency of previous comparisons with this standard.

H 1.1: If participants previously compared themselves repeatedly with Person A, the response latency of a comparison between the self and Person A is shorter than the response latency of a comparison between the self and Person B and vice versa.

Design

I realized a 2 (routine standard: A vs. B) x 2 (comparison standard: A vs. B) mixed-factorial design in this study. Whereas the first factor was varied between participants by repeated self-comparisons with the routine standard in the first block of the experiment, all participants compared themselves with Person A as well as with Person B in the second block of the experiment (second factor).

Method

Participants. Forty-six students of the University of Würzburg participated in Study 2 and received a chocolate bar as compensation.

Materials and Procedure. Participants were seated in front of portable notebooks at which the experiment, including all instructions, was conducted. Participants read that I was interested in their perception and evaluation of fellow students. I therefore asked them to think about students with whom they had considerably close contact, for instance based on shared work assignments or class participation. Participants were instructed to type in the names of three of those students. I will refer to these students as Persons A, B, and C depending on the order in which participants named them.

The remaining experiment consisted of two blocks. In the first block, participants practiced comparing themselves with one particular person and thus estab-

lished this person as a routine standard. For this reason, participants repeatedly compared themselves with one person, e.g. Person A. In the second block, I examined whether this practice facilitates a subsequent comparison between the self and the routine standard (e.g., Person A) but not a comparison between the self and the control standard (e.g., Person B).

In the practice block, participants engaged in a total of thirty comparisons in a randomized order. In each trial they had to decide which of two persons showed a personal attribute to a greater extent (e.g., Who is more intelligent? Person C or Person B?). To keep the time during which participants thought about each comparison more or less equal, I presented each question for ten seconds before participants were able to answer. After the ten seconds a screen merely showing the two names emerged and participants indicated their decision by either pressing the right “Strg” key, representing the person presented on the right half of the screen, or the left “Strg” key, representing the other person. I stressed in the instructions that participants should leave their index fingers on the Strg keys throughout the entire block and that they should answer immediately upon the appearance of the screen showing the two names.

In fifteen trials, half of the participants compared themselves with Person A on personal attributes like intelligence, punctuality, and laziness. In the remaining fifteen trials, they compared Person C with Person B concerning the same attributes. The other half of the participants compared themselves with Person B, and compared Person C with Person A. In other words, half of the participants practiced self-comparisons with Person A and the other half practiced self-comparisons with Person B. At the same time they compared the control standard with a third person. Consequently, one person was established as the routine standard in self-

evaluations, whereas the control standard was used in comparisons, but not in relation to the self. This procedure ensured that participants practiced using both standards in comparison processes. Through this, both standards were activated to a similar extent during the practice phase. Furthermore, the knowledge about these standards activated in the comparisons should also be similar as the participants compared the routine standard as well as the control standard on the same fifteen attributes and each comparison took approximately the same time. However, only the routine standard was compared with the self. If there are practice effects limited to repeated comparisons of the same target with the same standard, these should exclusively facilitate subsequent comparisons with the routine standard.

In the second block of the experiment, I measured the response times for further comparisons. Specifically, I assessed the time participants needed to compare themselves with the routine standard relative to the control standard. Therefore, participants engaged in fourteen comparisons on personal attributes that were not used in the first block. The critical comparisons with the routine standard and the control standard appeared in the third and the fifth trials. There, participants compared themselves with Person A and Person B concerning humor or creativity respectively. The order of the standard (first routine standard or first control standard) and the order of the comparison dimension (first humor or first creativity) were counterbalanced between participants. The whole procedure was very similar to the one in the first block with the only difference being that the pause between the question and the decision was removed. Instead of forcing participants to delay their answer for ten seconds, I instructed them to press the answer key as soon as possible after reading the question.

Subsequent to the second block, participants answered six additional questions concerning their friendship to the two standards (e.g., How friendly are you with Person A?, How much do you like Person A?, How close do you feel to Person A?, How well do you know Person A?, How often do you meet Person A?, and For how long have you known Person A?) and one indicating their perceived similarity (e.g., How similar is Person B to you?). The answers were given on nine point-scales, ranging from 1 (e.g., not at all) to 9 (e.g., very much). These questions should detect possible, but unintended, systematic differences between the two standards. Afterwards, participants were thanked, fully debriefed and dismissed.

Results

Evaluations. I averaged the six evaluations concerning the closeness of participants' friendships to the standards in two single friendship scores. The reliability (Crombach's α) for these scores was satisfyingly high (α_A = .81 and α_B = .84). I expected that Person A and Person B would differ neither on this friendship score nor in the perceived similarity to the self. However, this was only the case for the similarity dimension. The participants did not perceive Person A to be more similar to themselves than Person B, $t(45) = 1.27$, *ns*. Conversely, Person A and Person B differed significantly on the friendship score. Overall, participants evaluated Person A (M_A = 6.34) to be a closer friend than Person B (M_B = 5.65), $t(45) = 2.75$, $p < .01$.

Response latencies. The dependent variables in this study are the response latencies of comparisons between the self and Person A or Person B respectively. As in Study 2, I excluded first the extreme outliers (rt > 6000 ms) and then the response latencies, which deviated by more than two standard deviations from the group mean. Furthermore, to reduce the skewness of the single response latencies I loga-

rithmically (ln) transformed the data prior to analysis (Fazio, 1990a). For ease of understanding I will nevertheless report the untransformed means.

In this study, I wanted to show that inducing a routine standard by practicing self-comparisons with this person increases the efficiency and the speed of subsequent comparisons with the practiced standard compared to comparisons with a control standard. In other words, after comparing oneself fifteen times with Person A but never with Person B, a subsequent comparison with Person A should be faster than a comparison with Person B.

This is exactly what I found and is presented in Figure 2. The speed of the critical comparisons clearly differs depending on the practice in the first block of the experiment (Hypothesis 1). Whereas participants who had previously repeatedly compared themselves with Person A compared themselves faster with Person A (1,907 ms) than with Person B (2,362 ms), the pattern of means reversed after establishing Person B as a routine standard (Person A = 2,188 ms; Person B = 1,998 ms). This interaction proved to be significant in an analysis with routine standard and comparison standard as independent variables and the ln-transformed response latencies in the critical comparisons as dependent variable, $F(1, 38) = 8.55$, $p < .01$. None of the main effects were significant, all Fs < 1. Analysis of the simple effects revealed that the contrast between the two standards reached significance only if Person A $t(18) = 2.70$, $p < .01$ but not Person B was established as routine standard $t(20) = -1.41$, *ns.* Thus, my data only partly confirm Hypothesis 1.1.

In this study, I intended to compare two standards that solely differ with regard to the participant's practice with them in self-comparisons. However, it transpired that Person A was on average a closer friend of the participant than Person B. To control for this difference at least statistically, I conducted an ANCOVA with differences in

the friendship score as covariate[2]. In this analysis the relevant routine standard by comparison standard interaction effect on the response latencies remains significant, $F(1, 37) = 5.67$, $p < .03$.

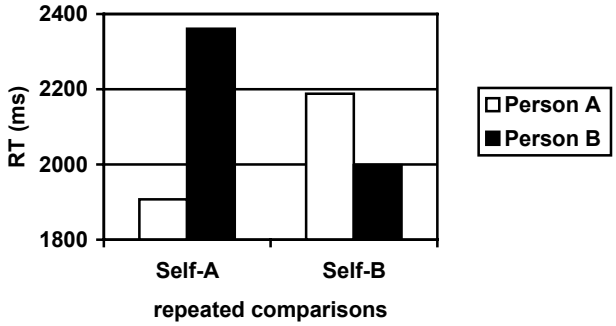

Figure 2. Response latencies for the self-comparisons (comparison standard: Person A vs. Person B) subsequent to repeated comparisons with Person A vs. Person B (routine standard) (Study 2). RT = response time.

Discussion

These results confirm the hypothesis that comparisons with a routine standard are more efficient, i.e. faster, than comparisons with other standards. In this study, the routine standard was experimentally constructed. I proposed that frequency of comparison is the main mechanism that determines whether or not a standard becomes a routine standard. Consequently, repeatedly comparing oneself with the same standard should also be sufficient to elicit practice effects unique to routine standards in social comparisons. In a natural setting, a routine standard might differ from other standards on other, confounding factors like perceived likeability, close-

[2] A recent article by Yzerbyt, Muller & Judd (in press) points to potential problems with ANCOVAs conducted to estimate the impact of an interaction while controlling for the covariate. However, since

ness, and frequency of contact. However, the experimental design in the present study controls for these differences and enables me to test whether the mere frequency of comparison is a sufficient prerequisite to ascertain the efficiency advantage of routine standards. This seems to be the case. Whether Person A or Person B was established as routine standard, participants subsequently executed comparisons with this routine standard faster than with the control standard.

Contrary to my expectations, the participants indicated having a closer friendship with Person A than with Person B. Obviously, such a systematic difference cannot explain the interaction effect, since in one condition the close friend Person A was the routine standard, but in the other condition the routine standard was the less close friend Person B. In addition, statistically controlling for the difference did not diminish the interaction effect specified by faster comparisons with the person that was previously established as the routine standard. Thus, even though I did not successfully select two equivocal friends as standards, the data still confirm that the facilitation of comparison is due to the manipulated practice.

In addition, it is important to note that the control standard, as the routine standard, was involved in prior comparisons. However, the control standard was compared with a third person, whereas the routine standard was compared with the self. Thus, the advantage of the routine standard was not more comparison practice or an increased activation of comparison relevant standard-knowledge. Both standards were involved in comparison processes equally often. Therefore a more general practice effect in comparison, independent from the target / standard combina-

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in the present ANCOVA the relevant interaction is constituted out of one within and one between factor, the critical between factor x covariate interaction is automatically included in the model.

tion, could not have caused the facilitation of the subsequent comparisons. Likewise, both standards were compared on the same dimensions. Therefore, the knowledge about the two standards activated during the first phase of the experiment should also be highly similar. This means that the facilitation of the critical comparisons in the experimental condition has to be due to repeated comparisons with a fixed target / standard combination in the first phase of the experiment. This could explain the unique efficiency advantage of routine standards.

Altogether, the results of this experiment strongly support the hypothesis that repeated comparisons with the same standard, which is the core aspect of a routine standard, increase the speed of the comparison process. Natural routine standards may be unique on many dimensions other than the frequency of prior comparisons, but these differences are not sufficient to explain the efficiency advantage of routine standards. There seems to be a mere procedural practice effect that facilitates comparison processes.

Study 4

The results of Study 3 suggest that people are able to execute comparisons faster if they have previously practiced them. Repeatedly comparing with the same person not only establishes the routine to select this standard in future comparisons (Mussweiler & Rüter, 2003, Study 4), it also ensures that these comparisons can be processed faster than comparisons with other standards. Since the efficiency of routine standards is their main advantage over other standards, it is important to understand the mechanisms and the circumstances under which practice facilitates comparisons. In the following study, I will therefore examine the practice effects in social comparison in more detail.

As outlined above, one can make a distinction between general and specific practice effects (E. R. Smith, 1989, 1994). Whereas specific practice effects refer to an increase of efficiency in the case that the same stimulus, i.e. the same content, is processed, general practice effects occur content-free. Besides this distinction, one can differentiate between the two practice effects further still. First, it is possible to distinguish between several specific practice effects based on the particular content processed repeatedly. In social comparison, standard-knowledge as well as self-knowledge contributes to the content that has to be processed (see Mussweiler, 2001b, 2003a; J. V. Wood 1996). A specific practice effect could therefore depend on repeatedly processing the same standard-knowledge, the same self-knowledge, or both. In this context only the specific practice effect caused by using the same standard-knowledge repeatedly would be part of the efficiency advantage of routine standards. Since a standard becomes a routine standard with frequent use, processing knowledge about a routine standard should be more practiced than processing knowledge about another possible standard. Conversely, the specific practice effect based on the repeated use of the same self-knowledge plays no role in the routine standard framework. Repeatedly engaging in self-comparisons increases the speed of the comparison process during a self-evaluation whether one compares oneself with a routine standard or with another standard. Thus, to explain the efficiency advantage of routine standards, the specific practice effect depending on repeatedly processing the same standard-knowledge is more relevant.

Specific practice effects based on standard-knowledge or self-knowledge differ not only with regard to their importance for the efficiency advantage of routine standards. They may also increase the efficiency of comparison processes to different extents. Specific practice effects could partly arise from an increase in the accessibil-

ity of the content (see Anderson & Pirolli, 1984; Higgins, 1989; Wyer & Srull, 1989). If the accessibility of different knowledge increases differently with practice, the kind of content repeatedly processed may thus influence the extent of the increase in efficiency. This may be the case regarding specific practice effects based on self-knowledge and based on standard-knowledge. Generally speaking, self-knowledge is more accessible and easier to activate than knowledge about another person (e.g., the standard) (e.g., Andersen, Glassman, & Gold, 1998; Prentice, 1990). Besides, the repetitive use of the same knowledge does not enhance its activation (and therefore its accessibility) infinitely, but only to a certain extent (Higgins, Bargh, & Lombardi, 1985). As a consequence, repeatedly activating the already highly accessible self-knowledge may increase its accessibility to a smaller extent than repeatedly activating standard-knowledge, which may have a low accessibility to begin with. Thus, there may be a difference in the increase of the accessibility of the standard-knowledge compared to the accessibility of the self-knowledge. Accordingly, this difference may cause a less pronounced specific practice effect if the same self-knowledge relative to the same standard-knowledge is processed repeatedly.

In addition to differentiating between different kinds of specific practice effects, one could also distinguish between different general practice effects (see E. R. Smith, 1989). As long as the same person (standard or target) is not repeatedly compared with somebody on the same dimension, a facilitation of the process would indicate a general, content-free practice effect. However, some general practice effects in social comparison may be even more general than others, depending on the number of elements of the comparison (self / target, standard, and comparison dimension) that are constantly involved in the repeated comparison processes. A general practice effect could occur in repeated comparisons either with two (target and

standard), one (target, standard, or comparison dimension) or no element being held constant. The more elements that are held constant, the less general the practice effect would be and the more pronounced the facilitation might be (for a comparison with general practice effects in behavior-trait inferences see E. R. Smith, 1989). Therefore, the general practice effect involved in comparisons with routine standards may be especially strong, since by repeatedly comparing the self with the same standard, two elements are held constant. Conversely, if only one or no element is repeated, the practice would be on a more general level. In such cases, additional comparisons may not facilitate the comparison process further, since people engage in comparison very frequently throughout their daily life (Festinger, 1954; Mussweiler, 2003b) and thus the pure comparison process is already highly practiced.

Finally, general and specific practice effects could facilitate the process in repeated comparisons together, which may lead to a particularly strong facilitation. This may be the case if all three elements of the comparison (target / self, standard, and comparison dimension) are held constant. There, all relevant knowledge is processed repeatedly (causing a specific practice effect) and the comparison process with a fixed target and standard combination is practiced (causing a general practice effect). Additionally, the exact repetition of the comparison may enable people to skip the comparison process altogether and instead retrieve the correct response from memory (Logan, 1988). Therefore, I would expect the strongest facilitation in repeated comparisons with all three elements held constant.

The next study set out to demonstrate the facilitation of social comparisons based on different practice effects. To achieve this, the response latencies will be measured in a series of social comparisons, in which different elements of the comparison (self / target, standard, and comparison dimension) are held constant. This

should show that different kinds of practice effects (general as well as specific) may facilitate the comparison process. Since the practice effect becomes more specific when more elements are held constant during the repetition, and since specific practice effects facilitate the process to a greater extent than general practice effects (E. R. Smith, 1989; E. R. Smith et al., 1988), I expect an increase in efficiency depending on the number of elements repeated. With repetition, comparisons with constant target, standard, and comparison dimension should be executed faster than comparisons with only two or, to a greater extent still, with only one element held constant. In the case of two elements that are repeatedly involved in the comparisons, I additionally distinguish between the self + dimension and the standard + dimension combination. In the former case, in which the same self-knowledge is repeatedly processed, I expect a smaller facilitation than in the latter case, in which the specific practice effect would be based on repeated standard-knowledge. Furthermore, I expect the increase in efficiency to follow a power law in any case. This pattern of facilitation has been observed in numerous studies demonstrating practice effects in many different domains (for an overview see Newell & Rosenbloom, 1981). Thus, whereas in the beginning of the series the practice effects have a strong impact on the response latencies, further facilitation will become more limited with additional repetition.

Hypotheses

H 1: Response latencies for social comparisons decrease with repetition.

H 2: The practice effect in social comparison depends on the elements of the comparison (self / target, standard, and comparison dimension), which are held constant in the repetition.

H 2.1: The biggest practice effect emerges if all three elements of the comparison are held constant, i.e. if the exact same comparison is repeated.

H 2.2: The practice effect is smaller if only two elements are held constant.

H 2.2.1: The practice effect in social comparison is smaller if the self and the comparison dimension are held constant in the repetition than if the standard and the comparison dimension are held constant.

H 2.3: The practice effect is minimal if only one element, e.g. the comparison dimension, is held constant.

H 3: The speed-up of social comparisons with repetition follows a power law.

Design

My dependent variables are the response latencies in a series of social comparisons. Participants engage in ten repeated comparisons following specific rules simulating different practice effects. Altogether, five conditions are realized. In three conditions, I look at the general practice effect with a fixed target and standard combination and at the two specific practice effects based on repeated standard-knowledge or self-knowledge. Therefore I hold two of the three elements of the comparison constant. These three experimental conditions are flanked by two control conditions, in which either all three or only one element is repeatedly involved in the comparisons. In sum, this study is based on a 10 (repetition) x 5 (condition) mixed-factorial design, with repetition as within-participant factor and condition as between-participant factor.

Method

Participants. One hundred and eleven students of the University of Würzburg were contacted in the dining hall and participated in the experiment. They received an ice cream or a chocolate bar as compensation.

Materials and Procedure. Participants in this study engaged in a series of comparisons between themselves and several of their friends. To receive the friends' names for the subsequent comparisons I asked participants to imagine that they want to give a party and are to invite 20 persons. Participants listed the names of the guests on a piece of paper, specified their relationship to the guest (e.g., brother, partner of friend, etc.) and subsequently typed the names into the computer.

The main task of the experiment contained 60 comparisons. These comparisons were presented in the same format as in the second block of Study 3. Participants read, for example, "Who is more creative, you our friend A?" and indicated their decision by pressing one of the two "Strg" keys on the computer keyboard. I instructed them to keep their index fingers on these keys during the whole task and to react as quickly as possible. Within the 60 comparisons there were 3 x 10 comparisons that followed a specific rule. These were the critical comparisons, whereas the remaining 30 comparisons were filler items with no regularity. The filler items were mixed in between the 30 critical comparisons.

The three experimental and the two control conditions in this study are specified by repetition rules. In one control condition (repetition), all three elements of the comparison were held constant leading to a tenfold repetition of the same comparison. In the other control condition (random), only the comparison dimension was repeated, while varying persons were compared with each other. These two control conditions mark the maximal and minimal facilitation in this experiment. In the repeti-

tion condition, I expect the maximum speed-up, because all elements of the comparison (self / target, standard, and comparison dimension) were held constant in the repetition. This repetition allows the most specific practice effect to facilitate the process (see Logan, 1988; E. R. Smith, 1989). On the other hand, I expect nearly no facilitation in the random condition (see E. R. Smith, 1989, 1994). Only the comparison dimension was held constant during the ten repetitions in this condition and there was no fixed combination of a particular target with a particular standard. Thus, no content is repeatedly processed in this series and even the process is practiced on a fairly general level. This random condition thus serves as a baseline against which the effect of the experimental conditions could be tested. If in the experimental conditions the comparison processes are facilitated, the response latencies should at least be shorter than the response latencies in the random condition.

In the three experimental conditions, participants either compared themselves ten times with the same standard with regard to several dimensions (process), compared several persons with one standard with regard to one particular dimension (standard-knowledge), or compared themselves with ten different persons with regard to one dimension (self-knowledge). With each of these repetition rules I simulate different practice effects in social comparison. In the process condition, participants practiced the process of comparing themselves with one particular standard. Since I varied the comparison dimension, no comparison relevant knowledge about the self or the standard (i.e., the content in the comparison process) should be processed twice in the course of the repetition. An increase of efficiency in the process condition therefore indicates a general practice effect with a fixed target / standard combination. Such a practice effect may explain the efficiency advantage of routine standards. Conversely, in the standard-knowledge and the self-knowledge conditions, the

combination of one person with one dimension was kept constant. Participants repeatedly compare the same person on the same dimension and therefore the comparison relevant knowledge about this person would be repeatedly processed during the repetitions. Therefore, these two conditions simulate specific practice effects based on self-knowledge or standard-knowledge respectively. In Table 2, the rules of all five conditions are described more schematically.

Table 2
Schematic description of the critical comparisons (target - comparison dimension - standard) in Study 4 separated by condition

	Control conditions		Experimental conditions		
	Repetition	Random	Process	Standard-knowledge	Self-knowledge
Replication 1 (10 trials)	Self-Dim1-a Self-Dim1-a Self-Dim1-a ….	d-Dim1-b e-Dim1-c g-Dim1-b ….	Self-Dim1-a Self-Dim2-a Self-Dim3-a ….	b-Dim1-a c-Dim1-a d-Dim1-a ….	Self-Dim1-a Self-Dim1-b Self-Dim1-c ….
Replication 2 (10 trials)	Self-Dim2-b Self-Dim2-b Self-Dim2-b ….	e-Dim2-c d-Dim2-c g-Dim2-a ….	Self-Dim1-b Self-Dim2-b Self-Dim3-b ….	a-Dim2-b c-Dim2-b d-Dim2-b ….	Self-Dim2-a Self-Dim2-b Self-Dim2-c ….
Replication 3 (10 trials)	Self-Dim3-c Self-Dim3-c Self-Dim3-c ….	g-Dim3-b d-Dim3-a e-Dim3-a ….	Self-Dim1-c Self-Dim2-c Self-Dim3-c ….	a-Dim3-c b-Dim3-c d-Dim3-c ….	Self-Dim3-a Self-Dim3-b Self-Dim3-c ….

Note. The order of the specific comparisons are randomized within each replication; Dim1 – Dim13: humorous, creative, optimistic, intelligent, goal-oriented, assertive, strong, audacious, rational, dominant, tidy, athletic, sensible; a-n: friends named by the participants

Results

In this study, the participants engaged in a total of 60 comparisons. Thirty of these comparisons were the critical comparisons and I recorded the response latencies in these. To control for extreme outliers, I again excluded all response latencies longer than 6,000 ms.

The 30 critical comparisons were composed as a triple replication of the same repetition rule, and each involved ten repetitions. I averaged the three replications, resulting in ten response latencies per participant, which represented the speed of a comparison depending on its position in the series. As in the previous studies, I excluded mean response latencies deviating by more than two standard deviations from the group mean. The means for each condition separately are shown in Figure 3.

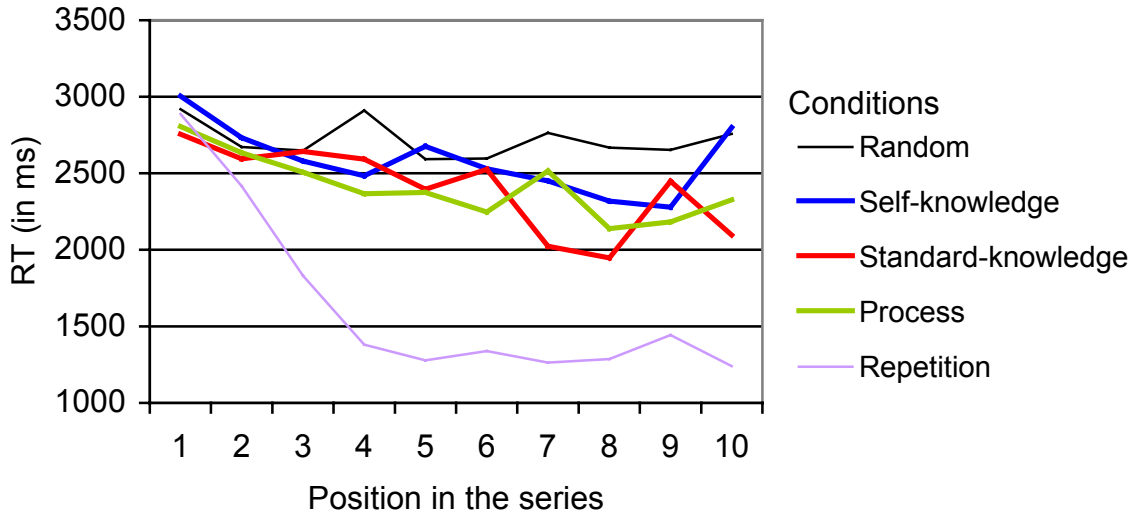

Figure 3. Mean response latencies of the comparisons at the different positions in the series separated by condition. RT = response time.

It is clear from Figure 3 that the participants in the repetition condition showed the highest increase in the speed of their comparisons. These participants executed an identical comparison (i.e., same target, same standard, and same comparison dimension) ten times, and with the fourth repetition they reached a response latency around 1,319 ms, which did not improve substantially with further repetition.

The picture is less clear for the other four conditions. The three experimental conditions do not differ a great deal from each other and all seem to speed up

slightly. For the first comparison, the participants in the experimental conditions needed 2,854 ms, whereas in the 10th repetition the response latency was only 2,407 ms. On the other hand, the response latencies of the participants in the random condition do not seem to speed up at all and fluctuate around a mean response latency of 2,717 ms.

To gain a deeper understanding of the facilitation of the comparisons due to the repetition rules realized in the different conditions, I ran several analyses. First, I tested whether there is a general effect of repetition and condition on the observed response latencies. Second, I based the analysis on the assumption that the speed-up of the comparisons follows a power function (Newell & Rosenbloom, 1981; E. R. Smith & Lerner, 1986; E. R. Smith et al., 1988). The exponent b_1 of this function describes the facilitation of the process. If the mechanisms simulated in the different conditions cause differing levels of facilitation, this will be visible in different exponents.

I first conducted a 10 (repetition) x 5 (condition) analysis of variance with the repeated measures of the response latencies as within-participant factor and condition as between-participants factor (H 1 and H 2). This analysis reveals a main effect for repetition, $F(9,711) = 16.68$, $p < .001$, as well as a main effect for condition, $F(4, 79) = 9.01$, $p < .001$. Furthermore, these effects are qualified by a significant repetition x condition interaction, $F(36,711) = 2.92$, $p < .001$. In order to test whether the proposed mechanisms do indeed facilitate comparisons, I conducted a planned contrast between the random-condition as a baseline and the four other conditions (H 2.3). Furthermore, I contrasted the repetition condition, in which I expected to observe the maximal practice effect, with the other four conditions (H 2.1). Finally, a third comparison between the standard-knowledge and the self-knowledge condition

should reveal whether the higher accessibility of self-knowledge does indeed decrease the proposed practice effect (H 2.2.1).

The results of all these comparisons are summarized in Table 3. Whereas the repetition condition clearly facilitates the comparisons to a greater extent than any other condition, the practice effects in the experimental condition compared to the random condition are less pronounced. There, only in the standard-knowledge and the process condition are the response latencies significantly smaller than in the random condition, whereas the contrast between the random-knowledge and the self-knowledge condition remain non-significant. Likewise, even though participants executed the comparisons in the standard-knowledge condition faster than in the self-knowledge condition, this difference was not statistically significant.

Table 3
Estimated contrast (in ms) between the mean response latencies of a condition and a reference condition

	Reference condition		
Condition	Repetition	Random	Self-knowledge
Random	1,080.65 ***		
Self-knowledge	948.17 ***	-132.48	
Standard-knowledge	764.55 ***	-316.10 *	-183.62
Process	772.55 ***	-308.10 *	
Repetition		-1,080.65 ***	

Note. ****p* < .001, ***p* < .01, **p* < .05

Because the effects observed in this ANOVA could be driven solely by the high facilitation of the response latencies in the repetition condition, I excluded this condition and ran the analysis again. This time the main effect for condition was no

longer significant, $F(3, 71) = 1.83$, *ns*. However, I still found a significant main effect for repetition, $F(9, 639) = 7.55$, $p < .001$, and more importantly, the expected repetition x condition interaction $F(27, 639) = 1.83$, $p < .01$.

Table 4
Mean response latencies for comparison 6 - 10 separated by condition

	Mean response latencies (in ms)	Standard deviation	N
Random	3,231.90 [a]	640.40	24
Self-knowledge	2,792.80 [b]	711.00	23
Standard-knowledge	2,635.70 [b]	636.48	25
Process	2,552.29 [b]	633.71	24
Repetition	1,314.98 [c]	328.89	9[1]

Note. Mean response latencies with different superscripts differ significantly from each other, $p < .05$; [1]This condition was not included in a second wave of data collection.

Practice effects are supposed to follow a power law (Newell & Rosenbloom, 1981). This means that the response latencies in the five conditions should not differ in the first trial[3], should then diverge with practice due to different facilitation, and finally end on different levels with no improvement due to further practice. Thus, excluding the first trials and averaging the response latencies of the last five comparisons into a mean response latency could make the analysis more sensitive to differences in the facilitation between the five conditions. As in the previous analysis, I excluded the mean response latencies deviating by more than two standard deviations from the group mean from this single-factorial (condition) ANOVA. The pattern of means presented in Table 4, is born out a significant effect for condition, $F(4,105) = 14.30$, $p < .001$. The mean response latency of the last five comparisons in the se-

[3] The effect of condition on the response latencies in the first trial was, as expected, not significant, $F < 1$. (see Appendix E3)

ries confirms again that practice mostly facilitates the comparisons in the repetition condition and least in the random condition. The three experimental conditions (process, standard-knowledge, and self-knowledge) fall in between and do not differ significantly from each other. In contrast to the standard-knowledge and the process condition, the mean response latencies in self-knowledge condition are not significantly smaller than in the random condition.

The assumption that the practice effect in social comparison follows a power law is even more fundamental for the next analyses. In his work identifying practice effects in social judgments, E. R. Smith (1989) used the exponent b_1 of the power function ($y = b_0 + x\text{^}b_1$, with y = response time and x = repetition) as the indicator for the facilitation. The advantage of such an analysis compared to the analyses I have conducted so far is that it utilizes all available information. It takes into account all empirically observed response latencies as well as our theoretical knowledge about practice effects. Thus, I fitted a power function to the response latencies of all participants individually and then compared the exponent b_1 of the different conditions with each other. Since the response latencies decrease with practice, the exponent is expected to be negative. The slope of the function becomes steeper the more the social comparisons are facilitated with practice.

As can be seen in Table 5, I found the biggest negative exponent in the repetition condition and the smallest in the random condition, with the mean exponents of the three experimental conditions resting in between. With regard to the experimental conditions, only the slope in the standard-knowledge condition was significantly steeper than the slope in the random condition. This pattern of means results in a significant effect of condition, $F(4, 106) = 15.86$, $p < .001$.

Table 5
Slope of the change in the response latencies over the 10 trials depending on the condition

Condition	Exponent b_1	Standard deviation	N
Random	-0.066 [a]	0.111	25
Self-knowledge	-0.090 [a, b]	0.080	25
Standard-knowledge	-0.134 [b]	0.105	26
Process	-0.116 [b]	0.133	26
Repetition	-0.404 [c]	0.159	9

Note. Exponents with different superscripts differ significantly from each other, $p < .05$.

Even though we know that a practice effect should theoretically follow a power law, I tested this assumption with my data (H 3). I therefore fitted a power function to each condition separately and looked at the R^2 as fit index[4]. These analyses indicate that only in the repetition condition did the power function explain a reasonable amount of variance, $R^2 = .36$. In the three experimental conditions and the second control condition, less than 5% of variance was explained by the assumed curve ($R^2_{\text{standard-knowledge}} = .05$, $R^2_{\text{process}} = .03$, $R^2_{\text{self-knowledge}} = .02$, $R^2_{\text{random}} = .01$).

Discussion

The goal of Study 4 was twofold. On the one hand I wanted to examine practice effects in social comparison in general. On the other hand I aimed to study which mechanisms could cause the efficiency advantage of comparisons with routine standards. I proposed that comparisons would become faster if either the self-knowledge or the standard-knowledge is repeatedly processed, or if the comparison process between the self and a given standard is facilitated with practice. Two of these practice effects would explain the advantage of routine standards: the general practice

effect with a fixed target / standard combination and the specific practice effect based on standard-knowledge repetition. Therefore, I was especially interested whether holding the target and the standard, or the standard and the comparison dimension constant in a series of comparisons leads to decreasing response latencies.

The results in the present study confirm my hypothesis: there are practice effects in social comparison. First of all, I observed a general facilitation of comparisons with repetition. Importantly, this effect of the repetitions was not dependent on the speed-up in the repetition condition. Even though the comparisons were clearly facilitated the most if participants repeatedly engaged in exactly the same comparisons, there was also a general speed-up in the remaining conditions. Thereby the practice effect seems to be influenced by the repetition rule realized in the respective condition. Whereas the facilitations of the comparisons in the standard-knowledge condition and the process condition were significantly larger than the facilitation in the random condition, this was not the case for the self-knowledge condition. The same pattern was observed if the mean response latency in the last five comparisons was analyzed. Thus, one could conclude that practice effects in social comparison depend on the number of elements held constant during the practice. The most specific practice effect in which all three elements were constant in the repetition was also the largest effect. Besides, repeatedly comparing different people on the same dimension (one element held constant) facilitates comparison to a lesser extent than repeatedly executing comparison with two constant elements. However, this stronger facilitation of comparisons with two elements held constant did not emerge when the same self + dimension combination was repeated, simulating a specific practice ef-

[4] All calculated exponents b_1 prove to be significant and in no conditions would a linear function have

fect based on self-knowledge. I hypothesized that this effect might be rather small, since the accessibility of self-knowledge may not increase substantially with further practice due to its generally high accessibility. Therefore, I expected a difference in the practice effects observed in the self-knowledge and the standard-knowledge condition. This specific contrast did not reach significance in any of the analyses, but the pattern in the data is still in line with expectation.

In the analysis of the exponent b_1 of the power function fitted to the response latencies, a slightly different pattern emerged. Here, beside the repetition condition, only the slope in the standard-knowledge condition was significantly steeper than the slope in the random condition. Thus, if one uses the random condition as control condition against which the practice effects in the experimental conditions have to be tested, only the specific practice effect based on repeated standard-knowledge would pass. Conversely, the general practice effect with a fixed target / standard combination simulated in the process condition, which was visible in the prior analyses of the response latencies, did not emerge here.

Across the three analyses I found clear evidence for a practice effect in social comparison if people compare the *same* target with the *same* standard on the *same* dimension repeatedly. This may either be due to a combination of general and specific practice effects, or it may be caused by a change in the process that is executed. After a few repetitions people could retrieve the correct response from memory instead of executing the same comparison again (Logan, 1988). The data also reveal that repeatedly comparing oneself on the same dimension with different standards does not facilitate the comparisons to a greater extent than holding just the

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fitted the data better than the power function (see Appendix E3).

dimension constant in the repetition. Thus, either in both conditions no practice effect emerges at all or the specific practice effect based on repeated comparisons of the same relevant self-knowledge does not add to the general practice effect due to executing varying comparisons. However, this does not mean that there are no specific practice effects in social comparison. If not the same self-knowledge but the same standard-knowledge has to be processed repeatedly in the comparison process, a specific facilitation becomes apparent in all three analyses. Less clear are conclusions regarding the advantage of a general practice effect with a fixed target / standard combination over the possible general practice effect in the random condition. Only in two of three analyses did this difference prove to be significant. However, in the analysis of the slope of the power function fitted to the response latencies, the pattern of means does at least confirm the results in the other analysis. In sum, these insights into practice effects in social comparisons have relevance for the proposed mechanisms underlying the efficiency advantage of routine standards. Comparisons with routine standards could profit from specific practice effects based on repeated standard-knowledge and from general practice effects with a fixed target / standard combination. In the present study evidence was found for both mechanisms.

Despite these supporting results for general and specific practice effects in social comparison, the data are still a matter for discussion. First of all, one could question whether the speed-up of the comparisons indeed follows a power law. Based on prior research this presumption seems reasonable (Gupta & Cohen, 2002; Newell & Rosenbloom, 1981; E. R. Smith, 1989, 1994), but it was not strongly supported by the data in the present study. Only in the repetition condition was the fit index acceptably high. This is also the condition in which the facilitation with repetition is strongest. It might be that the practice effect in the other condition is too small rela-

tive to the noise in the data (see Fazio, 1990a). Obviously, the response latencies are not only affected by the position in the repetition series but also by other factors specific for a particular comparison. For instance, some comparison dimensions may be more familiar to the participants than others and a comparative judgment between two persons might be easier (and faster) if target and standards are fairly dissimilar. I reduced this error variance by replicating the same repetition rule three times within participants. Thus, I captured not only one but three response latencies per participant for each position in the repetition series. I also randomized the position of specific comparisons within the series. Nevertheless, I only had approximately twenty-five participants in each condition[5] and this might not be enough to average out the error variance. Furthermore, the thirty filler items embedded might also make it more difficult to detect a practice effect. In an experiment by E. R. Smith and colleagues (1988) concerning practice effects in social judgments, a bigger effect was found if the repeated trials were not embedded in filler trials. Practice seems to occur to a stronger extent if the practice trials are not interrupted by irrelevant trials. Finally, it can be doubted whether ten repetitions are enough to establish a practice effect in social comparison. The limiting factor in this experiment was the number of friends participants could name and compare. In the self-knowledge conditions participants had to compare themselves on a dimension with varying standards. Thus, one would need at least as many friends as repetitions plus names of other friends for the filler items. However, the experiences in the present study indicate that participants would have difficulties to name many more than twenty friends whom they know well enough to be able to compare with each other on personal attributes. Additionally, E. R. Smith and Lerner (1986) argue that it should be possible to detect an increase in

[5] In the repetition condition N was even smaller. Since here the practice effect was clearly visible early on, I distributed the remaining participants over the other four conditions.

efficiency even with a small number of repetitions due to the nature of the power function. They point out that a power function with an exponent of -.10 (which is approximately the value observed in the experimental conditions of the present study) would lead to a decrease in the response latency to 80% with nine repetitions, whereas 165 repetitions would be necessary to reach an additional reduction of 20%. Thus, ten repetitions may be at the lower limit for the number of trials in experiments studying practice effects (but see MacKay, 1982, and Naveh-Benhamin & Jonides, 1984, for evidence for practice effects within even fewer trials), but it is not unreasonable to expect nevertheless a decrease of response latencies following a power law. This assumption is supported by the fact that the exponents b_1 detected in the present study correspond to the exponents observed by E. R. Smith and colleagues in their research about general and specific practice effects in social judgments (E. R. Smith et al., 1988; E. R. Smith & Lerner, 1986).

Another point to be discussed is the conclusion regarding a general practice effect with a fixed target / standard combination. First of all, the evidence for such a practice effect is not unequivocal in the present study. In the analysis of the exponents, the slope of the power function in the process condition was not significantly steeper than the slope in the random condition. This contradicts the hypothesis that repeatedly comparing the same target with the same standard facilitates comparisons to a greater extent than practicing comparisons on a more general level. But even if we agree on the existence of such a particular general practice effect (based on the supporting analyses of the response latencies), it could be doubted whether the facilitation is due to practice of the comparison process itself. It could also be suggested that increased accessibility of target-knowledge and standard-knowledge has facilitated these comparisons. Even though the dimensions on which the com-

parisons were executed differ from trial to trial, comparison relevant knowledge could become more accessible because of spreading activation (A. M. Collins & Loftus, 1975). Repeatedly using the same standard activates this standard in general and thereby increases the accessibility of all the knowledge associated with this person, including the knowledge needed for the subsequent comparison (see A. M. Collins & Loftus, 1975; Higgins, 1996; Wyer & Carlston, 1994). Thus, in the process condition, comparison relevant knowledge was not actively used in prior comparisons, but it could nevertheless become increasingly activated with each comparison because of the repeated activation of the same person. The power of specific practice effects based on repeated standard-knowledge is evident in the data of the present study. Repeatedly processing the same standard-knowledge clearly facilitates further comparison and this may be caused at least in part by increased accessibility (see Anderson & Pirolli, 1984; Higgins, 1989; Wyer & Srull, 1989). Therefore, I cannot rule out that this strong practice effect underlies the facilitation of the comparisons in the repeated comparisons of a fixed target / standard combination. But to explain the efficiency advantage of routine standards, such a general practice effect may be important. The advantage of routine standards would be much more general and relevant in more situations if the facilitation were not bound to a specific practice effect. If the accessibility of standards or of standard-knowledge mostly determines the speed of a comparison process, persons other than the routine standard may be advantaged for a particular comparison due to situational factors (see Higgins, 1996; Wyer & Srull, 1989). A person could, for example, be highly activated because the participant had recently met this person and this would then facilitate comparisons even though the participant had never compared him or herself with this person before. Conversely, only a routine standard would profit from a general practice effect with a fixed target / standard combination. The core aspect of a routine standard is that one

has compared oneself with this person frequently. Thus, to support the efficiency advantage of routine standards, I have to provide stronger evidence that a general practice effect with a fixed target / standard combination facilitates comparisons to a greater extent than the mere activation of standards or standard-knowledge do. I will address this issue in the next study.

Study 5

In the final study, my aim was to concentrate on the question of whether the comparison process between a given target and a particular standard is indeed facilitated with practice independently of the knowledge activated in the course of the repetition. Based on my results in Study 4, I cannot exclude the possibility that the facilitation of social comparisons with repetition is due to increased accessibility of comparison relevant knowledge. However, I want to show that the efficiency of routine standard use is at least partly caused by a general practice effect with a fixed target / standard combination. A core aspect of routine standards is that they could be efficiently used in comparisons regardless of the particular comparison dimension. If the efficiency advantage were bound to a specific content, this advantage would not be given. To demonstrate the generality of routine standards, I have to show an increase of efficiency with practice over and above pure knowledge activation. I therefore need to contrast the efficiency of comparisons after repeatedly executing comparison processes to a control condition in which the same knowledge about the target and the standard is activated, but without a comparison process between these two persons. In order to do this, in the next study I will compare a repetitive comparison condition with a repetitive evaluation condition.

In the repetitive evaluation condition participants have to evaluate two persons separately on several dimensions. In doing this they have to activate their knowledge about these persons concerning the dimensions in question. I assume that this knowledge is identical to the knowledge activated during a comparison between the two persons on the same dimension. This assumption is derived from research by Dunning and Hayes (1996), who concluded that a faster evaluation of the self subsequent to an evaluation of another person indicates the use of the self as a standard in the other-evaluation. This conclusion implies that the self-evaluation is based on knowledge activated during the self-other comparison. Only if the same knowledge is used in both processes could a facilitation of the evaluation subsequent to a comparison be expected. In the same sense, I propose that participants activate the same knowledge about a person, regardless of whether they evaluate this person or compare him or her with another person. Thus, faster comparisons after repetitive comparisons relative to repetitive evaluations would support my hypothesis that practicing comparison processes, and not the knowledge activated with it, facilitates comparisons.

To minimize the likelihood of participants in the repetitive evaluation condition engaging in the critical comparison even though they are not explicitly instructed to do so, I decided to refrain from comparisons with the self as target. As mentioned above, Dunning and Hayes (1996) found evidence that participants achieve the task of evaluating a person by comparing this person with the self. This tendency would undermine my intention to use repetitive evaluations as a control condition to repetitive comparisons. If I chose the self as the target, participants in both conditions may execute self-standard comparisons. Conversely, if I chose another person as target, participants in the repetitive evaluation condition may also compare the standard to

the self, but they would at least not practice the critical comparison with the selected target. The decision not to look at self-comparisons does not jeopardize the implications of this study for routine standard use in self-evaluations. Since the focus of this research is on general practice effects, the content plays a subordinate role. Self-knowledge, which is part of the content in self-evaluative comparisons, may be different to knowledge about other persons (e.g., regarding its accessibility, structure, and complexity) (see Baumeister, 1998; Fiske & Taylor, 1991; Srull & Weyer, 1993), but the productions describing the process of the comparison are general and unspecific (Anderson, 1987). If there is facilitation of repeated comparisons with a fixed target / standard combination due to a general practice effect like production strengthening, this would be unaffected whether self-knowledge or other-knowledge is the content of the process. Therefore the same general practice effect would also facilitate comparisons between the self and the routine standard.

Hypotheses

In Study 5, I want to test the following hypothesis:

H1: Comparisons between two persons are faster after previously comparing these persons on several other dimensions, than after previously evaluating them on the dimensions separately.

Design

This study is again based on a two-cells design. In a practice phase immediately before the critical comparisons, participants either compare the persons with each other, or evaluate each person separately on the same dimensions. In the critical comparisons all participants compare the two persons on new dimensions.

Method

Participants. Sixty-six students of the University of Würzburg participated in this study. While twelve participants were recruited in the dining hall and received a chocolate bar as compensation, the remaining participants took part in the experiment as part of a 1-hour experimental session and received € 6.00.

Materials and Procedure. As in the preceding studies, I first collected names of friends for the subsequent comparisons and evaluations. This time participants named six persons, which they did not specify any further themselves.

The main part of the experiment was split into five blocks (see Table 6). In each block the participants either compared two persons with each other or evaluated two persons separately on several dimensions. I informed the participants before each block which task they had to perform. In block 1, all participants compared two friends on six dimensions. In block 2, they evaluated two other friends on six dimensions each, meaning that block 2 had twelve trials. These first two blocks helped the participants to become familiar with the two tasks and served as practice trials. The experimental manipulation took place in blocks 3 and 4 and in block 5 I measured the response latencies as my dependant variable. Blocks 3 and 4 are comprised of 14 trials in the comparison task and 28 trials in the evaluation task, whereas in block 5 the participants engaged in six comparisons. In the repetitive comparison condition, the participants evaluated two friends in block 3 and then compared two other friends with each other in block 4, before comparing the same friends in block 5 as in block 4. In the repetitive evaluation condition the tasks in blocks 3 and 4 were switched. These participants engaged in comparisons in block 3 and then in block 4 they evaluated the two friends separately, before comparing them with each other in block 5. Thus, the participants in the repetitive comparison condition practiced the

process of comparing the two friends in block 4, whereas the participants in the repetitive evaluation condition did not practice this particular comparison process, even though they activated and evaluated these two friends. Participants in the repetitive evaluation condition were instructed to compare two other friends in block 3, in which the participants in the repetitive comparison condition evaluated two friends, in order to ensure that all participants were familiar with the comparison task to a similar extent in spite of the manipulation. Contrary to Studies 3 and 4, the participants in this study practice the comparison without any intermixed filler items. In the repetitive comparison condition, block 4 consists exclusively of 14 comparisons between the two critical friends. The aim of this is to increase the practice effect caused by the 14 repetitions (see E. R. Smith, 1989).

Table 6
Structure of the experiment in Study 5

		Repetitive comparison	Repetitive evaluation
Block	Dimension	Task (Persons)	Task (Persons)
1	sensible, intelligent, humorous, romantic, curious, patient	Comparison (C vs. D)	Comparison (C vs. D)
2	tall, thin, attractive, athletic, musical, talkative	Evaluation (A, B)	Evaluation (A, B)
3	tall, thin, attractive, athletic, musical, talkative, miserly, fond of traveling, active, open, creative, social, punctual, tidy	Evaluation (E, F)	Comparison (E vs. F)
4	Goal-oriented, diligent, self-confident, achievement-oriented, ambitious, rational, willing to take risks, resistant to stress, dominant, assertive, organized, dependable, makes decisions easily, glib	Comparison (A vs. B)	Evaluation (A, B)
5 (DV)	sensible, intelligent, humorous, romantic, curious, patient	Comparison (A vs. B)	Comparison (A vs. B)

Note. A-F are abbreviations for friends named by the participants

In addition, I also designed the comparison task in a different manner than in the previous studies. Instead of presenting the two persons and the comparison dimension simultaneously, they appeared on the computer screen sequentially. The series was build up as follows: fixation point (300 ms), first name (1,500 ms), fixation point (300 ms), second name (1,500 ms), fixation point (1,000 ms), attribute (until participant responds). The participants' task was to press one of two marked keys as fast as possible in order to indicate which of the persons possesses the attribute (i.e., the comparison dimension) to a greater extent. Therefore, two small squares appeared on the screen together with the dimension: a green one in the bottom left-hand corner and a red one in the bottom right-hand corner. These squares represented the keys that the participants had to press to indicate their decision and corresponded with the color of the names. The name presented first was always printed in green and the second presented in red. Correspondingly, I marked the left Strg key with a green sticker and the right Strg key with a red sticker. If participants thought, for example, that their friend "Karl" (first name) was more creative than their friend "Julia" (second name), they had to press the left-hand key marked in green.

With the sequential presentation of the target, the standard, and the comparison dimension, I wanted to reduce the error variance in the response latencies. The response latencies are not only determined by the speed of the comparison process itself, but also by the time participants need to perceive the stimuli. Since people differ in their reading speeds (e.g., Everatt & Underwood, 1994), the variance in the response latencies caused by individual differences in the stimulus perception increases with the amounts of word constituting the stimulus. Consequently, reducing the stimulus participants needed to read before giving their response from three words (see Study 1 - 4) to one word increases the share of variance determined by

the relevant comparison process and reduces the share of error variance. Thus, this change in the procedure makes the task more sensitive to a difference in the facilitation of the comparison process between the two conditions (see Bortz, 1999).

The evaluation task was created in a similar way to the comparison task. In these trials, instead of two names, only one name was presented, preceded by the fixation point. Additionally, instead of the squares, the words “rather yes” and “rather no” appeared in green and red in the bottom left and right-hand corners of the screen together with the dimension. Thus, while in the evaluation task the participants had to decide as fast as possible if a person possesses a certain attribute, in the comparison task the participants decided which of the two persons possess the attribute to a greater extent.

Finally I asked the participants to judge the similarity of the two critical friends on the six dimensions of block 5, since the perceived similarity between target and standard seem to influence the speed of the comparison process (see Studies 2 and 3). This time, the comparisons were made on a seven-point scale ranging from 1 (*not at all*) to 7 (*very much*) and participants judged the similarity without any time pressure.

Results

The paradigm in Study 5 differs substantially from Studies 2 to 4. In these studies the comparison question (e.g., Who is more creative? You or Peter?) was presented at once and participants had to perceive all three elements of the comparison (target, dimension, and standard) before they could compare and react. In the present experiment, I switched to a sequential presentation of the comparison element. Participants only had to read the comparison dimension (a single word) in or-

der to start the comparison process and to come to a decision. Therefore, the response latencies in this paradigm are shorter than in the previous studies and I switched the criterion to classify a response latency as an extreme outlier. Instead of excluding response latencies longer than 6,000 ms, I changed the cut-off point to 4,000 ms. This cut-off point again represents approximately 2 x median + 1000 ms (see Appendix F2).

Evaluations. Since the analyses in Studies 2 and 3 revealed a tendency for an influence of similarity between target and standard on the speed of the comparison, I first checked whether this similarity differs between the two conditions. However, this was not the case. Averaged over the six comparison dimensions used in the critical fifth block of the experiment, participants in both conditions perceived the target and the standard as equally similar, $M_{comparison} = 3.89$ and $M_{evaluation} = 3.94$, $t < 1$.

Response latencies. I hypothesized that participants would be faster comparing two persons if they had compared these persons in the block preceding the critical block instead of evaluating them separately. This was indeed the case. Participants in the repetitive comparison condition needed on average 1,547 ms to compare Person A with Person B on one of the six critical dimensions, whereas participants in the repetitive evaluation condition needed 1,808 ms, $t(64) = 2.03$, $p < .05$. Thus, my hypothesis was confirmed.

Discussion

I compared the speed of comparison after previous comparisons or after previous evaluations of the target and the standard. During comparisons, participants practice the process as well as activate knowledge about the persons. During evaluations, the same knowledge about the persons becomes activated, but the compari-

son between them is not practiced. Since subsequent to repetitive comparisons participants compared the two persons faster than subsequent to repetitive evaluations I conclude that the comparison process itself became more efficient with practice independently of knowledge facilitation. In this experiment, the effect is bound to the association of a target with a particular standard. This, however, simulates the exact process during self-evaluations based on comparisons with a routine standard – one compares oneself repeatedly with the same standard. Thus, this observed general practice effect with a fixed target / standard combination depicts an important mechanism contributing to the efficiency advantage of the use of routine standards.

Even though the present data support the assumption that the process itself is indeed facilitated in a general practice effect with a fixed target / standard combination, there are still some ambiguities. I tried to create a control condition in which the same knowledge is activated about the target and the standard as in the comparison condition. This seems to be the case if people engage in evaluations. A comparison and an evaluation are based on the same knowledge. However, the equality of the activated knowledge in a comparison and an evaluation may be restricted to single processes. The situation may change if one engages in repeated processes. There is a possibility that new knowledge is gained and activated in the course of the repeated comparisons, which is not gained in the course of repeated evaluation. Participants could, for example, store the result of a specific comparison in memory and apply this knowledge during subsequent trials. Or they might remember a general overall judgment like “positive attributes are possessed by Person A to a greater extent than by Person B” and use this as a rule of thumb in future comparisons. Such a transfer from comparison-based knowledge seems to be especially likely when the dimensions in subsequent comparisons are very similar or related to each other.

However, this was not the case in Study 5. The personal attributes used in block 5 are only loosely associated with the personal attributes in block 4. In a separate experiment I found no significant correlation between the averaged evaluation of a friend on the 14 attributes used in block 4 and the average evaluation on the six attributes used in block 5 (r (41) = -.12, *ns*). Since the personal attributes of block 5 are more heterogeneous than those in block 4 (Crombach's $\alpha_{block\ 4}$ = .78 and Crombach's $\alpha_{block\ 5}$ = .47), I additionally ran separate correlation analyses for the six attributes of block 5. Again, with the exception of the attribute *intelligence* (r (41) = .45, p < .01), I found no association with the average evaluation on the attributes of block 4. These data suggest that a useful transfer of knowledge specifically gained in the repetitive comparison condition is rather limited. Thus, a difference in knowledge or knowledge activation between the two conditions may not explain the facilitation of the comparisons subsequent to repetitive comparisons relative to repetitive evaluation. Instead, a general practice effect with a fixed target / standard combination may be the driving force behind this facilitation, independently of the content processed in the comparisons.

GENERAL DISCUSSION

The main goal of the present research was to demonstrate that there are specific efficiency advantages for standards, which are routinely used during comparative self-evaluations. Prior research (Mussweiler & Rüter, 2003) has shown that people compare themselves with their best friend as a routine standard, even if the standard is not suitable for an evaluation on the actual dimension. Thus, people do not always select standards out of strategic considerations but rely on routine to use the same standard as in prior comparisons. The justification for preferring a routine standard to a statistically selected standard lies in its efficiency. First, the routine to compare oneself repeatedly with the same standard makes an arduous standard selection process unnecessary (for an overview of routines in other decision processes, see Betsch et al., 2002). Second, and this is the focus of the present research, not only the selection process, but also the comparison process itself may be more efficient for comparisons with routine standards than with other standards. However, before the mechanisms causing efficiency advantages in the comparison process of these standards can be looked at in more detail, there has to be unequivocal evidence for the existence of routine standards. Therefore, in the first study I dispelled the ambiguity in the results of our prior research.

This ambiguity in the prior research was caused by the manipulation of the routine standard use. In those studies we compared the accessibility of the best friend subsequent to a self-evaluation and to an other-evaluation respectively (Mussweiler & Rüter, 2003, Study 1 & 2). Since the best friend was more activated than a control standard only after evaluating oneself, but not after evaluating another person, we concluded that the best friend was used as a routine standard in the self-evaluation. However, spreading activation (A. M. Collins & Loftus, 1975) from the self

to the more closely associated best friend would produce a similar pattern in the data. To preclude such an alternative explanation, I used a different manipulation in the present research (Study 1). I compared self-evaluations on absolute scales to self-evaluations on relative rating scales to provoke comparisons in the former, but not in the latter condition (for the difference between these scales concerning comparison processes involved, see Biernat et al., 1991 and Huttenlocher & Higgins, 1971). In line with my hypotheses, I found a higher accessibility of the best friend after comparative self-evaluations on relative rating scales than after absolute self-evaluations. Since in both conditions the self was activated, but participants only had to engage in comparison processes in the comparative self-evaluation condition, these results clearly support the conclusion that the best friend's activation was caused by its use as a comparison standard. Together with the results in the prior research I have thus strong evidence that people evaluate themselves by comparing themselves with their best friend as a routine standard.

On this basis I went on to demonstrate the efficiency advantage of routine standards in the comparison process itself. In two studies, I showed that people are able to compare themselves faster with a routine standard than with another standard. In the first study (Study 2), the routine standard was again participants' best friend. In the second study (Study 3), I extended the evidence to routine standards established in the experiment by repeated comparisons with the self. These results indicate that the mere practice of comparing a person with the self repeatedly facilitates further comparisons with the same standard even if the comparisons take place on new, unrelated dimensions. To explain this facilitation I refer to practice effects in cognitive processes. Based on the research by E. R. Smith and colleagues (E. R. Smith, 1989; E. R. Smith & Lerner, 1986; E. R. Smith et al., 1988), I identified two

mechanisms as potential causes for the efficiency advantage of routine standards: a specific practice effect based on repeated standard-knowledge and a general practice effect with a fixed target / standard combination. The focus of the remaining two studies in the present research is therefore on practice effects in social comparison.

The results in these studies strongly support a speed-up in comparison due to practice. First of all, there are specific practice effects based on the repeated processing of the same content. This effect is most pronounced if the exact same content has to be processed repeatedly. In the case of repeatedly comparing the same standard as well as the same target on the same dimension, the time needed to make the comparative judgment was reduced to half of the original response latency (Study 4, repetition condition). This extreme facilitation may be due to a process described by Logan (1988), who proposed that with repetition people might skip the original process and instead retrieve the correct response from memory. Such a switch is only possible if the exact same process is repeatedly executed. However, I also found a facilitation of comparisons if only a part of the relevant content is repeatedly processed. This was the case when the same standard was repeatedly compared on the same dimension with different targets. In this condition, not all content needed in the comparison was repeated, since the repeated standard-knowledge has to be judged in relation to new target-knowledge. Thus, no memory retrieval could be the basis of this facilitation. Instead, production compilation as described by Anderson (1987) or increased knowledge accessibility (see Anderson & Pirolli, 1984; Higgins, 1989, 1996; Wyer & Srull, 1989) may be the mechanisms underlying this specific practice effect. Interestingly, in my research it made a difference whether the same standard-knowledge or the same self-knowledge was repeatedly involved in the comparison process. There is evidence for a specific practice effect

based on repeated standard-knowledge but not for a specific practice effect based on repeated self-knowledge. Even though the difference in facilitation between these two conditions did not reach significance, this pattern may nevertheless hint at an influence of knowledge accessibility on the specific practice effect. Self-knowledge is better organized and easier accessible than knowledge about others (see Andersen et al., 1998; Markus, 1977; Prentice, 1990) and thus its accessibility may not increase as much as the accessibility of standard-knowledge due to repeated activation (see Higgins et al., 1985). However, the experiments in the present research were not designed to differentiate precisely between the different mechanisms involved in specific practice effects. I wanted to show that the practice effects, which may cause the efficiency of routine standards, indeed facilitate the comparison process. This was clearly the case for the specific practice effect based on repeated standard-knowledge.

However, I also proposed a second mechanism. Since routine standards are used in comparative self-evaluations regardless of the particular dimension, the standard-knowledge relevant for an actual comparison may not be processed in prior comparisons. Thus, if routine standards possess a general efficiency advantage relative to other standards, it additionally has to be based on a general, content-free practice effect. Whereas specific practice effects would be too limited, a general practice effect with a fixed target / standard combination would explain the efficiency of routine standards during self-evaluations. Supporting my hypotheses, in Study 4 the response latencies for comparisons decrease in the process condition, in which the self was repeatedly compared with the same standard but on changing dimensions. Because of the changing dimensions, the comparison-relevant knowledge of the self and the standard (i.e., the content) differ from trial to trial, but the comparison

process itself remains the same. Likewise in Study 5, the comparisons between a target and a standard were facilitated after practicing the comparison process relative to activating the target-knowledge and standard-knowledge. These results strongly support a general practice effect for a fixed target / standard combination. Conversely, if the process is even more generalized and the repetition is reduced to the pure comparison process with changing targets and standards, no practice effect occurs (Study 4, random condition).

What do these observed practice effects in social comparison imply for the advantages of routine standard use in self-evaluation? The specific feature of routine standards is that people frequently compare themselves with these standards and the standard selection is not based on considerations about the particular comparison dimension. Thus, repetitive comparisons on different dimensions with a fixed target / standard combination is typical for the use of routine standards in social comparison. The general practice effect observed in Study 4 and Study 5 may therefore be of special interest to explain the advantage of routine standards. If only specific practice effects had emerged, this could have meant that routine standards are not more efficient than other standards in self-evaluations on new dimensions. For a specific practice effect the same content has to be repeatedly processed. However, previously comparing on other dimensions would not necessarily involve the particular knowledge needed for the comparison on the new dimension. The actual comparison-relevant knowledge about the routine standard may never have been processed before. Nevertheless, specific practice effects may also contribute to the efficiency of routine standards. As pointed out before, different comparison dimensions (i.e., traits) may be associated with each other and therefore comparison-relevant knowledge (i.e., behavior) may overlap. In other words, the same behavior

may be characteristic for several traits (Srull & Wyer, 1979). Thus, the more often a particular standard has been used in comparisons with the self, the more likely it is that knowledge about this standard useful for an upcoming comparison has already been used, even if the new comparison does not occur on exactly the same dimension. Since routine standards are used more often than other standards, such a specific practice effect increases their efficiency. In addition, people may also evaluate themselves on the same dimension again and again (see Wheeler & Miyake, 1992). A routine standard used previously to evaluate oneself on the same dimension would then be especially advantageous, because the process of relating comparison-relevant standard-knowledge to comparison-relevant self-knowledge has been conducted before and is therefore facilitated.

An accumulation of these practice effects could explain the speed-up of comparisons with routine standards in contrast to other standards (Studies 2 and 3). Thus, several mechanisms work together to increase the efficiency of a particular standard. Some of the mechanisms are general and on a procedural level, but others, like standard-knowledge accessibility, are content-specific. This mixture of mechanisms may cause a certain variation in the efficiency of a routine standard. A routine standard may not be equally efficient in any comparison, because the share of facilitation due to specific practice effects depends on the comparison dimension. If a person is, for example, strongly associated with a particular dimension, content-specific practice effects may substantially enhance the efficiency of comparisons with this standard on this particular dimension. Under these circumstances, this standard may even be more efficient than other, more frequently used standards that profit only from general practice effects. Still, the general practice effect with a fixed target / standard combination produces a continuous increase of the routine standard's effi-

ciency. With every use, the comparison between the self and the routine standard becomes increasingly practiced.

Taken together, the efficiency advantage of routine standards during self-evaluation is based not only on the lack of necessity for an arduous standard selection, but is additionally supported by the facilitation of the comparison process itself. The efficiency of routine standards may provide an explanation as to why people base self-evaluations on comparisons with these standards and dispense with strategic considerations to select the most suitable standard. Social comparison is conducted very frequently and efficiency may be an important issue. People compare themselves with others in order to evaluate their own abilities, personal attributes, or opinions (Festinger, 1954; Suls et al., 2002; J. V. Wood & Taylor, 1991). Moreover, the self-evaluation relative to the social reality is often more relevant than a self-evaluation on a more absolute scale (W. M. Klein, 1997). In other words, social comparison is a major source for gaining self-knowledge (Baumeister, 1998). But people are cognitive misers (Taylor, 1981) and prefer processes they can carry out quickly and easily (e.g., Chaiken, 1980; Fazio, 1990b; Fiske & Neuberg, 1990; Petty & Cacioppo, 1986). The preference for efficient processes over more elaborate ones has been observed in many different areas (for an overview see Moskowitz, Skurnik, & Galinsky, 1999). People rely on stereotypes instead of noticing individuating information while perceiving another person (Neuberg & Fiske, 1987), they are influenced by easily available but peripheral cues but not by the quality of the arguments while listening to a persuasive message (Petty & Cacioppo, 1984), and they tend to stick to used behavior even though this may be inconsistent with their present attitude toward this behavior (Verplanken & Aarts, 1999). In all these cases, people engage in efficient processes even though more arduous and elaborated processes may provide a

more accurate result (for the limitations of elaborate processes and the accuracy of efficient processes see Gigerenzer, Todd, & ABC research group, 1999, and Simon, 1956). In self-evaluation, people may likewise choose the most efficient way of making a judgment by comparing themselves with a routine standard. The widespread use of the best friend as a natural routine standard in self-evaluation (Study 1; Mussweiler & Rüter, 2003), the preference of previously used standards over other standards (Mussweiler & Rüter, 2003), and the efficiency of comparisons with routine standards (Studies 2 & 3) due to specific and general practice effects (Studies 4 & 5) support this conclusion. However, the research on routine standards in social comparisons is still in its infancy and there are several questions that remain open.

Open questions with regard to routine standards

The present research indicates that routine standards provide an efficiency advantage over other standards, which may justify their use in self-evaluation. In future research it could be beneficial to focus on further aspects in order to gain a deeper understanding of the advantages and disadvantages as well as the applicability of routine standards. Firstly, one could investigate whether the efficiency of routine standards increases not only in speed but also in terms of other aspects of efficiency. Secondly, the circumstances under which people rely on comparison with routine standards in their self-evaluations still need to be identified. There have to be factors moderating the choice between strategically selecting a comparison standard and taking the efficient route of comparing oneself with a routine standard. Finally, it is important to find out whether and to what extent routine standards violate strategic considerations and norms in standard selection. Answering these three questions would substantially improve our understanding of the use of routine standards in social comparison.

More than speed

The main focus of the present research was to demonstrate the efficiency advantage of routine standards. However, efficiency is more than just speed. So far I have only demonstrated that people could compare themselves faster with their routine standard than with other standards, but efficient processes are also characterized by their minimal demand for cognitive capacity (Bargh, 1994; E. R. Smith & Lerner, 1986). Cognitive capacity is a limited resource and has to be divided between processes one simultaneously engages in (see Navon & Gopher, 1979; Wickens, 1980). Thus, the more efficient a process becomes, the more cognitive capacity remains available for other processes being executed at the same time. A dual task is therefore the typical paradigm with which to test for efficiency in the sense of reduced capacity consumption (e.g., Bargh, 1982; Odgen, Levine, & Eisner, 1979; Wickens, 1976). In such a task, participants are asked to work on two parallel assignments. In a study by Macrae, Milne and Bodenhausen (1994), participants had to form an impression of a target person and simultaneously perform a secondary probe-reaction task. The attentional resources not needed for the impression formation task would then determine the response latencies in the secondary task. In this research, Macrae and colleagues (1994) tested and confirmed the hypothesis that an activated stereotype facilitates impression formation. In the area of comparison processes, Mussweiler and Epstude (2004) used a similar paradigm to demonstrate the efficiency of comparative judgments. If their participants were primed to think in a comparative manner while simultaneously evaluating an object and listening to a story, they were subsequently able to retrieve more details about the story than participants who were not primed. I would expect similar results concerning the resource preservation potential of routine standards in self-evaluation. People should have more

cognitive capacity free while engaging in comparisons between themselves and a routine standard than while executing less practiced comparison processes. Such research would complete the notion of the efficiency of routine standards in social comparison.

Furthermore, it would be worthwhile to consider whether comparisons with routine standards are not only highly efficient but occur automatically. High efficiency is one characteristic of automatic processes (Bargh, 1994) and automaticity develops through practice (Shiffrin & Dumais, 1981). Thus, the high efficiency of comparisons with routine standards due to practice effects may lead to the assumption that these comparisons are also characterized by other aspects of automatism, which are unawareness, unintentionality, and uncontrollability (Bargh, 1994). Even though all four characteristics are rarely combined in a single process (Bargh, 1989, 1994), comparisons with routine standards may also possess one of the remaining characteristics. For instance, Gilbert, Giesler, and Morris (1995) pointed out that comparisons with standards that are highly salient in the comparison situation are uncontrollable. In this study, participants compared themselves with present but undiagnostic standards and were only able to undo this comparison by a subsequent correction process. Likewise, comparisons with routine standards may be uncontrollable and automatically executed, not because of their salience but because these specific comparisons are highly practiced.

Moderating factors for routine standard use

Most of the research into social comparison and standard selection carried out so far focuses on arduous and elaborate processes in self-evaluation (for an overview see J. V. Wood, 1996 or Suls & Wheeler, 2000b). A standard selection based

on the ability of the standard to satisfy a particular motive is a prominent alternative to a routinized standard selection process. If people sometimes engage in elaborate standard selection processes and at other times base their self-evaluation on comparisons with a routine standard, one has to ask what moderates the choice between these two options. What determines whether or not people rely on efficient processes and thereby risk being less accurate? In other domains, such a choice between a more and a less elaborate process is described in dual-process approaches like the Elaboration Likelihood Model (Petty & Cacioppo, 1986), the heuristic-systematic model (Chaiken, 1980), the MODE model (Fazio, 1990b), or the continuum model (Fiske & Neuberg, 1990; for an overview of dual processes see Moskowitz et al., 1999 and E. R. Smith & DeCoster, 2000). In all these models people come to a final judgment either with considerable thinking and information processing, or by using a short-cut or a rule of thumb. The Elaboration Likelihood Model (ELM), for example, describes two routes to persuasion and attitude change (Petty & Cacioppo, 1986). If people use the central route, they change their attitude due to relative extensive and effortful information-processing activities. They thereby pay attention to and weigh up the central arguments and merits of the persuasive message. Peripheral-route attitude change, on the other hand, requires less cognitive effort. In this route the change is based on peripheral cues like expertise of the information source and number of arguments, or on low-effort mechanisms like classical conditioning or mere-exposure effects (Petty & Wegener, 1999). Due to these different mechanisms, a central-route attitude change seems to be more rational than a peripheral-route one. Effortful scrutiny is usually perceived as the best way to evaluate how good an attitude object really is. However, the ELM postulates that people are nevertheless often persuaded by peripheral cues. It is neither adaptive nor possible to always spend considerable cognitive capacity on a message or an attitude (Petty &

Wegener, 1999). In the ELM, the peripheral and the central route are the end-points of an elaboration continuum. To what extent a person engages in a central-route information processing depends on his or her motivation and ability and varies along this elaboration continuum. Only people at the high end of the elaboration continuum effortfully scrutinize all available objective-relevant information. As in other dual-process models (e.g., MODE model by Fazio, 1990b), motivation and ability are both essential to trigger effortful information-processing activities. If a person is highly motivated but not able or, on the contrary, certainly able but not motivated, he or she will not reach the high end of the elaboration continuum.

Motivation and ability (i.e., available cognitive capacity) are also possible moderators determining whether people engage in an elaborate standard selection process or execute the routine to use the same standard as in previous comparisons. If one were highly motivated to come to an accurate self-evaluation and in addition had enough time and cognitive resources, one would be very high on the elaboration continuum. In this case, people would choose the comparison standard very carefully. They would engage in effortful information-processing activities and try to scrutinize all available information about different standards to finally base their judgment on a comparison with the most diagnostic standard. Under such circumstances, the particular advantage of routine standards, their efficiency, may be meaningless. The situation may be quite the opposite if the ability to process information is restricted. In the ELM, people base their attitude on peripheral cues of a persuasive message if they are distracted or under time constraints (Petty, Wells, & Brock, 1976; Ratneshwar & Chaiken, 1991). In this case, they use information that is easy to perceive and easy to process like the expertise of the author, the number of arguments, or the quality of the first argument (Petty & Cacioppo, 1984; Petty, Cacioppo, & Goldman,

1981). Likewise, people engaging in self-evaluations under time constraint or with limited cognitive capacity might also rely on easily available information that they could efficiently process – they might rely on their routine standard. In such a situation, efficiency is highly important and therefore an elaborate standard selection process may be unpractical regardless of a high motivation to make an accurate judgment. In other situations one may even lack this motivation. For people who are not motivated to engage in elaborate information-processing, an efficient route is especially attractive. The motivation could thereby be influenced by the consequences of the judgments. People are more willing to carefully analyze and weigh up each argument in a persuasive message if the topic of the message has a high self-relevance (Petty & Cacioppo, 1979, 1990). In the same sense, people may overcome the tendency to compare with their routine standard if decisions based on self-evaluation have severe, personal consequences. For example, if you are thinking about marrying your partner, you want to be really sure that you are happy and satisfied in your relationship. Other motives in social comparison like self-enhancement or self-improvement (see J. V. Wood & Taylor, 1991) could be strong and determine the standard selection process as well. If one's self-esteem is severely shattered one may choose a comparison partner very carefully. Likewise, if one pursues an important personal goal, one may watchfully compare oneself with the most helpful standard.

Thus, the mediators identified in other dual-process theories in which people either engage in effortful information-processing activities or apply more efficient processes could be easily transferred to social comparison. The likelihood that people rely in their self-evaluations on comparisons with routine standards may be espe-

cially high if the motivation and / or the ability to engage in a strategic but arduous standard selection process is less pronounced.

The perspective of norms and strategy

So far I have aimed to point out that comparisons with routine standards are especially efficient. This efficiency distinguishes routine standards from strategically selected standards. However, by opposing these two routes in standard selection I may implicitly provoke the expectation that routine standards are also less suitable than other standards. If a strategic standard selection is much more effortful, one would assume that it should at least lead to a more accurate judgment in the self-evaluation. However, this does not necessarily have to be the case. Research on the accuracy of heuristics in decision-making indicates, for example, that decisions based on rules of thumb are often quite accurate compared to the normative benchmark of optimizing models like multiple regression (Martignon & Hoffrage, 1999). Even though the fast and frugal rules demand less information and computational power, they nevertheless supply satisfying results (Martignon & Laskey, 1999). In the case of social comparison, there are no studies demonstrating to what extent self-evaluations based on routine standards diverge from self-evaluations based on strategically selected standards. However, one can try to judge the suitability of routine standards by comparing the characteristics of routine standards with those of strategically selected standards.

From a strategic point of view, people aiming to gain an accurate self-evaluation should select standards that provide diagnostic information. Since in the domain of social comparison similarity breeds diagnosticity (Festinger, 1954; Goethals & Darley, 1977), this would speak for the use of similar standards. Thus, if

in general, routine standards were rather similar to the comparers, they would even meet the demands of a strategic standard selection process. However, the main characteristic of routine standard is that they are frequently used and not that they are similar. On the other hand, this frequency may go hand-in-hand with similarity. To establish a routine, one needs to engage in many comparisons with a particular standard (see Betsch et al., 2002). For this reason, routine standards are likely to be close to the comparer. The more a particular person is embedded in the comparer's daily routines, the more opportunities occur to compare with this person (see Wheeler & Miyake, 1992). Thus, since we typically surround ourselves with people who are generally similar to us (Berscheid & Reis, 1998; Byrne, 1997) and since routine standards are typically persons who tend to be closer to oneself, the frequently used standard may at the same time be a reasonable similar one. Routine standards are not by definition similar to the self, but on average they are likely to be so.

Another aspect of the suitability of routine standards depends not on the personal motives of the person engaging in self-evaluations but on norms given in the comparison situation. Often people evaluate themselves on a particular dimension because they are asked to do so. In this case, conversational norms may guide the standard selection. Conversational norms urge people to follow cooperative principles (Grice, 1975), which require them to provide an appropriate amount of information (Maxim of Quantity), to tell the truth (Maxim of Quality), to be as clear as possible (Maxim of Manner), and to make contributions relevant to the aims of the ongoing conversation (Maxim of Relation/Relevance) (see also H. H. Clark & Clark; 1977). Such norms are necessary, since it is not sufficient to decipher the meaning of single words or to understand the grammar of the sentence in order to establish a successful communication. Instead, one has to depict the intended meaning of an utterance.

People rely on these conversational norms even in rather arbitrary communications like standardized question situations (Strack & Schwarz, 1992) and are heavily influenced by indirect information about the intended meaning of a question (e.g., N. Schwarz, Strack, Hilton, & Naderer, 1991; N. Schwarz, Strack, Müller, & Chassein, 1988). In the case that one is asked to evaluate oneself on a particular dimension, the intended meaning may be hidden in an assumed standard. The research on shifting standards clearly demonstrates that the answers to evaluative judgments differ depending on the point of reference (e.g., Biernat & Manis, 1994; Biernat et al., 1997; Biernat et al., 1991). However, the point of reference or the standard of an evaluation is mostly not specified in the conversation. Imagine somebody asking how athletic you are. The questioner may want you to judge your athletic ability relative to the average person of your age and sex, but this standard is not specified in the question. It is the task of the answerer to infer the right standard from cues such as the situation, the cultural norms, or the personal history of the person asking the question. You might, for example, assume that a professional fitness coach has different standards in mind than your obese nephew and therefore pronounce yourself to be less athletic while talking with the former than with the latter.

Thus, in a conversation in which a person answers a question about his abilities and attributes, conversational norms would require that both communicators have the same, or at least very similar standards in mind. To judge the suitability of routine standards under these specific circumstances, one has to estimate the similarity of the routine standard to the standard intended by the person asking the question. If one thinks about a standardized question situation the similarity may be rather low, since the intended meaning of the question, and thus the intended standard, should be the same for each person answering the questionnaire. An appropriate

standard would therefore be an average person from which a particular routine standard could widely differ. However, in a standardized question situation the motivation to fulfill the cooperative principles is rather high (Strack & Schwarz, 1992) and, as outlined above, this may motivate people to engage in more elaborate standard selection processes.

The suitability of routine standards may be higher in a personal conversation. This may be the case since personal conversation often occurs between members of a particular group about group-relevant topics (Levine & Moreland, 1998). You may discuss your work-related abilities with your colleagues, but talk about your athletic abilities with your friends in the sports club. If both communication partners belong to the same group, group norms or the average level of the group members influences the standards for evaluations (see Davis, 1966; D. T. Miller, Turnbull, & McFarland, 1988). At the same time, not only one's communication partner, but also one's routine standard may be domain specific. As I pointed out earlier, the efficiency of a routine standard varies with the comparison dimension due to content-specific practice effects. If one often compares oneself with one particular person on dimensions related to one domain, the specific practice effect facilitates further comparisons in the same domain. This specific practice may thus establish this person as a routine standard for comparisons in this domain, even if one has other routine standards in other domains. Since people compare with ingroup standards more often (see D. T. Miller & Prentice, 1996; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987; H. J. Smith & Leach, in press), it is very likely that a domain-specific routine standard is also member of one's ingroup. The point is that domain-specific routine standards (like your office mate in the work domain and your squash partner in the sports domain) may thus belong to the same group as both communication partners and

therefore may not diverge substantially from the average group level. In other words, if two group members talk about group-relevant abilities, attributes, or attitudes, the domain specific routine standard of one person may be sufficiently similar to the standard of the communication partner to guarantee a successful conversation.

Even though the above attempt to evaluate the suitability of routine standards in social comparison from a normative point of view remains somehow speculative, it nevertheless emphasizes that efficiency and strategic or normative considerations do not need to be at odds. Routine standards may be sufficiently diagnostic and may fulfill conversational norms. Thus, they may not constitute considerably less suitable standards than elaborately selected ones. However, one could also consider that the use of a routine standard and the elaborate selection of the most suitable standard do not have to be exclusive choices. It does not necessarily have to be the case that one compares either with a routine standard or with a normatively suitable standard. Instead, it is quite possible that people base their self-evaluation on more than one standard. In another line of research, we (Rüter & Mussweiler, 2004) confirmed this assumption empirically. The main hypothesis states that people compare themselves with a range of several possible standards and not only with a single, most suitable standard. In one experiment participants evaluated their level of conscientiousness when they were at high school. Subsequently, we assessed the activation and accessibility of a range of participants' classmates. If the self-evaluation had been based on the single comparison with the most similar standard, as Festinger (1954) suggested, only this standard should have been activated. However, this was not the case. Instead, several classmates were activated and accessible. This result led to the conclusion that the self-evaluation was based on comparisons with several standards. In this experiment the standards used were not classified as routine standards

or strategic standards. The consideration of multiple standards, however, includes the option of the simultaneous use of both kinds of standards. Thus, the use of routine standards may increase the efficiency of evaluations based on comparisons with multiple standards, whereas the inclusion of more elaborately selected standards guarantees that norms are not violated.

Consequences of routine standard use

So far I have discussed the results in the present research concerning the efficiency advantage of routine standards and some open questions about the applicability of routine standards in comparative self-evaluation. However, assuming that routine standards exist and are frequently used to compare oneself with, one also has to consider consequences of routine standard use. Does it make a difference whether one compares oneself with a routine standard or with any other standard? Are there any long-term consequences if one frequently bases one's self-evaluation on comparisons with the same standard? Next, I will discuss two potential areas of research and outline how these could be integrated into research on routine standards.

Emotional consequences

Self-evaluations based on social comparisons do not remain without emotional consequences (e.g., Buunk, Collins, Taylor, Van Yperen, & Dakof, 1990; Tesser et al., 1988). The research on self-enhancement focuses on this aspect. One possibility to feel good about oneself is to engage in downward comparison (Hackmiller, 1966; Wills, 1981). Especially when people experience misfortune or threat, they frequently compare themselves with an inferior standard in order to provoke a positive comparison result for themselves (Wills, 1981; J. V. Wood et al., 1985). On the other hand, a

person confronted with an unfavorable comparison, i.e., a superior standard, is likely to feel bad about him or herself. Brickman and Bulman (1977) wrote, “If two people compare themselves on a valued dimension … someone will feel bad”. To forecast the emotional consequences of social comparison more precisely, Tesser formulated the self-evaluation maintenance (SEM) model (Tesser, 1991; Tesser et al., 1988). He stressed that the superior performance of another person does not necessarily have to be frustrating, but can also entail positive consequences for the self. The idea is that one sometimes basks in the reflected glory of another’s good performance (Cialdini et al., 1976). Thus, the SEM distinguishes between a reflective process that could lead to positive feelings after the confrontation with a superior standard and a comparison process that more likely leads to negative feelings. Whether one engages in reflection or in comparison as well as the intensity of the produced emotion depend on three factors: closeness between the comparer and the standard, self-relevance of the comparison dimension, and performance. One could most easily bask in reflected glory if the standard is close to oneself, the performance of the standard is excellent and the relevance of the dimension on which the standard is superior is rather irrelevant for the self. On the other hand, if the dimension is self-relevant, a comparison process is more likely to occur and a close and superior standard would threaten one’s self-evaluation. Meanwhile, if the standard’s performance is only slightly better than one’s own, the threat of comparison and also the joy of reflection decrease. The same is true for standards that are not close to the self. One could hardly be proud of (and is unlikely to feel bad about) the excellent performance of a stranger. Thus, the relative performance and the closeness determine the intensity of the emotional consequence, whereas the relevance of the other’s performance to one’s self-definition determines the relative importance of the reflection and the comparison processes (Tesser et al., 1988).

Since the SEM postulates that the three factors relevance, performance, and closeness determine the emotional consequences of comparison, one could try to judge the routine standard on these dimensions to make predictions about the emotion elicited by comparisons with routine standards. To do this it has to be taken into account that the use of routine standards is not dimension specific. On the contrary, routine standards are repeatedly used regardless of the particular comparison dimension. Therefore, hardly any predictions could be made about routine standards concerning the two factors performance and relevance. On some dimensions the routine standard may be better than oneself and on others it may be worse. Likewise, the use of routine standards is not limited to comparisons on dimensions with a specific self-relevance. Even though a high self-relevance may increase the motivation of comparers to engage in an elaborate standard selection process (see pp. 103-106), comparisons with routine standards are also possible on such dimensions. However, routine standards may be less variable regarding the factor of closeness. As outlined above, people with whom one frequently compares oneself and who therefore are likely to become routine standards are likely to be closer to oneself. Only if there are many opportunities throughout one's daily life could one possibly compare with the same person repeatedly. I would therefore expect any routine standard to be likely to be close to oneself. Because of this closeness, the SEM would predict rather severe emotional consequences for comparisons with routine standards.

On the other hand, closeness is not the most important characteristic of a routine standard. Not everybody who is close is a routine standard. More important than the closeness is the frequency of comparison. This frequency of comparison may also influence the intensity of emotional consequences. W. Wood, Quinn and Kashy (2002) speak of "… subdued emotions … people experienced when performing be-

haviors habitually". They implemented a diary methodology with which they assessed people's thoughts and emotions while engaging in either habitual or non-habitual behaviors. As expected, the authors found less reported increase or change in the intensity of emotion at times when participants indicated being engaged in habitual behaviors. Even though this research deals with overt behavior, the same could be expected for habitually executed cognition. Habit performance reflects the routine repetition of past acts (Ouellette & Wood, 1998), and therefore the execution of comparisons with routine standards, which are highly practiced and repeatedly conducted, is an habitual activity. Thus, if habitual activities in general attenuate emotional intensity, one would expect that comparisons with a routine standard are accompanied by less intense emotions than comparisons with other standards.

Taken together, these two lines of research allow no specific predictions to be made concerning the emotional consequences of comparisons with routine standards. On the one hand, the closeness of the routine standard to the self implies the potential danger of threatening comparisons if the standard is superior, while on the other hand the frequency of the comparison with routine standards may lead to less intense emotions initiated by the comparison. But if the frequent use of routine standards indeed provides a buffering function to the emotional consequences, this could be an additional advantage of routine standards besides their efficiency.

People suffering from unfavorable comparison tend to avoid further comparisons (Brickman & Bulman, 1977; J. V. Wood, 2000). In the article "Can friendship survive success?", Powers (1975, cf. Brickman & Bulman, 1977) describes the destructive forces of upward comparison. However, since comparisons with superior standards also provide certain advantages, this avoidance comes with a cost (Taylor & Lobel, 1989). If, for instance, people find themselves in threatening circumstances,

they have to find a way to solve the threatening problem. In such a situation, contact to superior standards could be helpful and even inspiring (Brickman & Bulman, 1977; Taylor & Lobel, 1989). Superior standards can provide information on how to solve problems (Taylor & Lobel, 1989) and serve as a model for improving oneself (Berger, 1977). Therefore, a buffering function of routine standards could sustain that people engage in comparison even on dimensions on which they perceive themselves as rather unskilled or unfavorable without risking severe emotional consequences. Comparisons with a superior routine standard could be as helpful as, but less harmful than comparisons with other superior standards.

Cognitive consequences

Besides emotional consequences of social comparison there is also extensive research on the cognitive consequences in self-evaluation (see e.g., Mussweiler, 2003a; Pelham & Wachsmuth, 1995; Stapel & Koomen, 2000). In general, social comparison could yield two contrary effects: either the self-evaluation is assimilated toward the standard, or the self-evaluation is contrasted away from the standard. Whether assimilation or contrast occurs in a particular comparison depends on several moderators, such as category membership (Mussweiler & Bodenhausen, 2002), extremity of the standard (Herr, Sherman, & Fazio, 1983; Mussweiler & Strack, 2000a), mutability of the self (Stapel & Koomen, 2000), or closeness between self and standard (Brewer & Weber, 1994; Brown, Novick, Lord, & Richards, 1992). In the Selective Accessibility Model (SAM), Mussweiler (2003a) proposed that all these moderators produce assimilation or contrast through a common process. He suggests that the final judgment is based on knowledge that was made accessible during the comparison process. In the comparison, however, one can either test that the self and the standard are similar and, thus activating standard-consistent self-knowledge,

or one selectively activates standard-inconsistent self-knowledge to support the hypothesis of a dissimilarity between the self and the standard (Mussweiler, 2001a). Thus, similarity testing in social comparison yields assimilation, whereas dissimilarity testing produces a contrasting effect. The decision to test on similarity or on dissimilarity is based on an initial holistic assessment of the similarity between the self and the standard on a small number of salient features (see Mussweiler, 2003a). Since the aforementioned moderators all influence this initial assessment, the SAM provides an integrative framework for research on assimilation and contrast effects in social comparison. Extremity of the standard (Herr, 1986; Mussweiler et al., in press) and limited mutability of the self (Lockwood & Kunda, 1997; Stapel & Koomen, 2000), for example, is likely to yield dissimilarity testing, whereas an identical category membership (Brewer & Weber, 1994; Mussweiler & Bodenhausen, 2002) and perceived similarity (Brown et al., 1992; Mussweiler, 2001a) between self and standard increase the likelihood of similarity testing. To predict the evaluative consequences of comparisons with routine standards, one therefore has to judge the routine standard on these moderators.

Similar to the lines of argument on emotional consequences of comparisons with routine standards, one would again imagine a routine standard to be rather close to the self. In view of this, a stronger tendency toward similarity testing seems reasonable. On the other hand, even a routine standard as the best friend would not share all category memberships with the comparer, and depending on the salience of such categories (see Bodenhause & Macrae, 1998; McGuire & McGuire, 1988), the routine standard, too, may be initially assessed to be dissimilar. The same may be true if one looks at dimension-specific features. One quality of routine standards is that they are used to evaluate oneself on a great variety of different dimensions.

Therefore it is unpredictable how similar the routine standard may be on a particular dimension. On some dimensions he or she may be a moderate standard and on other dimensions an extreme standard and thus the self would either assimilate toward or contrast away from the standard (see Herr, 1986; Mussweiler, 2003a; Mussweiler et al., in press). Finally, features belonging to the self, like mutability, do not vary with the standard. If the self is perceived as mutable on a particular dimension it makes no difference whether one compares oneself with a routine standard or with another standard. Taken together, comparisons with a routine standard are not exclusively connected with either similarity testing or dissimilarity testing. Similarity testing and thus assimilation may be more likely due to the perceived closeness to the routine standard, but there are many other influences, which could override this moderator and yield to a contrast in a particular comparison.

So far I have discussed the cognitive consequences of comparisons with routine standards with regard to a single comparison. Another possibility would be to look at the cognitive consequences of repeated comparisons with a routine standard. Freytag and Fiedler (2003) recently suggested that repeated comparisons on a given dimension cumulate in a single judgment. Therefore, the more the respective comparisons differ in their results, the more variable the final judgment will appear. However, the variability of the results in the respective comparisons greatly depends on the variability of the standards. Thus, if one compares oneself with many different standards, the comparison results may vary to a greater extent than if one compares oneself with similar standards. Obviously, the comparison context is maximally stable if one repeatedly compares with the same standard. Freytag and Fiedler (2003) argued, for example, that the outgroup is perceived as more homogeneous than the ingroup, because the outgroup is typically compared with the always identical in-

group, whereas the ingroup is compared with several different outgroups. On the individual level a similar effect occurs. Since an evaluation of another person is typically based on comparisons with the self (Dunning & Hayes, 1996), such an evaluation is embedded in a stable comparison context, which results in a stable judgment of the other person. The comparison context for the self, on the other hand, seems to be less stable. Thus, it is not surprising that a great body of research verifies that people perceive themselves in regard to their behavior (e.g., Jones & Nisbett, 1972) and personal attributes (e.g., Prentice, 1990; Sande, Goethals, Radloff, 1988) as more variable and context-dependent than others. However, there is also evidence for the need to perceive the self as consistent and stable (Baumeister, 1998; Greenwald, 1980; Swann 1987). If one does always compare oneself with a wide variety of different standards, it is difficult to gain such an invariable self-concept. The notion of routine standard changes the situation. Comparisons with routine standards may provide the necessary stability in the comparison context. The once adopted self-concept could in this way be confirmed by repeated comparisons with the same standard.

Transfer to applied fields – an example

In this final part of the discussion I will consider how the knowledge about routine standards in comparative self-evaluation could be fruitfully used in relevant areas of applied social psychology. Social comparison is a very basic cognitive activity that accompanies people throughout their daily lives (Wheeler & Miyake, 1992). A better understanding of the mechanisms involved in social comparison may help to predict standard choice, comparison outcomes, and comparison consequences. Even though research on routine standards and practice effects in social comparison is only in its infancy, some interesting considerations could still be inferred. One applied

field in which social comparison theory has made substantial contributions is health psychology. In their historical overview of this cooperation, Buunk, Gibbons and Reis-Bergan (1997) point out that “social comparison theory is one of the most fruitful and most important [approaches] for application to health-related cognitions and behaviors”. I will therefore outline how knowledge about practice effects in social comparison may be applied to this field.

A major part of social comparison research in health psychology focuses on downward comparison or, more generally, on comparison as a coping strategy. Based on research by Wills (1981) and Taylor, Wood and Lichtman (1983), Gibbsons and Gerrard (1991) describe downward comparison as an emotional-focused coping strategy. Whereas Wills (1981) was among the first to recognize the adaptive potential of downward comparison to overcome the aversive consequences of a threatening situation, Taylor, Wood, and Lichtman (1983) found the earliest empirical evidence of downward comparison in the field. They asked women with breast cancer how well they were adapting compared to other women and from eighty percent of the patients were given the answer that they were doing better or much better than others. Thus, these women used downward comparison to reduce their emotional discomfort. The same strategy may be used by depressed people to overcome their negative self-view. People with depression tend to interpret social comparison information more negatively than non-depressed people and engage more often in upward comparison (Ahrens & Alloy, 1997). However, they also seek downward comparisons in order to cope with their circumstances. In one experiment, Gibbons (1986) asked participants to write down a negative life event. Afterwards, participants were allowed to look at stories describing positive or negative life events of other people. Depressed participants were found to look at more negative stories so as to

restore their self-esteem. Thus, depressed people tend to engage in upward comparisons but, on the other hand, could cope with their depression by engaging in downward comparison. A goal in therapy would therefore be to help depressed people to overcome old comparison habits and to engage more in downward comparison. Practice may provide the key in establishing such a new comparison tendency.

We know that people prefer standards they have practiced to compare themselves with. The more one practices a comparison with a standard, the more this particular comparison is facilitated and the greater the likelihood that one will compare with the same standard again. Thus, practice could be a way to influence the choice of comparison standards. Depressed people could be trained to compare with lateral or even downward standards instead of upward ones. Such an approach would be in accordance with the cognitive theory of depression described by Aaron Beck (Beck, 1976, 1987). In this theory Beck identified characteristic negative schemata and beliefs, pessimistic perception of the self, the world, and the future, and biased inferences and attributions as the main factors causing depression. In his therapy Beck tries to overcome these self-destructive cognitive habits, and practicing specific comparisons could be a part of this. Practice effects leading to more favorable comparisons unfold their effect on an unconscious level. One does not have to gain a thoughtful insight into one's own destructive cognitive structures or accept the irrationality of one's own assumptions and conclusions. By repeatedly comparing with supportive standards, this helpful cognitive activity becomes increasingly easy and the likelihood of doing so again increases. Thus, practicing supportive comparisons would be a good supplement to conscious efforts to change maladaptive cognition and information processing.

Even though the observed practice effects in the present research contain the potential to implement particular comparison preferences, this option is useless unless one identifies supportive comparison standards. Downward comparison seems to be a successful coping strategy, but it may not always be the best choice. For instance, Taylor and Lobel (1989) stress in their work the positive influence of upward contact. Thus, it may be some time yet before the results gained in the present research are translated into concrete advices and conclusions in applied fields like health psychology.

Conclusion

In this research I wanted to look at practice effects in social comparison and the particular significance of routine standards. Whereas traditional research on standard selection (for an overview see J. V. Wood, 1996; J. V. Wood & Taylor, 1991) mostly focused on goal-oriented and strategic standard selection processes, this research sets out to integrate social cognitive knowledge, ideas, and methods. Researchers from many different fields agree that people's behavior and thinking is not fully determined by rational choices or normative considerations. Quite the contrary, factors like knowledge accessibility, habits, procedural practice, stereotyping, categorization, and many more cognitive processes play an important role. The same is true in social comparison and standard selection. Instead of engaging in an elaborate selection process in every single comparison, people rely on standards they have frequently used in the past (Mussweiler & Rüter, 2003). This preference may be due to the particular efficiency of comparisons with these routine standards. Efficiency has been a neglected factor in standard selection, but the research on routine standards proves its importance. In the present research I found empirical evidence for the efficiency advantage of routine standards and was also able to describe the

processes involved in greater detail. I identified both a specific practice effect due to repeatedly processing comparison-relevant standard-knowledge and a general practice effect based on the facilitation of comparisons with a fixed target / standard combination. These two effects provide an explanation for the increased efficiency of comparison with routine standards even on new dimensions. An awareness of the existence of routine standards in social comparison and the practice effects described above can now enable the influence of efficiency in social comparison to be specified in further research. For instance, one could look at moderating factors in the trade-off between efficient and deliberate standard selections, or calculate the efficiency of standards depending on the actual comparison dimension or on situational and temporal factors. The greater the knowledge gained regarding the mechanisms causing the efficiency of routine standards, the stronger the possibility of detecting the use and the influences of these standards on self-evaluations above and beyond the influences of more strategically selected standards.

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APPENDIX

HISTOGRAM (STUDIES 2-4)

Frequency of responses in a particular response time interval and median (in ms)

Study	trial	<500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	>10000	Median
Study 2	rtbfr1	0	0	0	2	14	21	14	8	7	2	1	2	1	0	0	1	0	0	0	0	1	3039
	rtbfr2	0	0	5	19	12	11	8	4	6	2	0	1	1	1	0	1	2	0	0	0	1	2516
	rtbfr3	0	0	4	21	13	14	4	5	1	4	2	0	0	2	1	1	1	1	0	0	0	2460
	rtbfr4	0	0	5	20	19	12	5	5	1	1	1	2	1	1	0	0	0	0	0	0	1	2316
	rtbfr5	0	0	6	17	22	9	8	2	1	4	0	2	1	0	0	1	0	0	0	0	1	2321
	rtefr1	0	0	2	6	12	16	11	13	4	2	3	0	1	2	2	0	0	0	0	0	0	3042
	rtefr2	0	0	3	20	8	18	6	6	2	5	4	2	0	0	0	0	0	0	0	0	0	2602
	rtefr3	0	0	3	16	13	17	7	6	3	3	1	3	1	0	0	0	1	0	0	0	0	2692
	rtefr4	0	0	6	14	23	10	8	2	5	1	1	1	1	1	0	0	0	0	0	0	1	2334
	rtefr5	0	0	7	13	17	9	9	8	5	1	3	0	0	0	0	2	0	0	0	0	0	2521
	Mean																						2528
Study3	rta	0	2	3	12	15	9	1	0	0	1	2	0	1	0	0	0	0	0	0	0	0	2103
	rtb	0	0	6	13	8	10	6	1	1	0	1	0	0	0	0	0	0	0	0	0	0	2138
	Mean																						2121
Study4	rta1	0	0	2	6	20	25	15	12	9	2	3	1	3	1	1	1	3	2	1	1	3	3084
	rta2	0	0	16	15	21	18	13	6	5	4	3	1	2	2	1	0	0	2	0	0	2	2571
	rta3	0	0	16	20	32	15	8	6	5	3	0	3	1	0	0	0	0	1	0	0	1	2291
	rta4	0	5	21	20	19	11	7	9	8	1	0	3	2	0	1	0	0	1	0	0	3	2343
	rta5	0	3	20	17	19	12	8	6	7	3	6	4	0	1	0	1	0	0	2	2	0	2461
	rta6	0	4	16	23	19	14	13	7	4	1	2	1	2	3	0	1	1	0	0	0	0	2397
	rta7	0	7	19	14	19	10	10	12	4	6	0	3	1	2	1	2	0	1	0	0	0	2368
	rta8	0	7	24	21	19	12	7	4	3	3	3	2	2	0	1	0	1	0	0	1	1	2093
	rta9	0	5	18	22	18	16	8	10	7	1	2	0	0	1	0	1	1	0	0	0	1	2211
	rta10	0	9	22	26	14	12	9	4	2	5	1	3	1	1	0	2	0	0	0	0	0	1979
	rtb1	0	0	1	20	18	18	17	10	6	6	5	1	1	1	2	2	2	0	1	0	0	2960
	rtb2	0	0	1	18	23	20	16	9	9	4	2	2	3	2	1	0	0	0	0	1	0	2744
	rtb3	0	0	5	16	22	17	16	13	5	4	3	3	3	2	0	1	0	0	0	0	1	2723
	rtb4	0	1	9	27	21	14	9	6	10	3	1	2	2	1	0	1	0	2	1	1	0	2440
	rtb5	0	2	19	20	21	12	13	7	3	2	2	3	2	1	0	0	0	0	1	0	3	2256
	rtb6	0	4	12	30	20	16	16	7	1	1	2	0	0	1	0	0	1	0	0	0	0	2167
	rtb7	0	1	16	31	15	16	10	5	5	4	3	1	0	1	2	0	0	0	0	1	0	2235
	rtb8	0	3	18	27	24	9	12	8	1	2	3	1	0	1	0	1	0	1	0	0	0	2069
	rtb9	0	5	18	27	19	11	10	3	6	8	0	2	2	0	0	0	0	0	0	0	0	2141
	rtb10	0	6	17	23	22	15	6	5	7	2	3	0	1	1	0	0	1	0	0	1	1	2135
	rtc1	0	0	2	13	16	27	26	6	6	6	0	3	2	0	2	1	0	0	0	0	1	2897
	rtc2	0	0	6	17	21	20	13	10	6	3	4	2	1	0	2	1	1	4	0	0	0	2714
	rtc3	0	0	9	22	22	17	7	7	5	7	4	4	3	0	0	0	2	0	0	0	2	2559
	rtc4	0	2	12	20	18	14	7	14	5	3	4	4	2	1	0	1	0	1	0	1	2	2625
	rtc5	0	5	15	23	17	14	9	7	7	1	2	4	1	3	1	0	1	0	1	0	0	2404
	rtc6	0	6	9	21	12	15	15	9	7	3	1	5	0	2	0	0	0	0	4	0	2	2738
	rtc7	0	5	12	21	25	13	9	10	4	2	1	2	2	0	0	0	1	1	0	0	3	2401
	rtc8	0	1	19	22	19	12	8	6	8	3	1	5	0	3	1	0	1	0	0	1	1	2422
	rtc9	0	8	20	17	15	19	5	7	4	4	4	3	0	1	0	0	1	0	0	0	3	2383
	rtc10	0	6	13	22	14	12	6	8	8	8	4	3	0	4	0	1	0	1	0	0	1	2540
	Mean																						2445

Note. Rt = reaction to; bfr = best friend; efr = exfriend; a,b,c = Person A, B, C; the highlighted cells indicate the extreme outliers

STUDY1

Herzlich Willkommen!
In der folgenden Stunde werden Sie an vielen unterschiedlichen Untersuchungen teilnehmen. Ein Teil davon wird hier am Computer stattfinden und ein Teil wird mit Papier und Bleistift durchgeführt.
Bitte lesen Sie die Instruktionen immer genau durch. Sollte Ihnen etwas unklar bleiben oder Fragen auftauchen, wenden Sie sich bitte an die Versuchsleitung.
Natürlich werden all Ihre Angaben anonym behandelt.

In der ersten Untersuchung geht es darum, welche Bedeutung Namen bei der Wahl von Freunden haben. Deswegen möchten wir Sie zuerst bitten, mehrere Personen aus Ihrem gleichgeschlechtlichen sozialen Umfeld zu benennen.
Geben Sie bitte den Vornamen der jeweiligen Person in das dafür vorgesehene Kästchen ein. Benutzen Sie dazu bitte ausschließlich Großbuchstaben (Umschalttaste eingeschaltet lassen!).
Bitte nennen Sie als erstes den Vornamen des Mannes[6], den Sie momentan als Ihren besten Freund bezeichnen würden.
Sie sollten mit ihm sehr vertraut sein und viel Kontakt haben. <best friend>[7]

Bitte denken Sie nun an Ihre besten gleichgeschlechtlichen Freunde während der Schulzeit. Mit einigen von ihnen werden Sie heute noch Kontakt haben, während Sie andere aus den Augen verloren haben.
Bitte nennen Sie zuerst einen Freund, den Sie während Ihrer Schulzeit gut kannten, den Sie jedoch inzwischen aus den Augen verloren haben. <exfriend>

Während Sie mit dem soeben genannten Freund keinen Kontakt mehr haben, gibt es vielleicht andere gleichgeschlechtliche Schulfreunde, die heute immer noch zu Ihrem Freundeskreis zählen.
Bitte nennen Sie nun einen guten Freund aus Ihrer Schulzeit, mit dem Sie weiterhin Kontakt haben. <friend1>

Bisher haben Sie Männer genannt, die Sie während Ihrer Schulzeit kennengelernt haben. Denken Sie nun an die Zeit, nachdem Sie die Schule verlassen haben.
Bitte nennen Sie einen guten gleichgeschlechtlichen Freund, den Sie erst nach der Schulzeit kennengelernt haben und mit dem Sie momentan regelmäßig Kontakt haben. <friend2>

In Ihrem sozialen Umfeld befinden sich neben Freunden auch solche Männer, zu denen keine so starke Bindung besteht.
Bitte nennen Sie einen Mann aus Ihrem Bekanntenkreis, mit dem Sie zur Zeit relativ regelmäßig Kontakt haben, den sie jedoch nicht als guten Freund bezeichnen würden. <friend3>

Nun möchten wir Sie bitten, möglichst spontan zu entscheiden, wie sympathisch Sie verschiedene Namen finden.

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[6] This instruction was given to male participants. In the female-version I asked for female friends.

[7] <…> indicates that participant's response was recorded and subsequently used in the experiment

Legen Sie deswegen bitte Ihre Finger auf die Zahlen 1-6 der Zahlenreihe der Tastatur (linker Ringfinger auf die 1, rechter Ringfinger auf die 6). Je höher die Zahl ist, desto symphatischer finden Sie den Namen.
Antworten Sie bitte so schnell und spontan wie möglich.

Wie sympathisch ist Ihnen der Name
HELMUT[8]?

Wie sympathisch ist Ihnen der Name
[best friend][9]?

Wie sympathisch ist Ihnen der Name
TOM[8]?

Wie sympathisch ist Ihnen der Name
[exfriend]?

Wie sympathisch ist Ihnen der Name
[friend1]?

Wie sympathisch ist Ihnen der Name
ADAM[8]?

Wie sympathisch ist Ihnen der Name
[friend2]?

Wie sympathisch ist Ihnen der Name
[friend3]?

Vielen Dank!
Damit ist der erste Versuch beendet.
Bitte wenden Sie sich an die Versuchsleitung.

Herzlich Willkommen zu der folgenden Untersuchung.
Bei dieser Untersuchung beschäftigen wir uns mit der Auswirkung des Lebenswandels in verschiedenen Lebensbereichen auf spezielle kognitive Leistungen.
Dazu benötigen wir von Ihnen Auskünfte über Ihre Lebensgestaltung. Bitte denken Sie über diese Fragen in Ruhe nach und antworten Sie dann so korrekt, wie es Ihnen möglich ist.
Dazwischen werden Sie zwei Reaktionszeitaufgaben (RT-Aufgaben) bearbeiten, mit denen wir spezielle kognitive Leistungen erfassen wollen. Bei den RT-Aufgaben sollen Sie möglichst schnell antworten. Deswegen wird Ihnen vorher erklärt, auf welche Tasten Sie Ihre Finger legen sollen und wie die Antwortmöglichkeiten aussehen.

Die erste RT-Augabe dient der Erfassung der speziellen Aufmerksamkeit.
Bei dieser Aufgabe sollen sie möglichst schnell entscheiden, ob eine Buchstabenfolge einen Namen darstellt, oder nicht.

[8] The names in the female versions were: MAGARET, JULIA, and EVA

[9] […] indicates that the participant's previously recorded response appeared at this point

Bitte legen Sie dazu Ihre beiden Finger auf die mit Punkten markierten Tasten und richten Sie Ihren Blick auf die Mitte des Bildschirms. Dort werden die Buchstabenfolgen erscheinen. Handelt es sich um einen Namen, so drücken Sie bitte möglichst schnell die linke, weiße Taste. Handelt es sich um eine sinnlose Buchstabenfolge, so drücken Sie möglichst schnell die rechte, schwarze Taste.
Arbeiten Sie bei dieser Aufgabe so korrekt und so schnell wie möglich.

Nun beginnen wir mit den Fragen zu Ihrer Lebensgestaltungen in verschieden relevanten Lebensbereichen. Bitte denken Sie über die Fragen in Ruhe nach und versuchen Sie möglichst genaue Einschätzungen abzugeben.

Wie viel lesen Sie zu Ihrem Vergnügen? -Stunden pro Woche-[10]

Wie viel schauen Sie fern? -Stunden pro Woche-

Wie häufig besuchen Sie kulturelle Veranstaltungen (Theater, Konzert,..)? -Anzahl im Monat-

Wie viel telefonieren Sie (privat)? -Stunden pro Woche-

Wie viel Sport treiben Sie? -Stunden pro Woche-

Wie viel Alkohol trinken Sie? -Liter alkoholische Getränke pro Woche-

Wie viel arbeiten Sie? -Stunden pro Woche-

Wie viel schlafen Sie? -Stunden pro Woche-

Nun folgt die erste Reaktionszeitaufgabe.
Bitte legen Sie Ihre Zeigefinger auf die markierten Tasten. Konzentrieren Sie sich auf die Mitte des Bildschirms. Dort wird vor der Buchstabenfolge ein + erscheinen. Die Aufgabe wird in wenigen Sekunden starten.
Entscheiden Sie möglichst schnell, ob die Buchstabenfolge einen Namen darstellt (linke Taste), oder nicht (rechte Taste).

Bitte legen Sie die Zeigefinger auf die farblich markierten Tasten.
Handelt es sich bei der Buchstabenfolge um einen Namen?

{lexical decision task}[11]

[10] These are the response labels in the absolute self-evaluation condition. In the comparative self-evaluation condition the responses were given on 9-point scales labelled *sehr wenig* (1) and *sehr viel* (9) with the exception of the third question, which was labelled *sehr selten* (1) and *sehr häufig* (9)

[11] {...} indicates that at this point a DirectRT experiment was started.

Stimuli in the lexical decision task (Study 1)

No-Names	Names (female participants)	Names (male participants)
AGNEB	HILDE	BERTRAM
OLIMAR	WALBURGA	HEINZ
GERTWOL	GERTRUD	XAVER
TAJANER	STEFFEN	SYLVIA
SEBASRA	JOCHEN	NADINE
	KARSTEN	KATHARINA
	NILS	JULIA
	TOM	TINA

Histogram (Study 1):
Frequency of responses in a particular response time interval and median (in ms)

	<100	200	300	400	500	600	700	800	900	1000	1100	1200	>1200	Median
rtbfr	0	0	0	2	14	24	15	4	1	1	2	0	0	559
rtefr	0	0	0	2	16	21	12	8	3	0	1	0	0	567

Note. rtbfr = reaction to the name of the best friend; rtefr = reaction to the name of the exfriend.

STUDY 2

Herzlich Willkommen

In diesem Versuch sollen Sie sich mit Personen aus Ihrem Freundes- und Bekanntenkreis auseinandersetzen.
Dazu werden wir Sie bitten, verschiedene Personen zu benennen und auf verschiedenen Dimensionen miteinander zu vergleichen bzw. einzuschätzen. Einige der Personen, mit denen Sie sich im Laufe der Untersuchung beschäftigen sollen, fragen wir direkt ab, da sie zu Ihnen in einer bestimmten Beziehung stehen sollen. Andere Personen können wiederum frei von Ihnen gewählt werden.
Wichtig ist es dabei, dass Sie keine Person zweimal nennen. Eigentlich würde es zur Identifikation der Personen reichen, den Vornamen anzugeben. Da jedoch manchmal zwei Personen den selben Vornamen tragen, möchten wir Sie bitten, zusätzlich den ersten Buchstaben des Nachnamens zu nennen (z.B. Karin S.). So können bei den Einschätzungsaufgaben Verwechslungen vermieden werden.

Wir wollen nun mit der Benennung der Personen, die zu Ihnen in einer bestimmten Beziehung stehen, beginnen.
Bitte lesen Sie sich jeweils die Art der "Beziehung" durch und nennen Sie dann die Person, die auf die Beschreibung am besten passt oder Ihnen als erstes einfällt.
Sie sollten bei der Nennung nicht besonders lang überlegen, sonder eher spontan antworten.
Denken Sie bitte daran, dass Sie keine Person zweimal nennen dürfen!!!!

Bitte denken Sie an Ihre gleichgeschlechtlichen Freunde.
Wer ist derzeit Ihr bester Freund bzw. Ihre beste Freundin? <best friend>

Nun suchen wir noch eine zweite, gleichgeschlechtliche Person.
Mit dieser Person sollten Sie während der Schulzeit gut befreundet gewesen sein, sie jedoch inzwischen aus den Augen verloren haben. <exfriend>

Bitte denken Sie nun an Personen aus Ihrem Freundes- und Bekanntenkreis, die Sie besonders attraktiv und anziehend finden.
Bitte nennen Sie eine Person, mit der Sie sich ein intimeres Erlebnis vorstellen könnten oder gerne hätten. <friend 1>

Bitte nennen Sie nun eine Person aus Ihrem gegengeschlechtlichem Freundes- oder Bekanntenkreis, dem oder der Sie nur platonisch zugeneigt sind. <friend2>

Als nächstes suchen wir eine Person, mit der Sie schon sehr lange befreundet sind.
Bitte nennen Sie eine/einen Ihrer ältesten gegengeschlechtlichen Freund/inn/en. <friend3>

Nun sollen Sie noch eine Person nennen, die Sie erst vor kurzem als gute/n oder relativ gute/n Freund/in hinzugewonnen haben. <friend4>

Damit haben Sie die Personen, die zu Ihnen in einem bestimmten Verhältnis stehen sollen, ausgewählt. Dies waren [best friend], [exfriend], [friend1], [friend2], [friend3] und [friend4].

Im Folgenden sollen Sie noch zwei weitere Personen nennen, jeweils eine pro Bildschirm.
Denken Sie daran, dass es sich dabei nicht unbedingt um wirkliche Freunde, sondern durchaus auch nur um Bekannte handeln kann, von denen Sie einen ersten Eindruck haben.
Bitte denken Sie weiterhin daran, dass Sie keine Person zweimal nennen dürfen!

Bitte nennen Sie eine, und nur eine, weitere Person aus Ihrem Freundes- und Bekanntenkreis. <friend5>

Bitte nennen Sie jetzt noch eine Person. <friend6>

Vielen Dank.
Insgesamt haben Sie nun 8 Personen aus Ihrem Freundes- und Bekanntenkreis genannt
Nun sollen Sie einzelne dieser Personen miteinander vergleichen. Die Vergleiche beziehen sich auf verschiedene Persönlichkeitseigenschaften. Das heißt, Sie sollen entscheiden, wer von zwei Personen eine bestimmte Eigenschaft stärker ausgeprägt hat. Diese Entscheidungen sollen Sie so schnell wie möglich treffen.
Ihre Antworten geben Sie, indem Sie die rot oder die grün markierte Taste drücken. Die Namen der beiden Personen werden auf dem Bildschirm rechts bzw. links erscheinen. Wenn Sie sich für die rechte Person entscheiden, drücken Sie die rechte, rote Taste. Entscheiden Sie sich für die linke Person, drücken Sie die linke, grüne Taste.
Damit Sie die Antworten möglichst schnell und spontan geben können, sollten Sie Ihre Zeigefinger während der gesamten Aufgabe auf den beiden Tasten liegen lassen.

Wahrscheinlich werden Ihnen die Vergleiche teilweise recht schwer fallen. Vertrauen Sie dann auf Ihr Gefühl. Denken Sie daran, dass Sie die Entscheidungen spontan treffen sollen.
Das heißt, der erste Gedanke oder Eindruck zählt!
Versuchen Sie nicht lange nach Kriterien zu suchen, um die Entscheidung zu fällen.

Bitte legen Sie nun Ihre Zeigefinger auf die rote und die grüne Taste.
Sie sollen gleich mehrmals hintereinander entscheiden, welche von zwei Personen eine Eigenschaft stärker ausgeprägt hat. Denken Sie daran, dass Sie diese Entscheidungen möglichst schnell und spontan treffen sollen.
Person, die rechts im Bildschirm steht = rechte, rote Taste
Person, die links im Bildschirm steht = linke, grüne Taste
Die Aufgabe startet gleich automatisch.

{comparison task}[12]

[12] The attributes in the comparison task were: Nervöser, leistungsorientierter, optimistischer, stressanfälliger, neugieriger, ängstlicher, harmoniebedürftiger, ehrgeiziger, geselliger, kreativer, nachgiebiger, verständnisvoller, heiterer, wissbegieriger, zuverlässiger, wohlwollender, unsicherer, aktiver, herzlicher, phantasievoller, kooperativer, mitfühlender, trauriger, gesprächiger, disziplinierter

Nun möchten wir Sie noch bitten, einige der Personen auf einigen Eigenschaften einzuschätzen. Diesmal müssen Sie die Antworten jedoch nicht möglichst schnell geben.

Wie sympathisch ist Ihnen [best friend]?

Wie nahe stehen Sie [best friend]?

Wie ähnlich sind Sie [best friend]?

Wie sympathisch ist Ihnen [exfriend]?

Wie nahe stehen Sie [exfriend]?

Wie ähnlich sind Sie [exfriend]?

Damit ist der Versuch beendet. Bitte beantworten Sie noch folgende Fragen zu Ihrer Person.

Wie alt sind Sie?

Was studieren Sie?

In welchem Semester studieren Sie?

Welches Geschlecht haben Sie?

ENDE

STUDY 3

Herzlich Willkommen

Bei der heutigen Untersuchung interessieren wir uns für Ihr soziales Umfeld an der Universität. Insbesondere möchten wir wissen, wie Sie Ihre Mitstudierende wahrnehmen und einschätzen.
Bitte rufen Sie sich nun Personen ins Gedächtnis, die mit Ihnen zusammen studieren. Denke Sie an solche Mitstudierende, mit denen Sie einen etwas engeren Kontakt haben. Vielleicht waren Sie zusammen in einer Arbeitsgruppe, gehen gelegentlich zusammen in die Mensa oder in die Cafete, oder sie arbeiten gemeinsam an Übungszetteln, Referaten, Hausarbeiten oder ähnlichem.

Bitte nennen Sie uns nun den Namen eines solchen Mitstudierenden.
Geben Sie dazu bitte den Vornamen und den ersten Buchstaben des Nachnamens in das untenstehende Feld ein (z.B. Sabine M.). <Person A>

Bitte nennen Sie nun den Namen eines weiteren Mitstudierenden. <Person B>

Sicherlich fällt Ihnen noch eine dritte Person ein, mit der Sie zusammen studieren.
Bitte geben Sie nun einen dritten Mitstudierenden an. <Person C>

Bei den folgenden Fragen sollen Sie nun diese Personen auf verschiedenen Dimensionen miteinander vergleichen.
Der Ablauf ist dabei wie folgt:
Als erstes wird die Frage (z.B. "Wer ist entscheidungsfreudiger? Person A oder Person B?") für 10 Sekunden eingeblendet. Diese Zeit sollte ausreichen, um in Ruhe über die Frage nachzudenken und zu einem Urteil zu kommen. Bitte versuchen Sie ein möglichst akkurates Urteil zu fällen.
Danach werden auf dem Bildschirm nur die beiden Namen eingeblendet. Einer rechst und einer links. Wenn Sie der Meinung sind, die rechte Person ist entscheidungsfreudiger als die linke, dann drücken Sie bitte die rechte, rot markierte Taste. Denken Sie dagegen die linke Person ist entscheidungsfreudiger als die rechte, so drücken Sie bitte die linke, grün markierte Taste.

Bitte legen Sie Ihre Zeigefinger schon während Sie über die Frage nachdenken auf die beiden markierten Tasten und geben Sie Ihr Urteil ab, sobald der Bildschirm mit den beiden Namen erscheint. Lassen Sie am besten die Finger während der gesamten Aufgabe auf den Antworttasten liegen.

Bitte legen Sie jetzt Ihre Zeigefinger auf die markierten Tasten.
Der Frageblock wir gleich automatisch gestartet.

{practice block}[13]

[13] The personal attributes used for the comparisons in the practice block were: Autoritätshöriger, durchsetzungsfähiger, engstirniger, fauler, fleissiger, hilfsbereiter, intelligenter, leistungsorientierter, prüfungsängstlicher, pünktlicher, rationaler, sozial kompetenter, strebsamer, wissbegieriger, zielstrebiger

Damit wäre der erste Fragenblock beendet.
Die folgenden Fragen ähneln den vorhergehenden in weiten Teilen. Wieder sollen Sie zwei Personen miteinander vergleichen. Allerdings sollen Sie diesmal Ihre Urteile spontan fällen. Das heißt, die 10 Sekunden, die Sie bisher immer Zeit hatten über die Frage nachzudenken, entfallen diesmal. Stattdessen sollen Sie nun sofort angeben, bei welcher der beiden Personen die gefragte Eigenschaft stärker ausgeprägt ist. Wieder steht die rechte Taste für die Person, die auf dem Bildschirm rechts und die linke Taste für die Person, die auf dem Bildschirm links erscheint.
Bitte geben Sie Ihr Urteil so schnell wie möglich, aber trotzdem korrekt ab.
Bei dieser Aufgabe ist es besonders wichtig, dass Sie die Zeigefinger während des gesamten Blocks auf den markierten Tasten liegen lassen, damit Sie möglichst spontan antworten können.

Bitte legen Sie jetzt Ihre Zeigefinger auf die markierten Tasten.
Der Frageblock wir gleich automatisch gestartet.
Bitte fällen Sie Ihre Urteile schnell und spontan.

{comparison task}[14]

Bitte beantworten Sie nun noch ein paar Fragen zu Ihren Mitstudierenden.
Die Antworten erfolgen auf 9-stufigen Skalen. Drücken Sie bitte jeweils die Zahl, die Ihre Antwort am ehesten wiederspiegelt.
Diesmal gibt es keine Zeitvorgaben. Das heisst, Sie können so lange über die Frage nachdenken, wie Sie benötigen, um zu einer Antwort zu kommen.

Wie häufig sehen Sie [Person A]?

Wie nahe steht Ihnen [Person A]?

Wie eng sind Sie mit [Person A] befreundet?

Wie lange kennen Sie [Person A] schon?

Wie gut kennen Sie [Person A]?

Wie sehr mögen Sie [Person A]?

Wie ähnlich ist Ihnen [Person A]?

Wie häufig sehen Sie [Person B]?

Wie nahe steht Ihnen [Person B]?

Wie eng sind Sie mit [Person B] befreundet?

[14] The personal attributes used in the comparison task were: Reiselustiger, musikalischer, humorvoller, sportlicher, kulturell interessierter, kreativer, redseliger, aktiver, handwerklich begabter, geselliger, kann besser kochen, sparsamer, kinderlieber, ordentlicher

Wie lange kennen Sie [Person B] schon?

Wie gut kennen Sie [Person B]?

Wie sehr mögen Sie [Person B]?

Wie ähnlich ist Ihnen [Person B]?

Wie alt sind Sie?

In welchem Semester studieren Sie?

Welches Fach studieren Sie?

Welches Geschlecht haben Sie?

Hiermit ist der Versuch beendet.
Vielen Dank für Ihre Teilnahme.

Bitte wenden Sie sich an die Versuchsleitung.

STUDY 4

Herzlich Willkommen!

Vielen Dank, dass Sie an diesem Versuch teilnehmen!

Zunächst sollen Sie dieses Blatt bearbeiten, danach geht es am Computer weiter.

Stellen Sie sich vor, Sie organisieren eine Party zu der Sie 20 Personen einladen wollen.

Bitte schreiben Sie nun auf, welche 20 Personen aus Ihrem Bekannten- und Freundeskreis Sie einladen wollen. Darunter können auch Personen sein, die Sie nur locker kennen oder länger nicht mehr gesehen haben. Wichtig ist allerdings, dass Ihnen die Personen soweit bekannt sind, dass Sie eine genaue Vorstellung von der Person haben, wenn Sie ihren Namen lesen.

Bitte tragen Sie die Namen der 20 Personen in die Liste ein. Es müssen genau 20 Namen sein!

Um die Anonymität des Versuchs zu bewahren, genügt es, wenn Sie den Vornamen der Person nennen. Bei gleichen Vornamen schreiben Sie bitte den ersten Buchstaben des Familiennamens dazu, um Verwechslungen auszuschließen.

Bitte geben Sie auch an, woher Sie die jeweilige Person kennen, bzw. in welcher Beziehung Sie zu Ihnen steht (z.B. beste/r Freund/in, Verwandte/r, Studienkollege/in, Schulfreund/in, Partner/in,...).

Schreiben Sie nun 20 Personen auf, die Sie gerne zu einer Party einladen würden!

Person	Vorname	Beziehung
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Nun geht es am Computer weiter...

Wenn Sie die Namen in die Liste eingetragen haben, drücken Sie bitte die Leertaste.

Hier am Computer sollen Sie nun mehrere von Ihnen genannte Personen auf bestimmten Dimensionen einschätzen.
Zunächst werden Sie aufgefordert, die Vornamen der Personen, die Sie auf Ihrer Liste gesammelt haben, in das jeweilige Textfeld zu schreiben. Danach startet automatisch die Untersuchung mit den Fragen.
Denken Sie bitte daran, dass dieser Versuch vollkommen anonym abläuft. Es reicht also, wenn Sie nur die Vornamen nennen. Um Verwechselungen der Personen auszuschließen, fügen Sie bei doppelten Namen bitte den ersten Buchstaben des Familiennamens dazu. Wenn Sie einen Namen lesen, sollen Sie ein konkretes Bild von dieser Person vor Augen haben.
Bei Fragen können Sie sich jederzeit an den Versuchsleiter wenden.
Weiter mit der Leertaste...

Bitte geben Sie den Namen der Person 1 ein. <Person 1>

Bitte geben Sie den Namen der Person 2 ein. <Person 2>

Bitte geben Sie den Namen der Person 3 ein. <Person 3>

Bitte geben Sie den Namen der Person 4 ein. <Person 4>

Bitte geben Sie den Namen der Person 5 ein. <Person 5>

Bitte geben Sie den Namen der Person 6 ein. <Person 6>

Bitte geben Sie den Namen der Person 7 ein. <Person 7>

Bitte geben Sie den Namen der Person 8 ein. <Person 8>

Bitte geben Sie den Namen der Person 9 ein. <Person 9>

Bitte geben Sie den Namen der Person 10 ein. <Person 10>

Bitte geben Sie den Namen der Person 11 ein. <Person 11>

Bitte geben Sie den Namen der Person 12 ein. <Person 12>

Bitte geben Sie den Namen der Person 13 ein. <Person 13>

Bitte geben Sie den Namen der Person 14 ein. <Person 14>

Bitte geben Sie den Namen der Person 15 ein. <Person 15>

Bitte geben Sie den Namen der Person 15 ein. <Person 16>

Bitte geben Sie den Namen der Person 17 ein. <Person 17>

Bitte geben Sie den Namen der Person 18 ein. <Person 18>

Bitte geben Sie den Namen der Person 19 ein. <Person 19>

Bitte geben Sie den Namen der Person 20 ein. <Person 20>

In dem nachfolgenden Aufgabenblock werden Sie aufgefordert, jeweils zwei Personen miteinander auf verschiedenen Dimensionen zu vergleichen.
Die Frage könnte z.B. lauten:

Wer ist musikalischer?
Person A oder Person B

Drücken Sie die grün-makierte, linke Taste, wenn Sie die linke Person als Antwort angeben wollen und die rot-makierte, rechte Taste für die rechte Person.
In unserem Beispiel drücken Sie also die grüne Taste, wenn Sie denken Person A ist musikalischer als Person B und die rote Taste, wenn Die denken Person B ist musikalischer als Person A.
Weiter mit der Leertaste...

Manche dieser Vergleiche werden Ihnen leichter, anderer schwerer fallen. Versuchen Sie jedoch immer, möglichst schnell zu antworten. Denke Sie nicht lange über die Antwort nach, sondern vertrauen Sie Ihrem ersten Gefühl. Wenn Sie meinen, den Vergleich nicht wirklich durchführen zu können, dann antworten Sie einfach "aus dem Bauch" heraus.
Sobald Sie Ihre Antwort gegeben haben, folgt automatisch die nächste Frage.
Um die Untersuchung möglichst ohne Ablenkung durchzuführen, legen Sie nun bitte Ihre beiden Zeigefinger auf die markierten Tasten und lassen Sie sie während des gesamten Aufgabenblocks dort liegen.
Denken Sie daran, möglichst spontan und schnell zu antworten!
Weiter mit der Leertaste...

{comparison task}[15]

Bitte beantworten Sie zum Abschluss noch einige Fragen.
Weiter mit der Leertaste...

Welches Geschlecht haben Sie?

Wie alt sind Sie?

Was ist Ihr Studienfach?

In welchem Semester studieren Sie?

Der Versuch ist nun beendet.

Vielen Dank!

[15] The dimensions used in the comparison task are listed in Appendix E2

Order of the trials in the comparison task (Stud 4)

Filler trials	Repli-cation	Critical trials	Repetition	Random	Process	Standard-knowledge	Self-knowledge
1			d-Dim4-n	l-Dim4-d	d-Dim1-n	l-Dim4-d	d-Dim4-a
2			h-Dim8-k	l-Dim8-j	h-Dim2-i	l-Dim8-j	h-Dim8-b
3			m-Dim12-i	l-Dim12-f	m-Dim3-e	l-Dim12-f	m-Dim12-c
	1	1	l-Dim1-a	d-Dim1-b	l-Dim4-a	d-Dim1-a	l-Dim1-d
4			e-Dim5-m	l-Dim5-e	e-Dim1-m	l-Dim5-e	e-Dim5-a
	2	1	l-Dim2-b	d-Dim2-c	l-Dim4-b	d-Dim2-b	l-Dim2-d
5			f-Dim6-k	l-Dim6-f	f-Dim1-k	l-Dim6-f	f-Dim6-a
	2	2	l-Dim2-b	e-Dim2-c	l-Dim5-b	e-Dim2-b	l-Dim2-e
6			g-Dim7-j	l-Dim7-g	g-Dim1-j	l-Dim7-g	g-Dim7-a
	3	1	l-Dim3-c	d-Dim3-a	l-Dim4-c	d-Dim3-c	l-Dim3-d
7			h-Dim8-i	l-Dim8-h	h-Dim1-i	l-Dim8-h	h-Dim8-a
	2	3	l-Dim2-b	f-Dim2-c	l-Dim6-b	f-Dim2-b	l-Dim2-f
8			i-Dim9-h	l-Dim9-i	i-Dim1-h	l-Dim9-i	i-Dim9-a
	1	2	l-Dim1-a	e-Dim1-b	l-Dim5-a	e-Dim1-a	l-Dim1-e
9			j-Dim10-g	l-Dim10-j	j-Dim1-g	l-Dim10-j	j-Dim10-a
	3	2	l-Dim3-c	e-Dim3-a	l-Dim5-c	e-Dim3-c	l-Dim3-e
10			k-Dim11-f	l-Dim11-k	k-Dim1-f	l-Dim11-k	k-Dim11-a
	2	4	l-Dim2-b	g-Dim2-c	l-Dim7-b	g-Dim2-b	l-Dim2-g
11			m-Dim12-e	l-Dim12-m	m-Dim1-e	l-Dim12-m	m-Dim12-a
	3	3	l-Dim3-c	f-Dim3-a	l-Dim6-c	f-Dim3-c	l-Dim3-f
12			n-Dim13-d	l-Dim13-n	n-Dim1-d	l-Dim13-n	n-Dim13-a
	1	3	l-Dim1-a	f-Dim1-b	l-Dim6-a	f-Dim1-a	l-Dim1-f
13			d-Dim4-e	l-Dim4-f	d-Dim2-n	l-Dim4-f	d-Dim4-b
14			e-Dim5-d	l-Dim5-g	e-Dim2-m	l-Dim5-g	e-Dim5-b
15			f-Dim6-n	l-Dim6-h	f-Dim2-k	l-Dim6-h	f-Dim6-b
	2	5	l-Dim2-b	h-Dim2-c	l-Dim8-b	h-Dim2-b	l-Dim2-h
16			g-Dim7-m	l-Dim7-i	g-Dim2-j	l-Dim7-i	g-Dim7-b
	1	4	l-Dim1-a	g-Dim1-b	l-Dim7-a	g-Dim1-a	l-Dim1-g
17			i-Dim9-j	l-Dim9-k	i-Dim2-h	l-Dim9-k	i-Dim9-b
	3	4	l-Dim3-c	g-Dim3-a	l-Dim7-c	g-Dim3-c	l-Dim3-g
18			j-Dim10-i	l-Dim10-m	j-Dim2-g	l-Dim10-m	j-Dim10-b
	1	5	l-Dim1-a	h-Dim1-b	l-Dim8-a	h-Dim1-a	l-Dim1-h
19			k-Dim11-h	l-Dim11-n	k-Dim2-f	l-Dim11-n	k-Dim11-b
	1	6	l-Dim1-a	i-Dim1-c	l-Dim9-a	i-Dim1-a	l-Dim1-i
20			m-Dim12-g	l-Dim12-d	m-Dim2-e	l-Dim12-d	m-Dim12-b
	2	6	l-Dim2-b	i-Dim2-a	l-Dim9-b	i-Dim2-b	l-Dim2-i
21			n-Dim13-f	l-Dim13-e	n-Dim2-d	l-Dim13-e	n-Dim13-b
	3	5	l-Dim3-c	h-Dim3-a	l-Dim8-c	h-Dim3-c	l-Dim3-h
22			d-Dim4-g	l-Dim4-h	d-Dim3-n	l-Dim4-h	d-Dim4-c
	3	6	l-Dim3-c	i-Dim3-b	l-Dim9-c	i-Dim3-c	l-Dim3-i
23			e-Dim5-f	l-Dim5-i	e-Dim3-m	l-Dim5-i	e-Dim5-c
	1	7	l-Dim1-a	j-Dim1-c	l-Dim10-a	j-Dim1-a	l-Dim1-j
24			f-Dim6-e	l-Dim6-j	f-Dim3-k	l-Dim6-j	f-Dim6-c
	2	7	l-Dim2-b	j-Dim2-a	l-Dim10-b	j-Dim2-b	l-Dim2-j
25			g-Dim7-d	l-Dim7-k	g-Dim3-j	l-Dim7-k	g-Dim7-c
	3	7	l-Dim3-c	j-Dim3-b	l-Dim10-c	j-Dim3-c	l-Dim3-j
26			h-Dim8-n	l-Dim8-m	h-Dim3-i	l-Dim8-m	h-Dim8-c
	1	8	l-Dim1-a	k-Dim1-c	l-Dim11-a	k-Dim1-a	l-Dim1-k

Filler trials	Repli-cation	Critical trials	Repetition	Random	Process	Standard-knowledge	Self-knowledge
27			i-Dim9-m	l-Dim9-n	i-Dim3-h	l-Dim9-n	i-Dim9-c
	2	8	l-Dim2-b	k-Dim2-a	l-Dim11-b	k-Dim2-b	l-Dim2-k
	1	9	l-Dim1-a	m-Dim1-c	l-Dim12-a	m-Dim1-a	l-Dim1-m
	2	9	l-Dim2-b	m-Dim2-a	l-Dim12-b	m-Dim2-b	l-Dim2-m
28			j-Dim10-k	l-Dim10-d	j-Dim3-g	l-Dim10-d	j-Dim10-c
	3	8	l-Dim3-c	k-Dim3-b	l-Dim11-c	k-Dim3-c	l-Dim3-k
	1	10	l-Dim1-a	n-Dim1-c	l-Dim13-a	n-Dim1-a	l-Dim1-n
29			k-Dim11-j	l-Dim11-e	k-Dim3-f	l-Dim11-e	k-Dim11-c
	2	10	l-Dim2-b	n-Dim2-a	l-Dim13-b	n-Dim2-b	l-Dim2-n
	3	9	l-Dim3-c	m-Dim3-b	l-Dim12-c	m-Dim3-c	l-Dim3-m
30			n-Dim13-h	l-Dim13-g	n-Dim3-d	l-Dim13-g	n-Dim13-c
	3	10	l-Dim3-c	n-Dim3-b	l-Dim13-c	n-Dim3-c	l-Dim3-n

Explanation of the abbreviations

Abbreviation	Person	Abbreviation	Dimension
a	1	Dim1	humorvoller
b	2	Dim2	kreativer
c	3	Dim3	optimistischer
d	4	Dim4	intelligenter
e	5	Dim5	zielstrebiger
f	6	Dim6	leistungorientierter
g	7	Dim7	stärker
h	8	Dim8	wagemutiger
i	9	Dim9	rationaler
j	10	Dim10	durchsetzungsfähiger
k	11	Dim11	ordentlicher
m	12	Dim12	sportlicher
n	13	Dim13	sensibler

Mean response time in the first critical trials (in ms) (Study 4)

Condition	*M*	*SD*
Repetition	2,887	711
Process	2,805	622
Standard-knowledge	2,754	584
Self-knowledge	3,005	703
Random	2,918	602

Main effect for condition on the response latencies in the first critical trial (Study 4)

Source	*df*	Mean square	*F*
Condition	4	84862,96	,201
error	101	422375,89	

Linear and power functions:
Curves fitted to the response latencies in the respective conditions (Study 4)

Condition	Curve	R^2	*d.f.*	*F*	b_1
Repetition	linear	.21	265	70.08	-144.70 ***
	power	.36	265	133.41	-.41 ***
Process	linear	.02	749	12.57	-49.14 ***
	power	.03	749	24.95	-.11 ***
Standard-knowledge	linear	.03	738	23.72	-69.91 ***
	power	.05	738	35.21	-.13 ***
Self-knowledge	linear	.01	704	6.10	-36.05 *
	power	.02	704	14.45	-.08 ***
Random	linear	.01	668	5.80	-35.72 *
	power	.01	668	8.71	-.06 **

Note. ***p < .001; **p < .01; *p < .05

STUDY 5

Herzlich Willkommen

Vielen Dank, dass Sie an diesem kurzen Versuch teilnehmen.
Wir interessieren uns diesmal dafür, wie Sie Ihr soziales Umfeld wahrnehmen. Wie schätzen Sie Ihre Freunde und Bekannte ein? Wie gut kennen Sie sie? Könnten Sie spontan über deren Charakter urteilen?
Um uns mit solchen Fragen auseinander zu setzen, werden Sie im Laufe des Versuches mehrere Personen einschätzen oder miteinander vergleichen. Dazu müssen wir jedoch von Ihnen erfahren, wer Ihre Freunde und Bekannte sind.

Deswegen benötigen wir als erstes von Ihnen die Namen einiger Ihrer Freunde.
Natürlich nicht die vollen Namen, schließlich soll Anonymität gewahrt bleiben. Uns reichen die Vornamen. Nur wenn ein Name mehrfach auftaucht, möchten wir Sie bitten, den ersten Buchstaben des Nachnamens mit anzugeben (z.b. Anette M.), damit sie später eindeutig wissen, wer damit gemeint ist.
Sie können jede beliebige Person aus Ihrem Freundes- und Bekanntenkreis nennen. Es können Männer oder Frauen sein. Bedenken Sie jedoch, dass Sie die Person schon etwas besser kennen sollten, sonst werden Ihnen die folgenden Einschätzungen unnötig schwer fallen.
Bitte nennen Sie uns nun den Namen einer ersten Person aus Ihrem Freundes- und Bekanntenkreis.

Bitte schreiben Sie nur EINEN Namen in dieses Feld! [Person C]

Bisher haben Sie [Person C] genannt.
Nennen Sie uns bitte eine weitere Person. [Person A]

Bisher haben Sie [Person C] und [Person A] genannt.
Nennen Sie uns bitte eine weitere Person. [Person B]

Sie haben uns bereits [Person C], [Person A] und [Person B] genannt.
Bitte nennen Sie uns eine weitere Person. [Person D]

Sie haben uns bereits [Person C], [Person A], [Person B] und [Person D] genannt.
Bitte nennen Sie uns eine weitere Person. [Person E]

Wie haben von Ihnen schon folgende Namen ihrer Freunde und Bekannten erhalten: [Person C], [Person A], [Person B], [Person D] und [Person E].
Bitte nennen Sie uns nun noch eine letzte Person. [Person F]

Vielen Dank.
Wir haben nun von Ihnen genügend Namen von Freunden und Bekannten erhalten, um mit dem eigentlichen Versuch beginnen zu können.

Es gibt im Folgenden zwei Aufgabentypen.
Bei dem ersten Aufgabentyp sollen Sie zwei Personen bezüglich einer Eigenschaft miteinander vergleichen.

Bei dem zweiten Aufgabentyp sollen Sie entscheiden, ob eine Person eine Eigenschaft besitzt, oder nicht.
Beidesmal sollen Sie ihre Entscheidung durch Drücken der grün bzw. rot markierten Taste anzeigen. Die Entscheidungen sollen hierbei möglichst schnell und spontan getroffen werden.
Weiter mit der Leertaste…

Sie sehen nun ein Beispiel für den ersten Aufgabentyp – dem Vergleich zwischen zwei Personen. Die Farbe, in der die Personen geschrieben sind, korrespondiert mit der Antworttaste. Bitte schauen Sie genau hin, aber reagieren Sie erst, wenn Sie dazu aufgefordert werden.
STARTEN mit der Leertaste…

{practice item: Steffi Graf, Verona Feldbusch, sportlicher}

Nun folgt ein Beispiel für den zweiten Aufgabentyp – der Einschätzung einer Person. Die Darstellung ist sehr ähnlich wie beim ersten Aufgabentyp. Allerdings wird diesmal nur eine Person präsentiert und die linke, grüne Taste steht für 'eher Ja', währen die rechte, rote Taste 'eher Nein' bedeutet. Bitte drücken Sie erst eine Taste, wenn Sie dazu aufgefordert werden.
STARTEN mit der Leertaste…

{practice item: Verona Feldbusch, sportlich}

Nachdem Sie nun einen ersten Eindruck von den Aufgabentypen haben, sollen Sie im folgenden die von ihnen genannten Freunde bezüglich verschiedener Eigenschaften vergleichen bzw. einschätzen.
Insgesamt durchlaufen Sie 5 Blöcke. Innerhalb eines Blocks wird immer der selbe Aufgabentyp durchgeführt. Der Aufgabentyp wird zu Anfang des jeweiligen Blocks angezeigt. Die ersten beiden Blöcke dienen als Übungsdurchgänge.
Weiter mit der Leertaste…

Bitte lassen Sie während der Blöcke Ihre Zeigefinger auf den Antworttasten liegen. Konzentrieren Sie sich auf die Mitte des Bildschirms und denken Sie daran, Ihre Entscheidungen schnell und spontan zu fällen. Natürlich sollen Sie trotzdem möglichst akkurat sein. Manchmal wird Ihnen eine Entscheidung schwer fallen, entscheiden Sie dann nach Ihrem ersten Gefühl.
Wenn Sie noch Fragen haben, wenden Sie sich bitte jetzt an die Versuchsleitung!
Weiter mit der Leertaste…

1. Block: Vergleichen[16]
Bitte treffen Sie Ihre Entscheidungen schnell aber korrekt!
Der Block startet gleich automatisch. Legen Sie Ihre Zeigefinger auf die Antworttasten.

{Block 1}[17]

[16] The task sequence in the presented version corresponds to the repetitive comparison condition. The task sequence in the repetitive evaluation condition is described in Table 6.

Ende des ersten Blocks
Starten Sie den nächsten Block mit der Leertaste, wenn Sie dazu bereit sind.

2. Block: Entscheiden
Bitte treffen Sie Ihre Entscheidungen schnell aber korrekt!
Der Block startet gleich automatisch. Legen Sie Ihre Zeigefinger auf die Antworttasten.

{Block 2}

Ende des zweiten Blocks
Starten Sie den nächsten Block mit der Leertaste, wenn Sie dazu bereit sind.

3. Block: Vergleichen
Bitte treffen Sie Ihre Entscheidungen schnell aber korrekt!
Der Block startet gleich automatisch. Legen Sie Ihre Zeigefinger auf die Antworttasten.

{Block 3}

Ende des dritten Blocks
Starten Sie den nächsten Block mit der Leertaste, wenn Sie dazu bereit sind.

4. Block: Vergleichen
Bitte treffen Sie Ihre Entscheidungen schnell aber korrekt!
Der Block startet gleich automatisch. Legen Sie Ihre Zeigefinger auf die Antworttasten.

{Block 4}

Ende des vierten Blocks
Starten Sie den nächsten Block mit der Leertaste, wenn Sie dazu bereit sind.

5. Block: Vergleichen
Bitte treffen Sie Ihre Entscheidungen schnell aber korrekt!
Der Block startet gleich automatisch. Legen Sie Ihre Zeigefinger auf die Antworttasten.

{Block 5}

Ende des fünften und letzten Blocks
Weiter mit der Leertaste…

So, nun ist der eigentliche Versuch schon vorbei.
Bitte beantworten Sie noch ein paar Fragen zu Ihren Freunden und zu Ihrer Person.

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[17] The persons and dimensions involved in the task of the respective blocks are listed at the end of Appendix E1

Wie ähnlich sind sich [Person A] und [Person B] auf der Dimension:
Sensibilität?

Wie ähnlich sind sich [Person A] und [Person B] auf der Dimension:
Intelligenz?

Wie ähnlich sind sich [Person A] und [Person B] auf der Dimension:
Humor?

Wie ähnlich sind sich [Person A] und [Person B] auf der Dimension:
Emotionalität?

Wie ähnlich sind sich [Person A] und [Person B] auf der Dimension:
Neugierde?

Wie ähnlich sind sich [Person A] und [Person B] auf der Dimension:
Geduld?

ENDE

Persons and dimensions involved in the comparison / evaluation tasks

	Block 1	Block 2	Block 3	Block 4	Block 5
Persons	C, D	A, B	E, F	A, B	A, B
Dimensions	sensibeler	groß	groß	zielstrebiger	sensibeler
	intelligenter	schlank	schlank	fleissiger	humorvoller
	humorvoller	attraktiv	attraktiv	selbst-bewusster	romantischer
	romantischer	sportlich	sportlich	leistungs-orientierter	intelligenter
	neugieriger	musikalisch	musikalisch	ehrgeiziger	neugieriger
	geduldiger	gesprächig	gesprächig	rationaler	geduldiger
			sparsam	risikobereiter	
			reiselustig	durchsetzungs-fähiger	
			aktiv	selbstsicher	
			offenherzig	stress-resistenter	
			kreativ	organisierter	
			gesellig	zuverlässiger	
			pünktlich	entscheidungs-freudiger	
			ordentlich	schlagfertiger	

Histogram (Study 5):
Frequency of responses in a particular response time interval and median (in ms)

Study	trial	<500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	>10000	Median
Study5	rt1	0	8	12	18	9	7	6	3	1	0	0	0	1	0	0	1	0	0	0	0	0	1754
	rt2	0	8	22	18	6	4	1	2	1	2	1	0	1	0	0	0	0	0	0	0	0	1598
	rt3	0	10	34	6	8	2	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1264
	rt4	0	11	23	16	6	3	3	1	1	1	0	0	0	0	0	1	0	0	0	0	0	1472
	rt5	0	10	28	13	5	4	3	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1408
	rt6	0	10	22	12	11	3	5	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1522
	Mean																						1503

Note. rt1-rt6 = reaction to six comparisons in block 5; the highlighted cells indicate extreme outliers

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ERKLÄRUNG GEMÄß § 4 ABS. 4 NR. 3

DER PROMOTIONSORDNUNG DER UNIVERSITÄT WÜRZBURG VOM 14.06.2001

Hiermit versichere ich an Eides statt, dass ich die Dissertation selbständig angefertigt und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt habe.

Würzburg, den 19.04.2001 _____

Katja Rüter