Bridging attribution and spontaneous inferences:

Spontaneous and intentional components of

dispositional and situational inferences

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Chapter 1

General Introduction

Imagine you are watching your favorite television show (e.g., "Big Brother"), and, in that episode, your favorite character (e.g., "Ron") wears only his pants (and his chest hair) during a meeting in the dining room under the bright studio lights. Probably, this behavior gave rise to all kinds of inferences. You may have thought of "macho", as a property of Ron, but also of "warm", as a property of the set, or even both. Social inferences like these are abundant: People draw them all the time. While sipping a beer and watching somebody at another table talk loudly and make big gestures. When meeting a job applicant who chews on his nails all the time. When hearing that John got an A for a test which you have to make tomorrow. The current thesis will examine the process of thought you go through when drawing a social inference: The social inference process.

Currently, there are two separate research traditions that study social inferences (see Uleman, 1999). First, in the research area of trait attribution, social inferences and social inference processes have been studied and described extensively (e.g., Gilbert & Malone, 1995; Gilbert, Pelham, & Krull, 1988; Krull & Erickson, 1995; Trope & Gaunt, 1999). Second, social inferences have been studied in the area of spontaneous inference research (for an overview, see Uleman, Newman, & Moskowitz, 1996). Although both research traditions study social inferences that occur when people observe behavior, so far, they remained incomparable (Uleman, 1999).

The current thesis will bridge differences between these two research areas to be able to directly compare the social inferences they study. Based on these comparisons, in the final chapter, I will propose a refinement of current models of the social inference process (e.g., Krull & Erickson, 1995) that encompasses both research traditions. First, however, I will describe the research area of trait attribution and that of spontaneous inferences in more detail, and underline the similarities and differences between them and the assumptions they make about each other. Then, an overview of the three empirical chapters will be given in which I will discuss the way each empirical chapter contributes to connecting these research areas.

Trait Attribution Research

Research in the area of trait attribution has studied social inferences since Heider's work on attribution (1944; 1958). In this research area, social inferences are investigated using research paradigms (e.g., Gilbert et al., 1988; Krull, 1993; Krull & Dill, 1998) that can be traced back to Jones' (Jones & Davis, 1965; Jones & Harris, 1967) work on correspondent inferences. In these paradigms, participants are first presented with a behavior. For example, participants were shown a video tape of a woman behaving in an anxious manner (Gilbert et al., 1988). Then, they were asked to make a trait judgment about the actor (and, in later studies, e.g., Krull, 1993, a judgment about a property of the situation). Earlier studies (e.g., Jones and Harris, 1967) found that participants' judgments were dispositionally biased. That is, participants inferred the actor to posses a trait (e.g., the woman to posses an anxious nature) while disregarding situational forces (e.g., the interview topic being her sex life). Gilbert (Gilbert & Malone, 1995; Gilbert et al., 1988) showed that under cognitive load this bias was even stronger. Later, Krull (1993) showed that an opposite bias can also occur: A situational bias. Although the default goal (at least in Western societies) might be to make a dispositional inference, a situational bias is found when people are asked to make a situational inference (Krull, 1993).

Presumably, inferences as assessed by this paradigm are intentional inferences (Uleman, 1999) and, hence, are guided by the perceiver's intent, that is, to form an inference of the actor or the situation.

In this research area, several models of the process of social inference have been developed (e.g., Gilbert & Malone, 1995; Gilbert et al., 1988; Krull & Erickson, 1995; Trope, 1986; Trope & Gaunt, 1999). Most of these models assume that social perceivers go through three stages when drawing a social inference. A prominent example of these models is the three-stage model by Krull and Erickson (1995; see Figure 1.1). In the first stage of this model, people categorize the actor's behavior (e.g., after reading the behavior description "John got an A for the test", this behavior might be categorized as "smart"). In the second stage, people draw an initial inference (e.g., a dispositional inference; "John is smart"), guided by processing goals: If the observer has the goal of forming an impression of the actor, a dispositional inference will be drawn; if the observer has the goal of forming an impression of the situation[1] the actor is in, a situational inference will be drawn (e.g., “The test is easy”). If the observer has both goals, both inferences will be drawn. Finally, in the third stage, a correction takes place: In this stage, second stage inferences are corrected for the influence of the situation (in case of an actor inference) or the actor (in case of a situation inference), if sufficient attentional resources are available (e.g., "John may have been smart, so the test may not be all that easy").

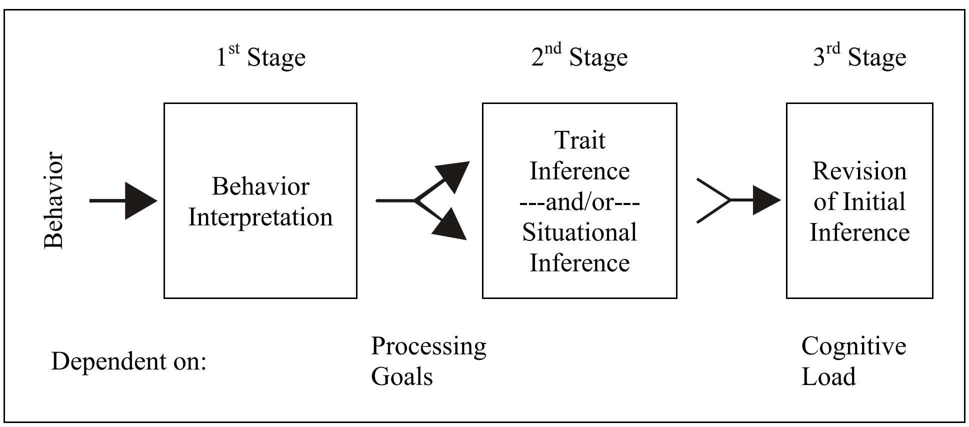

Figure 1.1. The social inference process (Krull & Erickson, 1995).

Spontaneous Inference Research

In the area of spontaneous inferences research, social inferences have been studied since Smith and Miller (1983) found evidence that attributional (intentional) inferences might occur spontaneously. Since then, this research tradition developed separately from the tradition of trait attribution research. Research paradigms in this area are different from those used in the area of trait attribution. These were developed to show that people can draw social inferences without having been asked to, that is, spontaneously. This research area shows that when observing the behavior of a target in a specific situation, people typically make spontaneous trait inferences (STI's; for an overview, see Uleman, Newman, et al., 1996). For example, the STI "smart" might become activated after reading the behavior description "John got an A for the test".

Many of the research paradigms used in this research area (for an overview, see, Uleman, Newman, et al., 1996) take advantage of Tulving and Thomson's (1973) encoding specificity principle, which suggests that events that are encoded together (i.e., are associated in memory) can serve to retrieve each other. In these studies, participants are presented with short behavior descriptions (e.g., "John got an A for the test"). While reading this behavior description, the corresponding trait ("smart") or situation property ("easy") inference might be drawn spontaneously. Through implicit learning, this inference becomes associated with other elements around at the time of activation, as, for example, the behavior description, the actor or the behavior itself. By testing the strength of this association, these paradigms detect spontaneous social inferences.

A multitude of later studies using this and other paradigms (see, Uleman, Newman, et al., 1996) show that STI's almost completely fit Bargh's (1994) four criteria of automaticity (Bargh, 1994): They are drawn without awareness, unintentionally, are highly efficient, and cannot easily be controlled. STI's occur independent of any intention to infer traits or form impressions (e.g., Carlston & Skowronski, 1994; Lupfer, Clark, & Hutcherson, 1990; Uleman, Newman, & Winter, 1992; Winter, Uleman, & Cunnif, 1985). Also, STI's are relatively effortless, that is, largely unaffected by cognitive capacity (Uleman, Newman, et al., 1996).

Recently, some studies showed that people not only make spontaneous inferences about properties of other people, but also about properties of the situation a person is in (e.g., Duff & Newman, 1997; Lupfer, Clark, Church, DePaola, & McDonald, 1995; Lupfer et al., 1990). For example, after reading the behavior description “John gets an A for the test”, the spontaneous situational inference (SSI) "easy" could become activated, as an inference about the test. However, many questions concerning SSI’s still have to be answered.

Two Separate Research Areas

The research area of trait attribution and that of spontaneous inferences have in common that they study social inferences that occur on-line when people observe behavior (e.g., Gilbert & Malone, 1995; Uleman, Newman, et al., 1996). In addition, they both find that these inferences occur effortlessly (e.g., Gilbert & Malone, 1995; Uleman, Newman, et al., 1996), that is, both types of inferences occur while participants are performing various other tasks (e.g., Gilbert et al., 1988; Uleman, Hon, Roman, & Moskowitz, 1996). Furthermore, both lines of research show that social inferences can be drawn not only about properties of the actor (traits), but also about properties of the situation the actor is in (e.g., Krull, 1993; Krull & Erickson, 1995; Lupfer et al., 1990; Uleman, Newman, et al., 1996).

However, notwithstanding the similarities between these two areas of research, there are also many differences. The two areas of research currently are separate research traditions that use different paradigms to detect social inferences, different kinds of stimulus materials and different manipulations of processing goals and cognitive load. Therefore, in some respects, results from the two research traditions are not comparable, and the concepts measured not compatible.

The Present Thesis: Overview

The present thesis will directly compare these two lines of research to be able to come to a refinement of the social inference process (Krull & Erickson, 1995) that encompasses both research traditions. However, before we can directly compare the two research areas, several differences have to be bridged.

An important difference between the two research areas is that they used behavior descriptions of a different nature. In trait attribution or social inference research, behavior descriptions are used that consist of several pages of text (Gilbert et al., 1988) or even video material (Gilbert et al., 1988; Krull, 1993), describing one behavior. In spontaneous inference research, behavior descriptions are used that consist of several sentences (e.g., Carlston & Skowronski, 1994; Carlston, Skowronski, & Sparks, 1995), short sentences (e.g., Newman, 1991; Winter & Uleman, 1984) or symbolic pictures of behavior (Fiedler & Schenck, 2001), always describing several behaviors within a study.

Another, related difference is that, in recent social inference research (Krull, 1993), both dispositional and situational inferences have been studied, whereas, research on spontaneous inferences studied either STI's (see Uleman, Newman, et al., 1996), or SSI's (e.g., Lupfer et al., 1990), but not both. Therefore, next to them being of a difference nature, behavior descriptions used in the two research areas differed in the inferences they implied. In trait attribution research, behavior descriptions allowed inferring both a trait and a situation property (e.g., a video tape of a woman behaving in an anxious manner while being interviewed), whereas, in spontaneous inference research, behavior descriptions allowed either a trait inference or the inference of a situation property. For example, "The secretary solves the mystery halfway through the book" leads to the STI "clever" (Winter et al., 1985), whereas "A businessman and his girlfriend are trying to dance on a very crowded dance floor. Everyone is bumping into others" leads to the activation of the SSI "Not enough room" (Lupfer et al., 1990). Therefore, to enable a comparison across the two areas, in all studies of the current thesis, we will use the same type of behavior descriptions: Short sentences that imply both a trait and a situation property.

Chapter 2: Smart and Easy: Co-occurring Activation of Spontaneous Trait Inferences and Spontaneous Situational Inferences

Before dispositional and situational inference in trait attribution research can be directly compared to STI's and SSI's, however, we need answer the question whether STI's and SSI's can occur together. That is, because earlier research studied either STI's or SSI's, in Chapter 2, we examined spontaneous inferences about behaviors that allow for both an STI and an SSI. In Study 2.1, we used a paradigm often used to detect STI's (the probe recognition paradigm; McKoon & Ratcliff, 1986) to measure activation of both types of spontaneous inferences. In Study 2.2, used a completely different paradigm: We developed a new paradigm (an adaptation of the relearning paradigm; e.g., Carlston & Skowronski, 1994) to measure activation of both STI's and SSI's.

Furthermore, and associated with the previous point, in social inference research (e.g., Krull, 1993), processing goals were manipulated to be dispositional and situational within the same study. However, in spontaneous inference research, since either STI's or SSI's were studied, processing goals were never manipulated this way. Therefore, in Study 2.2, we also studied the influence of dispositional or situational processing goals on spontaneous dispositional and situational inferences.

After we investigated STI's and SSI's together in Chapter 2, we can now compare dispositional and situational inferences as measured by the two research areas. To come to a refinement of the social inference process (Krull & Erickson, 1995) that encompasses both research traditions, we need to compare the effects of the two major factors in this process across the two research traditions. Therefore, in Chapter 3, we investigated the influence of processing goals, and in Chapter 4, the effects of both processing goals and cognitive load on intentional and spontaneous inferences.

As for processing goals, another important difference between the two areas is that they used different instructions to manipulate them. In trait attribution research, an extensive instruction has been used, especially adapted to the single behavioral episode (e.g., Krull, 1993). In spontaneous inference research, either general instructions (e.g., Carlston & Skowronski, 1994), not adapted to any single behavior description, or several short instructions were used, each adapted to a behavior description (e.g., Lupfer et al., 1990). Importantly, while models and research in the area of trait attribution show an influence of processing goals on social inferences (e.g., Krull, 1993; Krull & Erickson, 1995), this influence is not found in the research area of spontaneous inferences (e.g., Uleman, Newman, et al., 1996). Therefore, in Chapter 3 and 4, both studies that assess intentional inferences and those that asses spontaneous inferences used identical manipulations of processing goals.

Chapter 3: Trait Attribution and Spontaneous Inferences: Different Paradigms, Different Effects of Processing Goals

In Chapter 3, we compared the effects of processing goals on social inferences as measured in the two research traditions. As described, in trait attribution research, processing goals influence social inferences, whereas in spontaneous inference research, this influence is not expected or found. Notwithstanding, in research on trait attribution, (second stage) social inferences are drawn relatively effortlessly (e.g., Gilbert et al., 1988), and, therefore, these social inferences might seem comparable to spontaneous inferences, since these also occur effortlessly. Indeed, this assumption would fit most of the literature on three-stage models (e.g., Gilbert & Malone, 1995; Gilbert et al., 1988), and sometimes is found explicitly (e.g., Krull & Dill, 1996; 1998; Krull & Erickson, 1995). Since previously, results from these two research traditions were not directly comparable, in Chapter 3, we performed two studies that were identical except for the paradigm used to measure social inferences. In Study 3.1, we used a probe recognition paradigm (McKoon & Ratcliff, 1986) to investigate the influence of processing goals on spontaneous inferences, whereas, in Study 3.2, we used a trait attribution paradigm (comparable to Krull, 1993) to assess intentional inferences. These results allowed for a refinement of our understanding of especially the first and the second stage of social inference models.

Chapter 4: Social Inferences Dissected: Spontaneous and Intentional Components

In Chapter 4, we assessed all three stages of social inference models by also investigating the effects of cognitive load. In Study 4.1, we used a trait attribution paradigm (comparable to Krull, 1993) to investigate the influence of processing goals and cognitive load on intentional inferences, whereas, in Study 4.2, we used a probe recognition paradigm (McKoon & Ratcliff, 1986) to assess spontaneous inferences. In both studies, we identically manipulated both goals and load, and, therefore, these results allowed for a refinement of our understanding of all three stages of social inference models.

Endnotes

[1]"The situation", or external cause of behavior can either be an entity / stimulus towards which the behavior is enacted (e.g., another person or an object such as a test), or circumstances (Heider, 1958; Kelley, 1967, 1973). In the current thesis, we will focus on entities as situational causes.

Chapter 2

Smart and Easy: Co-occurring Activation of Spontaneous Trait Inferences and Spontaneous Situational Inferences*

John gets an A for the test. What is the first thing that comes to mind: Smart or easy? Do we immediately think of a property of John: "smart"? Or do we instantly think of a property of the test: "easy". Or is it conceivable that both inferences are activated?

A lot of research has demonstrated activation of spontaneous trait inferences (STI's; for an overview, see Uleman, Newman, Moskowitz, 1996). In addition, other studies show that activation of spontaneous situational inferences (SSI's) is possible as well (Duff & Newman, 1997; Lupfer, Clark, Church, DePaola, & McDonald, 1995; Lupfer, Clark, & Hutcherson, 1990). However, all of these studies were aimed at demonstrating the existence of either STI's or of SSI's. In everyday life, the behaviors that people witness very often allow for dispositional as well as situational inferences (e.g., Krull & Dill, 1996). As in the example above, not only the STI "smart" may be activated but also the SSI "easy". As Uleman (1999, p. 151) describes, there is no evidence yet whether multiple (perhaps even mutually inconsistent) STI's can co-occur. Neither has the question been answered of whether an STI and an SSI can both occur. Filling this gap in empirical knowledge is important not only for ecological reasons, but also because it could refine stage models on the process of social inference (e.g., Gilbert & Malone, 1995; Gilbert, Pelham, & Krull, 1988; Krull & Erickson, 1995; Trope, 1986; Trope & Gaunt, 1999).

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A prominent example of these models is the three-stage model of social inference by Gilbert (e.g., Gilbert & Malone, 1995; Gilbert, et al., 1988). In the first stage of this model, people categorize the actor's behavior (e.g., after reading the behavior description "John gets an A for the test", this behavior might be categorized as "smart"). In the second stage, people make an initial dispositional inference (e.g., "John is smart"). Finally, in the third stage, situational information is used to correct the initial inference and to come to a final inference (e.g., "The test may have been easy, so John may not be all that smart"). The third stage requires ample cognitive capacity, whereas the first and second stage are relatively effortless (Gilbert et al., 1988).

Krull and Erickson (1995) have proposed an extension of Gilbert's model that includes situational inferences. According to Krull and Erickson, in the second stage, an inference is drawn that depends on the processing goals of the observer: If the observer has the goal of forming an impression of the actor, a dispositional inference will be drawn; if the observer has the goal of forming an impression of the situation the actor is in, a situational inference will be drawn. If an observer has a dispositional as well as a situational inference goal, Krull and Erickson assume that both a dispositional and a situational inference will be drawn. In the third step, correction of the initial inference takes place. If, in the second stage, a dispositional inference was drawn, the observer will now revise his initial inference by considering situational information. If a situational inference was drawn, the observer will now revise his initial inference by considering dispositional information.

Because inferences in the second stage are drawn without cognitive effort (e.g., Gilbert et al., 1988), these inferences might seem to be identical to spontaneous inferences. Although most models do not use the term spontaneous inferences, Krull and Erickson (1995; see also Krull & Dill, 1996) explicitly assume that the inferences drawn in the second stage are STI's and SSI's.

However, in the research tradition of Krull and Erickson (1995), a completely different paradigm is used to measure social inferences, compared with the paradigms used in research of STI’s (see Uleman, Newman, et al., 1996). The paradigm used in the studies of Krull (Krull, 1993; Krull & Dill, 1996) is similar to that used in earlier studies in this line of research (e.g., Gilbert et al., 1988), and can be traced back to Jones and Davis’ (1965) seminal work on correspondent inferences. In this paradigm, participants are first presented with a behavior. Then, they are asked to indicate to what extent they inferred certain traits (or situation properties). For example, in Krull’s (1993) and Gilbert’s (Gilbert et al., 1988) research, participants watched a videotape of a woman behaving nervously while being interviewed. Then, they were asked to rate on a 9-point scale how anxious this woman was and how anxiety provoking they believe the interview was. By introducing cognitive load (e.g., Gilbert et al., 1988, Krull, 1993), it can be demonstrated that some inferences are relatively effortless. However, considering the totally different paradigms used in STI research, the question arises whether the two types of methods assess the same inferences. Before this question can be addressed further, we shall more specifically discuss research of spontaneous inferences, the methods they use and what their results tell us about social inferences.

Spontaneous Inferences

People typically make spontaneous trait inferences (STI’s) when observing the behavior of a target in a specific situation (for an overview, Uleman, Newman, et al., 1996). For example, the STI "smart" might become activated after reading the behavior description "John gets an A for the test". STI's almost completely fit Bargh's (1994) four criteria for automaticity (Bargh, 1994): They are drawn without awareness, unintentionally, are highly efficient, and cannot easily be controlled. STI’s occur even without any direct intention to infer traits or form impressions (e.g., Carlston & Skowronski, 1994; Lupfer et al., 1990; Uleman, Newman, & Winter, 1992; Winter, Uleman, & Cunnif, 1985). STI's are activated regardless of temporary processing goals (Uleman, 1999; Uleman, Newman, et al., 1996), provided that the goal induces participants to pay attention to the contents of the behavior descriptions (Uleman & Moskowitz, 1994; Whitney, Waring, & Zingmark, 1992). STI's are also largely unaffected by cognitive capacity (Uleman, Newman, et al., 1996). Different amounts of cognitive load (manipulated by the difficulty of numbers to be remembered) do not affect STI's (Winter et al., 1985). At very high load levels however, STI activation does seem to be hampered (Uleman et al., 1992) because of diminished comprehension of the behavior.

Other research shows that people not only make spontaneous inferences about properties of other people, but also about properties of the situation[1] a person is in (e.g., Duff & Newman, 1997; Lupfer et al., 1995; Lupfer et al., 1990). For example, after reading the behavior description above, the SSI "easy" could become activated. Although many questions concerning spontaneous situational inferences (SSI's) still have to be answered, research suggests that SSI’s and STI's are quite similar processes (Uleman, Newman, et al., 1996).

Spontaneous inferences have been studied using a variety of experimental paradigms (for an overview, see Uleman, Newman, et al., 1996). We will now describe two paradigms that have been used extensively in earlier research because they will also be used in the present research (for a discussion of other paradigms to measure STI activation see Uleman, Newman, et al., 1996).

A first paradigm is the probe recognition paradigm. This paradigm is based on a paradigm developed by McKoon and Ratcliff (1986) and has been used successfully to examine activation of STI's (e.g. Lupfer et al., 1995, Study 1; Newman, 1991; Uleman, Hon, Roman, & Moskowitz, 1996; Wigboldus, Dijksterhuis, & van Knippenberg, 2003). In these studies, participants read a behavior description after which a probe word is presented on screen. Participants are instructed to indicate whether this probe word was part of the sentence they just read. In the experimental trials, the behavior description activates a certain STI and this same STI is used as the probe. For example, participants read the sentence "John gets an A for the test", then the word "easy" is presented on screen and participants are to indicate whether that word was part of the sentence. The probe word itself is not part of the behavior description, so the correct answer is negative. However, the STI activated by the sentence can interfere with quickly and correctly rejecting the probe. It is more difficult for participants to indicate that the probe was not in the description after reading a description that did imply the probe than after reading a description that did not (McKoon & Ratcliff, 1986). As a consequence, participants need more time to make a correct judgment, and they more often respond incorrectly that the probe was in the sentence. Results of the aforementioned studies showed activation of STI's, indicated by slower and more incorrect responses to an STI probe following a behavior description that strongly implied this STI (Newman, 1991; Uleman, Hon, et al., 1996; Wigboldus et al., 2003).

In a study by Lupfer (Lupfer et al., 1995, Study 1) the probe recognition paradigm has successfully been used to measure not only STI but also SSI activation. In this study, for example, after reading the behavior description "The carpenter asked for a second helping of beef stew. The carpenter rarely asks for extra helpings of food.", which implies a situational cause, participants had difficulty responding that the situation property "delicious" had not been in the sentence.[2] In showing activation of STI's by certain behavior descriptions and SSI's by others,[3] this study indicates that STI's and SSI's are quite comparable and can both be established by the probe recognition paradigm.

What makes the probe recognition paradigm especially suited to study spontaneous inferences is that, by its very nature, it pits ostensible task demands against spontaneous inferences (Uleman, Hon, et al., 1996). To respond quickly and correctly as instructed, participants must suppress STI's (or SSI's). Thereby, this paradigm provides strong evidence that inferring the probe concepts is unintended and that spontaneous inferences are activated during encoding.

A second paradigm used in the STI research tradition is the savings paradigm, developed by Carlston and Skowronski (1994; Carlston, Skowronski, & Sparks, 1995) to study the activation of STI's and the influences of processing goals. This paradigm, which they called relearning paradigm, is based on insights about learning by Ebbinghaus (1885/1964) and, more generally, on the idea that relearning is more effective than learning. In Carlston and Skowronski's paradigm, participants have the opportunity to learn a combination two times. In the first phase, called learning phase, participant browse through a booklet containing pictures of people paired with self-descriptive statements. Each description strongly implies a certain trait, for example, "I hate animals. Today I was walking to the pool hall and I saw this puppy. So I kicked it out of my way.", which strongly implies cruel.

After a distraction task, participants are asked to learn photo-trait combinations presented in a second booklet. Some combinations in this second booklet consist of a photo from the first booklet combined with the trait implied by the initial description. For example, the photo that was accompanied by the "I hate animals…" description in the first booklet is now presented with the word "cruel" underneath the photo. Participants are to learn the association between this photo and the word "cruel". Assuming that the STI "cruel" was already activated during the first task, this implies that they are now learning a combination they already saw once before. In effect, then, they are relearning the combination. Carlston and Skowronski (1994) argued that, if STI's occurred while reading the description in the first phase, these relearning combinations will be remembered better than control combinations (which consist of new photo-trait pairs), because the first exposure has produced a residual (savings) effect that facilitates learning in the second phase. These savings effects were found in all studies.

Furthermore, the study by Carlston and Skowronski (1994) confirms the suggestion of other research (see Uleman, Newman, et al., 1996) that STI’s occur regardless of processing goals. That is, in the study by Carlston and Skowronski (1994), processing goals were manipulated by giving participants the instruction to generate a trait while reading each self-descriptive statement, form themselves a general impression of the actor, or memorize the material. Instruction did not have any influence on the savings effect found, implying not only that participants inferred traits spontaneously but also that STI’s occur regardless of processing goals. Paradoxically, in a study by Uleman and Moskowitz (1994), temporarily activated processing goals do seem to have an influence on STI's. However, unlike other studies (Carlston & Skowronski, 1994; those reported in Uleman, Newman, et al., 1996) the Uleman and Moskowitz (1994) study did not just manipulate goals to be either dispositional or neutral. In this study, participants were given the goal to either make a social judgment or analyze sentence features. The goal to analyze sentence features caused STI's to be absent or at least infrequent. As Bargh (1989) indicates, STI's depend on the goal of spending attention to the trait-implying stimuli. Thus, as long as the processing goal does not keep participants from spending attention to the behavior description, STI’s seem to occur regardless of processing goals.

Co-occurrence of STI's and SSI's

We now return to our question of whether the research tradition of Krull and Erickson (1995) as well as Gilbert (Gilbert & Malone, 1995) assesses the same inferences as does the research of STI’s (see Uleman, Newman, et al., 1996). More specifically, are the inferences drawn in the second stage of three-stage models of social inferences similar to STI’s and SSI’s, as Krull and Erickson (1995) assume?

Uleman (1999, p. 153) assumes that the inferences studied in the area of social inference research (e.g., Gilbert & Malone, 1995; Krull & Erickson, 1995) are of a different type than the inferences studied in the area of spontaneous inference research (e.g., Uleman, Newman, et al., 1996). Uleman (1999) distinguishes spontaneous from intentional inferences. Spontaneous inferences occur without the necessity of an impression formation goal, e.g., during "uneventful people watching" (Uleman, 1999). Intentional inferences, on the other hand, occur when one attends to other people with an impression goal in mind, e.g., during a job interview. Spontaneous inferences, Uleman assumes, are guided by chronically accessible constructs, whereas intentional inferences are guided by temporarily activated processing goals.

If we distinguish spontaneous from intentional inferences, it can be argued that the paradigms used in the research tradition of Krull and Erickson (1995; Krull & Dill, 1996) and Gilbert (Gilbert et al., 1988) measure intentional inferences: If the inference is measured by directly asking participants to draw an inference, as in these studies, the inference measured is intentional, as Uleman (1999) notes. Spontaneous inferences, on the other hand, can only be detected using a paradigm that controls for the spontaneity of the inferences drawn, and this is exactly what STI and SSI paradigms accomplish. Thus, by using different types of paradigms, these lines of research seem to have measured different types of inferences.

Even though inferences drawn in the second stage of the social inference process (Gilbert & Malone, 1995; Krull & Erickson, 1995) occur relatively effortlessly (Gilbert et al., 1988; Krull, 1993), they are also goal-dependent (e.g., Krull, 1993). If, for example, the observer has the goal of forming an impression of the actor, a dispositional inference will be drawn (Krull, 1993); if the goal is to form an impression of the situation, a situational inference is drawn. On the other hand, as indicated, STI's are goal-independent. And, if SSI's are as automatic as STI's, SSI's should also occur independent of inferential goal. If both types of spontaneous inferences are made regardless of processing goal, this implies that they can both occur, provided that the stimulus materials allow for the activation of both an STI and an SSI.

Because earlier research investigated the activation of either STI's or SSI's, this issue has not been addressed in previous studies. Precisely because earlier research investigated the activation of either STI's or SSI's, that research used stimulus materials that were either strongly situational cause-implying or strongly trait implying. In the present research, we will use stimulus materials that allow for the activation of both STI’s and SSI’s. The behavior description "John gets an A for the test", for example, allows for the activation of both the STI "smart" as well as the SSI "easy".

According to Uleman (1999), multiple unrelated spontaneous inferences can occur. Moreover, research of comprehension shows that an ambiguous sentence can activate several concepts at the same time (e.g., Gernsbacher & Faust, 1991; Swinney, 1979). After reading an ambiguous sentence, several concepts are initially activated (Gernsbacher & Faust, 1991). For example, the ambiguous sentence "Pam was annoyed by a quack", activated both "duck" and "doctor". Both concepts remained activated just as long as only "duck" remained activated after reading "Pam heard a sound like a quack" (Gernsbacher & Faust, 1991). Thus, multiple meanings can be activated simultaneously. Might the same be valid for multiple spontaneous inferences?

Experiment 1

In this experiment, a probe recognition paradigm (McKoon & Ratcliff, 1986) was used to study whether activation of STI's and SSI's can co-occur. As discussed above, this paradigm is very well-suited to measure activation of spontaneous inferences (Uleman, Newman, et al., 1996). We assume that STI’s and SSI’s are equally automatic processes. Therefore, we expected activation of both STI’s and SSI’s. This expectation also is in line with Uleman's (1999) characterization of spontaneous inferences.

As explained earlier in this paper, in a probe recognition paradigm, participants read a behavior description followed by a probe word and then indicate whether that probe word has been in the description. In the experimental trials of our study, the probe word represented a property (of the actor or the situation) that was implied by the description. In control trials, the probe word was not implied by the description. We expected longer reaction times on experimental trials than on control trials, because it is harder to reject probes implied by the description than probes not implied. Because we used a version of the probe recognition paradigm that strongly stimulates participants to react quickly and accurately (like Uleman, Hon, et al., 1996, Study 2; Wigboldus et al., 2003) we expected to find an effect on reaction times, rather than on accuracy of responses (see Footnote 2). The behavior descriptions we used allowed for activation of both an STI and an SSI. For example, the description “Eric lifts the boulder” might activate the STI “strong” as well as the SSI “light”. We expected this effect on reaction times to occur for both probes representing an STI as well as for probes representing an SSI.

Method

Participants. Participants were 85 (60 female, 25 male, $M = 20.93$ years old) students at the University of Nijmegen. All participants were native Dutch speakers. For a participation of 20 minutes they received the equivalent of $2.

Design. Participants were randomly assigned to one of two conditions. In both conditions, the same behaviors were presented. In one condition, the probe words of the experimental and control trials were only traits, in the other only situation properties were used. Thus, Probe Type (trait vs. situation property) was manipulated between subjects. The other independent variable, Trial Type (experimental vs. control), was manipulated within subjects: All participants were presented with 10 experimental trials as well as 10 control trials. This design was chosen to keep the current paradigm comparable to the probe recognition paradigm used in other research (Lupfer et al., 1995; Newman, 1991; McKoon & Ratcliff, 1986; Uleman, Hon, et al., 1996; Wigboldus et al., 2003). In these studies, Trial Type was manipulated within participants. However, Probe Type did not form part of their designs, simply because these studies were designed to detect STI's only. Both the manipulation of Trial Type within subjects as the manipulation of Probe Type between subjects will be further discussed in the Results and Discussion section of Experiment 1. The experiment, thus, consisted of a 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial Type: Experimental vs. Control) design, with the latter varied within participants.

Materials. In an open-ended task, 60 pretest participants were asked to write down inferences about 48 behavior descriptions. All behavior descriptions had a male actor whose first name served as subject of the sentence. Half of the participants were asked to write down inferences about the actor, the other half about the situation. For Experiment 1, 10 descriptions were selected that led to (a) the highest number of similar inferences across participants (dispositional or situational), and (b) approximately the same number of similar dispositional and similar situational inferences for all descriptions, on average (see Appendix). By this selection, those descriptions were selected that allowed for the highest level of activation of both STI and SSI. In the Appendix, the 10 selected behavior descriptions and corresponding properties can be found, as well as the percentage of pretest participants that wrote down that property. These properties were used as probe words in the current experiment.

Each behavior was succeeded by a probe word that was either implied by the behavior (e.g., "John gets an A for the test" was succeeded by "smart") or, in control trials, not implied (e.g., "John gets an A for the test" was succeeded by "friendly"). The control trials consisted of the same behavior descriptions and probe words as the experimental trials, but the probes were rearranged such that each probe word was combined with a behavior description that did not imply it. Each participant saw all 10 behavior descriptions and all 10 probes twice; once in an experimental trial and once in a control trial.

In addition to ten experimental trials and 10 control trials, 40 filler trials were used that also consisted of a behavior description and a probe word. These filler trials were included for two reasons. Firstly, if the correct response on all trials would only be to answer "No", as is the case for all experimental and control trials, spending attention to the description would not be necessary to complete the task (see also McKoon & Ratcliff, 1986; Uleman, Hon, et al., 1996). Therefore, 30 filler trials were included of which the probe was a word that was literally in the behavior description (e.g., "John helped the elderly lady cross the street" was followed by the probe word "elderly"), so that the correct response on half of the 60 trials was "Yes". Secondly, if the probe words in all trials would be only properties of the actor or the situation, as is the case for the experimental and control trials, participants may gradually spend less attention to the verb in the description. The verb, however, is essential to grasp the meaning of each description. Therefore, 20 filler trials were included of which the probe word was a verb. Of these 20 filler trials, 10 had a probe word that was not in the description (e.g., "Fred looks at the train passing by" was followed by "solves"), whereas for the other 10 it was (e.g., "looks"). Thus, of the total of 60 trials, 40 trials (10 experimental, 10 control and 20 filler trials) had a property as a probe word, whereas 20 (all filler trials) had a verb as a probe word.[4]

Procedure. The experiment was run on a computer for each participant individually. In a practice round of 12 trials, participants were familiarized with the task. These trials consisted of the same kind of behavior descriptions and probes in the same proportions as the trials of the experimental task. Eight practice trials had a property (of the actor or the situation, depending on condition) as a probe. Participants' task was to indicate as accurately and quickly as possible whether the probe had literally been in the description. A reward of the equivalent of $10 was promised to the participant whose responses were most accurate and quick. Participants were instructed to press the 'a'-key to indicate 'no', meaning the probe had not been in the description and to press the '6'-key on the numeric part of the keyboard to indicate 'yes'. They were told to keep their left and right index finger on the appropriate keys during the task. In the practice round, participants received feedback on the number of correct answers they had given.

In the real task, first a row of X's appeared in the middle of the screen for 1000 msec to focus the gaze of the participant. Then the behavior description was displayed for 3000 msec, followed by a blank screen lasting for 500 msec. Again a row of X's appeared for 500 msec, this time followed by the probe. During the whole task, the words 'yes' and 'no' remained visible on respectively the right and left side of the screen. The probe remained visible until the participant had pressed one of both keys. After the answer was given, a blank screen was displayed for 1000 msec. Then the next trial started with a row of X's. All 60 combinations of behavior descriptions and probes were presented in random order.

Dependent variables. Responses and reaction times were recorded by the computer. Reaction times are reported here in milliseconds, but were measured with an accuracy of 16.67 ms.

Results and Discussion

Reaction times. All participants had a low error rate (M = 2.12%, ranging from 0% to 15%). RT's were analyzed only if the response had been correct. Analyses of RT's can be quite sensitive to outliers (Uleman, Hon, et al., 1996). As recommended by Ratcliff (1993), we analyzed our RT data by using two methods. First, an absolute cutoff criterion of < 200 ms and > 2000 ms was used. By using these cutoff points only 2 responses (0.12%) had to be dropped from the statistical analysis. Second, an inverse transformation (1/x) of the RT's was used. The analyses reported hereafter are based on the cutoff criterion, which yielded converging results to the inverse transformation analysis unless reported otherwise.

The average response time per trial was submitted to a 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial Type: Experimental vs. Control) MANOVA with the latter as a within-subjects variable. A main effect for Trial Type was found, F (1, 83) =

19.37, $p < .001$. RT's on experimental trials were longer ($M = 728$, $SD = 165$) than on Control trials ($M = 692$, $SD = 144$). The main effect for Probe Type and the interaction were non-significant, both $F < 1$. Analysis of the simple main effect for Probe Type revealed that both when the probe was a situation property, the effect of Trial Type was significant, $F(1,83) = 14.52$, $p < .001$, as well as when the probe had been a trait, $F(1,83) = 5.87$, $p < .05$.

Error rates. Error rates were highly skewed, as in most cognitive and perceptual tasks (Cohen & Cohen, 1975). Cohen and Cohen recommend a square root transformation for this kind of distribution to reduce skew. The square root of number of errors was analyzed in a 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial Type: Experimental vs. Control) MANOVA. No main effect for Probe Type was found, $F(1, 83) = 1.69$, *ns*. Neither a main effect for Trial Type was found, $F < 1$. However, the interaction between Probe Type and Trial Type was significant, $F(1, 83) = 4.60$, $p < .05$. Analysis of the simple main effect for Probe Type revealed that when the probe was a situation property, the effect of Trial Type was significant, $F(1,83) = 4.52$, $p < .05$: Error rates on experimental trials were higher ($M = 3.5\%$, $SD = 5.3$) than on control trials ($M = 1.6\%$, $SD = 4.3$). When the probe had been a trait, the effect of Trial Type was non significant, $F < 1$.

Confirming our expectancies, we found that participants responded slower to probe words that were implied by the behavior description and quicker on control trials. This effect was found for probe words representing a trait as well as probe words representing a situation property. Thus, in the experimental trials, both the activated STI and SSI made it harder for participants to respond quickly that the probe word was not in the preceding behavior description. These data, then, indicate that while reading the behavior descriptions, the corresponding STI and SSI were both activated.

We did not expect to find an effect of Trial Type on error rates, because this effect was not reported in research comparable to ours in reaction times and number of incorrect answers found (Uleman, Hon, et al., 1996, Study 2; Wigboldus et al., 2003). However, we did find this effect when the probe word was a situation property. This result may be regarded as additional evidence for the activation of SSI's.

In the current study, we manipulated Trial Type within participants as did all other studies using this paradigm (Lupfer et al., 1995; Newman, 1991; McKoon & Ratcliff, 1986; Uleman, Hon, et al., 1996; Wigboldus et al., 2003). However, this procedure might diminish the spontaneity of the inferences drawn, because each participant saw all 10 behavior descriptions and all 10 probes twice; once in an experimental trial and once in a control trial. Diminished spontaneity should show up in order effects. For example, if an experimental trial happens to be presented before a control trial with the same behavior description, the spontaneous inference made while reading the behavior description for the second time might be influenced by the spontaneous inference made while reading the description for the first time or by the probe word presented in the experimental trial.

To examine the possibility of order effects, we performed two sets of detailed analyses. In the first set of analyses, we examined order effects of behavior description. For these analyses, we differentiated experimental trials that had been preceded by a control trial with the same behavior description from those that had been followed by it. A new independent variable (Order) with these two levels was added to the MANOVA. In an analysis of the RT data, the average response time per trial was submitted to a 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial Type: Experimental vs. Control) x 2 (Order: Experimental Precedes vs. Control precedes) MANOVA. The main effect of Order was non-significant, $F(1, 83) = 1.51$, *ns*, as were all interactions involving Order (Order x Probe Type, $F(1, 83) = 1.63$, *ns*, Order x Trial Type and the three-way interaction, both Fs < 1). All other effects (not containing Order) remained comparable to those in the initial analysis. In an analysis of error rates, the same pattern of results was found. This analysis also showed no significant effects involving Order, all Fs < 1, while all other effects remained.

In the second set of analyses, we examined order effects of probe. For these analyses, we differentiated experimental trials that had been preceded by a control trial with the same probe word from those that had been followed by it. As in the first set of analyses, the independent variable (Order: Experimental Precedes vs. Control Precedes) was added to the MANOVA on RT data. All effects of order were non-significant, *F*s < 1. Similarly, in an analysis on the error rates including the additional independent variable Order, all effects of Order were non-significant, except for the (irrelevant) main effect of Order, $F(1, 83) = 5.95$, $p < .05$.

So, even though manipulation of Trial Type might have affected the spontaneity of the inferences drawn, order did not qualify the effects we obtained. This suggests that the within-subjects manipulation of Trial Type did not diminish the spontaneity of inferences drawn.

The current results suggest that both STI's and SSI's were drawn concurrent. However, three alternative explanations would also explain our findings. First, the inferences found may have been activated by the probes, and not have been drawn spontaneously. In this case, subjects in trait probe conditions made STI's, and those in situation property probe conditions made SSI's. This would imply that the probe produces the inference it aims to assess. However, in concurrence with previous studies, we may assume that the probe recognition paradigm detects activation at the time of encoding (for a discussion of the probe recognition paradigm see Uleman, Newman, et al., 1996), and that the inference has already been drawn when the probe is presented.

Second, if certain behavior descriptions activated only STI's while others activated only SSI's, the net result would suggest that, overall, all behavior descriptions appear to have activated both STI's and SSI's. To certify that each behavior description activated both the corresponding STI and SSI, we included Behavior Description in a 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial Type: Experimental vs. Control) x 10 (Behavior Description: 1 to 10) analysis of variance on the response times.[5] The possibility that certain behavior descriptions were triggering STI's, while others were triggering SSI's would be indicated by a three way interaction between Behavior Description, Trial Type, and Probe Type. However, this interaction was not significant, $F < 1$. As in the previous analysis, the main effect of Trial Type was strong, F (1, 52) = 11.86, $p < .01$ and both the main effect of Probe Type and the interaction between Trial Type and Probe Type were non-significant, $F < 1$. Thus, we have no indication that the type of spontaneous inference made was qualified by behavior description.

A third explanation of our findings is possible, although perhaps not plausible. If some participants drew STI's while others drew SSI's, the net result would suggest that, overall, both inferences were drawn by all participants. It is conceivable that there are individual differences in the tendency to infer traits or situation properties. These differences could be related to personality variables such as the implicit theories people have about the nature of human attributes (Levy & Dweck, 1998) or explanatory style (Buchanan & Seligman, 1995). This would imply that, as an individual's tendency to infer a trait increases, the tendency to infer a situation property decreases, and vice versa. However, in a related study we performed (see Chapter 3, Study 1), we did not find evidence for this alternative explanation. On the contrary, this study strongly supports the suggestion that each participant spontaneously drew both the corresponding STI and SSI. In this study, exactly the same probe recognition paradigm and the same behavior descriptions and probes as in the current experiment were used, but Probe Type was manipulated within participants. Results of this study again show activation of both STI's and SSI's and no correlation between activation of STI's and SSI's, $r = -.057$, $p = .51$. Thus, the two tendencies are independent.

In sum, additional analyses on the current data as well as additional data appear to rule out alternative interpretations of our findings and, hence, support our assumption that both STI's and SSI's were drawn concurrent.

Experiment 2

Experiment 1 demonstrates activation of both STI's and SSI's using a probe recognition paradigm. In Experiment 2, our aim is to replicate this finding using a different paradigm. Additionally, we will study whether the activation of STI's and SSI's occurs independent of the inferential goal of the perceiver. For SSI's, this independence of temporarily activated processing goals is yet to be shown.

In Experiment 2, comparable to research by Krull (1993), temporarily activated processing goals will be manipulated by means of an instruction that gives participants either a dispositional or situational processing goal. Participants are instructed to form an impression of either the actor or the situation this actor is in. Using an adapted version of the relearning paradigm as developed by Carlston and Skowronski (1994; Carlston et al., 1995), we will then measure activation of STI's and SSI's. If STI and SSI are both goal-independent, they should both be activated, as in Experiment 1, and independent of temporarily activated processing goals of the observer.

Method

The adapted relearning paradigm. In this second experiment, an adapted version of the relearning paradigm (Carlston & Skowronski, 1994; Carlston et al., 1995) was used to measure activation of STI's and SSI's. In this subsection we will describe why the paradigm in its original form is not readily suited to measure activation of SSI's, and how we have adapted it to measure both STI's and SSI's.

In Carlston's (Carlston & Skowronski, 1994; Carlston et al., 1995) version of the relearning paradigm, participants are to learn associations between a photograph of a person and a trait. For instance, participants may have to remember that John, represented by a photo of a man with a beard, jumps over the fence and, hence, is athletic, and that Don, represented by a photo of a man with glasses, passes the exam and, hence, is smart. Because of the differences between persons and situations, however, a problem arises when using photos of situations in this paradigm. Traits are easily interchangeable; e.g., "athletic" as a property of the man with the beard and "smart" as a property of the man with the glasses, can be quite easily confused. Properties of situations, on the other hand, are object-specific and cannot be easily interchanged. E.g., "low" as a property of a fence and "difficult" as a property of an examination cannot easily be confused. Hence, it would be a lot easier to learn associations between situations and properties than between persons and traits. The error that the property "low" belongs to the photo of the exam and the property "difficult" belongs to the photo of the fence, is very unlikely to be made. Because the relearning paradigm is based on how well participants remember associations, in its original form it is not suited to measure activation of both STI's and SSI's.

To adapt the paradigm so that it can demonstrate both STI's and SSI's, we developed a paradigm in which the photo is replaced by something more abstract: a cell in a grid. Each cell in the grid can contain a trait-word (STI) or a property of a situation (SSI). Participants are to learn what is presented in each cell of the grid. The association participants are to learn now is a combination between, on the one hand, a property of the person or the situation and, on the other hand, a cell in a grid. Specifically, instead of remembering which trait or property is associated with which photo, participants are to remember which trait or property has been presented in which cell of a 4 x 4 grid. Each association, hence, is of the same quality and difficulty for STI's as well as for SSI's, and errors in remembering are as easily made for combinations containing a STI as they are for combinations containing a SSI.

Overview of the adapted relearning paradigm. As the Carlston and Skowronski paradigm, the current paradigm consisted of five tasks: An exposure task, a filler task, a relearning task, a filler task, and a cued-recall task. In each task, a grid of 4 x 4 cells was displayed on screen. In the exposure task, 16 behavior descriptions were presented in the cells. One by one, in random order, in every cell a description was displayed for 6 seconds. In the relearning task, a property of the actor or the situation (depending on condition) instead of a behavior description was presented in each cell. Participants were instructed to memorize which property was displayed in which cell. One after another, in random order, in every cell a property was displayed for 4 seconds. In half of the cells - the relearning trials - this property fitted an implication of the behavior that had been presented in the same cell during the exposure task. In a relearning trial, for example, had the behavior “John gets an A for the test” been presented in a certain cell in the exposure task, the property “smart” would be presented in the same cell in the relearning task. In the other half of the cells - the control trials - the displayed property did not fit an implication of the behavior presented in the same cell. These control trials, thus, did not allow relearning. In the cued-recall task, participants were asked to recall what property was shown in which cell in the relearning task. The number of correctly remembered items was the dependent variable. If relearning trials are remembered better than control trials, a savings effect has occurred (Carlston & Skowronski, 1994; Carlston et al., 1995).

Participants and materials. Hundred and twenty-two (78 female, 44 male, *M* = 22.02 years old) students of the University of Nijmegen participated in this experiment. All participants were native Dutch speakers and received the equivalent of $3, - for a participation of 40 minutes. As stimulus materials, 16 behavior descriptions and concurrent properties (of the actor or the situation) were used. Ten of the behavior descriptions were the same as in Experiment 1, six were not used before, but were selected on the basis of the pretest described in the Method section of Experiment 1. The behavior descriptions used in Experiment 2 and their properties are shown in the Appendix.

We manipulated inference goals by using three different instructions. Before reading a description, participants in the dispositional inference goal condition read an instruction in the format of "Form yourself an impression of (the actor)". For instance, preceding the description "John jumped over the fence", participants were instructed "Form yourself an impression of John". So, the instruction was adapted for each behavior description, and before each behavior description a new instruction was given. The same format was used in the condition in which we activated a situational processing goal, but in this case a short identification of the situation was included in the instruction. For example, a situational processing goal was activated by means of the instruction "Form yourself an impression of the fence", followed by the behavior description "John jumped over the fence". In the control instruction condition, participants were instructed "Form yourself an impression of what is described".

Design. The design was a 3 (Instruction: Situational vs. Dispositional vs. General) x 2 (Cue: Trait vs. Situation Property) x 2 (Trial Type: Relearning Trial vs. Control Trial). As in Experiment 1, the last variable was varied within-participants.

Procedure. Seated behind a computer screen, participants individually went through the instructions and the tasks. They were told that they were to participate in a study investigating communication. After some general instructions, participants completed a practice task to make them accustomed to the upcoming task. This practice task consisted of two separate tasks; an exposure task and a cued-recall task. In the exposure task, instead of behavior descriptions, sixteen titles of famous pop songs appeared in different cells of the grid. Identical to the exposure task in the remainder of the experiment, participants received an instruction before every pop song was displayed. To ensure that participants would pay attention to the instruction, we used four different instructions in this practice task, i.e., "Think about what year this song was written in", "Think of who performed this song", "Think about what the title of this song is in Dutch" or to "Think about what the first line of this song goes like". As in the real exposure task, participants were asked to use the instruction while reading the contents of the cell. In the control condition, the instruction "Form yourself an impression of what is described" was used. In the cued-recall practice task, one by one, all 16 pop song titles were presented and participants were asked in which cell each title had been shown during the exposure task.

After the practice task, the actual experiment began, starting with the exposure task. Before each behavior description was displayed, participants received an instruction to form an impression of the actor, the situation, or the event being described. This instruction was displayed for 3 seconds, in the middle of a blank screen. After each instruction, the computer showed the grid again, with a description in one of its cells. After a description had been presented, the screen turned blank and the next instruction was displayed.

Between the exposure and the relearning task, a filler task was inserted to interfere with participants' ability to recall the specific information presented in each cell (cf., Carlston & Skowronski, 1994). In this task, participants completed five word puzzles. In each puzzle the letters a word of 5 to 9 letters were presented in a mixed-up order. Participants were asked to type in the word these letters formed within 60 seconds.

After the filler task, participants completed the relearning task. Half of the participants received only traits in this task, and the other half received only properties of the situation. Between the relearning and the cued-recall task, a second filler task was inserted. This second filler task was identical to the first one, but the word puzzles consisted of other words.

The last task was the cued-recall task. In this task, participants were presented with a property of a person or a situation, and asked in which cell that property had been shown during the relearning task. This question was asked about all 16 properties, in random order. Every time, the question was presented underneath the 4 x 4 grid, and participants could answer by clicking on a cell with their mouse. Finally, participants were debriefed and thanked for their participation.

Results and Discussion

The proportion of correctly remembered items (of the total of 16 items) by each participant was submitted to a 3 (Instruction: Situational vs. Dispositional vs.

General) x 2 (Cue: Trait vs. Situation Property) x 2 (Trial Type: Relearning Trial vs. Control Trial) MANOVA with Trial Type as a within-subjects variable. Activation of spontaneous inferences would be indicated by savings effect for relearning trials over control trials, i.e., a main effect for Trial Type with superior recall on relearning trials compared to control trials. This main effect of Trial Type was found F (1, 116) = 370.74, $p < .001$. Relearning trials were remembered better (M = 85.5%, SD = 30.6%) than control trials (M = 23.4%, SD = 11.7%).

There was a tendency for the savings effect to be stronger when the cue was a trait than a situation property (interaction Trial Type x Cue, F (1, 116) = 3.25, $p < .10$). When the Cue was a property of the actor, the difference between relearning trials (M = 90.6%, SD = 29.2%) and control trials (M = 22.7%, SD = 10.9%) was bigger than when the Cue was a property of the situation, (M = 79.9%, SD = 31.3% and M = 24.1%, SD = 12.6%, respectively). However, the difference between relearning trials and control trials was significant for both trait cues (F (1, 116) = 242.04, $p < .001$) and situation cues (F (1, 116) = 147.56, $p < .001$).

The interaction between Instruction and Trial Type and the 3-way interaction were both non-significant, F (1, 116) = 1.78, *ns*, respectively $F < 1$. Thus, the savings effect emerged regardless of instruction.

No other effects were significant. Neither the main effect for Cue, F (1, 116) = 2.60, *ns*, nor the main effect of Instruction, F (1, 116) = 1.10, *ns*, nor the interaction between Cue and Instruction, $F < 1$, reached significance.

As the probe recognition paradigm used in Experiment 1, the current paradigm detects activation at the time of encoding (comparable to the original relearning paradigm, see, Carlston & Skowronski, 1994; Carlston et al., 1995; Uleman, Newman, et al., 1996). Therefore, we may assume that the inferences found were not activated by the probes, but rather have been drawn spontaneously, and, hence, that STI's and SSI's co-occurred in Experiment 2 as well.

As in Experiment 1, a second analysis refuted the alternative explanation that certain behavior descriptions activated only STI's while others activated only SSI's. A dichotomous variable (correct or wrong response) was submitted to a 3 (Instruction: Situational vs. Dispositional vs. General) x 2 (Cue: Trait vs. Situation Property) x 2 (Trial Type: Relearning Trial vs. Control Trial) x 16 (Behavior Description: 1 to 16) MANOVA with the latter two as within-subjects variables. This re-analysis showed co-occurring activation for 14 of all 16 behavior descriptions.[6]

The results of Experiment 2 confirm those of Experiment 1 in suggesting that activation of both STI's and SSI's can occur. Using a different paradigm, the current experiment shows the expected savings effects for both traits and situation properties.

No evidence was found for an influence of processing goals on activation of STI or SSI. This finding converges with other studies (Carlston & Skowronski, 1994; for an overview, see Uleman, Newman, et al., 1996) that found no influence of temporarily activated processing goals on STI's. Additionally, we found no influence of processing goals on the activation of SSI's. Earlier, SSI's have been shown to be similar to STI's in other respects, e.g., SSI's are also made without awareness (Lupfer et at., 1990), and are also made unintentionally (Lupfer et al., 1995; see Uleman, Newman, et al., 1996). The present results show that STI's and SSI's are also similar in that they are not directly guided by temporary processing goals.

Another suggestion of the current results is that, in addition to dispositional processing goals, situational processing goals also do not guide spontaneous inferences. Previous research (e.g., Carlston & Skowronski, 1994) has already shown that STI's are activated regardless of processing goals, dispositional or neutral. Additionally, the current results show that STI's and SSI's can be activated regardless of processing goals, dispositional or situational.

Importantly, these results show that the current version of the relearning paradigm is suitable to detect activation of spontaneous inferences, analogue to its original version (Carlston & Skowronski, 1994; Carlston, et al., 1995). The adapted relearning paradigm used in this study appears to be a suitable instrument to measure activation of not only STI's, as in the original version, but also of SSI's. Additionally, it might be suited to measure activation of other types of spontaneous inferences. Because of its generality (learning an association between a cell in a grid and a stimulus), the current paradigm allows for very diverse stimulus materials, and hence, it has potential applicability to a wide range of domains.

Another contribution of the current results is that they may shed light on a suggestion by Skowronski, Carlston, Mae, and Crawford (1998) on the phenomenon of spontaneous trait transference (STT). This phenomenon implies that a trait that should logically only be associated with the actor, also may become associated with another person, e.g., the person who issues a trait-implying description (Carlston et al., 1995; Mae, Carlston, & Skowronski, 1999; Skowronski, et al., 1998). Skowronski et al. suggest that STT stems from incidental associative processes. An STI that is activated gets associated - incidentally - to the person uttering the behavior description. For example, the trait "untrustworthy" might be spontaneously inferred when hearing the utterance "can't be trusted" and become incidentally associated to Dave who issues this trait-implying description about a third person. However, another explanation might be that STT stems from more explicit inferential processes. For example, the trait "untrustworthy" might be explicitly inferred about Dave, simply because he says "can't be trusted" about somebody else. Convergent with Skowronski et al.'s suggestion, research by Brown and Bassili (2002) suggests that STT occurs in the absence of explicit inferential processes and goals. For example, they reported a savings effect for combinations between the photo of a banana and the trait "superstitious". However, even inanimate objects (like bananas) might activate an inferential goal: Very often people ascribe human traits to inanimate objects. The paradigm used in the current experiment and its results show that an association can be formed between something totally abstract (a location on a grid) and a trait. Although an inanimate object might still activate an explicit inferential goal, this seems to be very improbable for something as abstract as a location in a grid. Hence, the current paradigm provides more conclusive evidence for Skowronski et al.'s (1998) suggestion that STT stems from incidental associative processes and not from explicit inferential processes.

General Discussion

In two experiments, using two different experimental paradigms, we showed that activation of both an STI and an SSI is possible. Furthermore, the results of the second experiment indicate that SSI's, just as STI's (see Uleman, Newman, et al., 1996), are not affected by temporary processing goals. SSI's seem to occur just as automatically as STI's. Thus, given stimulus materials that allow for inferences about the actor as well as the situation, the social perceiver can draw both an STI and an SSI, independent of processing goal. As a lot of behavior in the real world allows for both a dispositional and a situational inference (e.g., Krull & Dill, 1996), co-occurring activation of STI and SSI may not be rare.

As noted in the Introduction, there are differences between intentional inferences examined in the research tradition of Krull (Krull & Erickson, 1995) and Gilbert (Gilbert & Malone, 1995), and the spontaneous inferences examined in STI research. Intentional inferences are goal-dependent. Thus, intentional inferences of trait or situation property are dependent on processing goals. Spontaneous inferences, on the other hand, are not only effortless, but also goal-independent, as our second experiment demonstrates for both STI’s and SSI’s. As a consequence, if the behavior description allows for both, STI’s and SSI’s will be activated simultaneously.

In the field of person perception, one study is available which indicates that several spontaneous inferences can co-occur. Uleman and Moskowitz (1994) examined whether STI's and spontaneous inferences about other aspects of the behavior can co-occur. For example, the sentence "The child tells his mother he ate the chocolates" implies the trait "honest" but might also activate "confessing". Results showed that activation of the two types of spontaneous inferences co-occurred (Uleman & Moskowitz, 1994). In this example, the two types of spontaneous inferences are similar and hence, might facilitate each other. The current results, however, suggest that several spontaneous inferences can be activated that are independent of each other or even are mutually inconsistent.

In line with our findings, Uleman (1999, p. 151) suggested that unrelated and even mutually inconsistent spontaneous inferences can be activated at the same time. Several STI’s and SSI’s in our experiments actually were mutually inconsistent to some extent. For example, the STI “athletic” and the SSI “low” were used with the behavior description “John jumped over the fence”. In a Heiderian (1958) perspective, the causal strength of the dispositional factor is weaker as the causal strength of the situational factor increases, and vice versa. The more athletic John is, the higher the fence can be. And the lower the fence is, the less athletic John needs to be. In this perspective the spontaneous inferences "low" and "athletic" may be seen as contradicting. Nonetheless both were activated. This corroborates our view that spontaneous inferences occur in the first stage, and that in this stage multiple concepts are activated which may be unrelated or even inconsistent. In the second stage, some concepts are subsequently inhibited while the activation of others is increased.

Whereas intentional inferences reflect the second stage of the inference process as described in three-stage models, we suggest that spontaneous inferences occur in the first stage. Interestingly, little attention has been given to the distinction between the first and second stage. In the literature on correspondent inferences (for a review, see Gilbert& Malone, 1995), much attention has been given to the second and third stage, with the third (correction) stage being more thoughtful and effortful. An explicit discussion of what exactly happens in the first stage, and how it is different from the second, has been omitted.

Based on our findings and our review of the literature, we propose that STI’s and SSI’s represent the first stage of the inference process. In the first stage, behavior is interpreted and, automatically, all kinds of constructs are activated in a quick-and-dirty way, among them spontaneous inferences. In this stage, various activated spontaneous inferences can co-occur. As our results show, even mutually inconsistent STI's and SSI's can be activated at the same time. These results corroborate our view that in the first stage multiple concepts are activated which may be unrelated or even inconsistent. Also, spontaneous trait transference (Carlston et al., 1995) can occur in this stage, because the activated inferences are not yet connected with a specific actor or object. In the second stage, intentional inferences are drawn, guided by processing goals. Although mutually inconsistent concepts could co-exist in the first stage, in the second stage, some concepts are inhibited by explicit inferential processes while the activation of others is increased. These explicit inferential processes now connect activated inferences to specific actors or entities that the perceiver is motivated to form an impression of. In the third stage, correction of prior inferences takes place.

The present research suggests that, in the first stage, processing goals do not have an inhibitory effect on competing spontaneous inferences activated in the first stage. A situational processing goal does not seem to inhibit the activation of an STI, nor does a dispositional processing goal seem to inhibit activation of an SSI. The research of Krull and Dill (1996) suggests that this effect does exist for inferences occurring in the second stage. This research (Krull & Dill, 1996) shows that a situational processing goal inhibits intentional dispositional inferences and that a dispositional processing goal inhibits intentional situational inferences.

As to John getting an A for the test, the following can be said. Given this behavior, which allows for both an STI and an SSI, the social perceiver will probably think spontaneously of "smart" as well as of "easy". Even if we have the goal to try to think solely of properties of the situation, we will still think spontaneously of both a property of John as well as of the situation, independent of our processing goals. When asked for our inference however, we will draw an intentional inference that is guided by our goals. If we want to get to know John better, we might think he is a smart guy.

If, on the other hand, we have to take the test next, we might infer the test is easy. If we have both goals, we might think of both.

Appendix

Behavior Descriptions Used as Stimulus Materials in Experiments 1 and 2 with Corresponding Trait and Property of the Situation and the Percentage of Pretest Participants Who Mentioned that Property

	Behavior Description	Trait	%	Property of Situation	%
1	John gets an A for the test	Smart	44.6	Easy	59.3
2	Maurice doesn't feel like moving the desk	Lazy	83.8	Heavy	52.0
3	Robert leaves the cinema smiling	Happy	55.5	Funny	79.8
4	Bill complains about his soup not being hot enough	Nagging	75.5	Cold	55.2
5	Will talks during the lecture	Impolite	67.5	Boring	71.0
6	Eric lifts the boulder	Strong	76.5	Light	50.9
7	Ben jumps over the fence	Athletic	53.6	Low	64.3
8	Ron drops the fish he just caught	Clumsy	38.9	Slippery	71.0
9	Steven swims the lake	Sporty	32.1	Small	46.9
10	Leo can't get the computer started	Inept	45.7	Broken	42.4
	Average of descriptions 1 to 10		57.4		59.3
11	Pete tells the waiter the food tastes well	Complimentary	59.1	Delicious	83.1

table continues

	Behavior Description	Trait	%	Property of Situation	%
12	Jerome indicates he caught a fish of 1 meter long	Boastful	58.9	Big	45.4
13	Nigel can't read the letter	Illiterate	27.1	Unclear	33.6
14	Paul helps the old lady cross the street	Helpful	34.4	Needy	28.1
15	Ed loses the game of chess from his opponent	Good chess player	39.0	Bad chess player	24.1
16	Hank can't remember the phone number	Forgetful	32.8	Difficult	22.3
	Average of descriptions 1 to 16		51.6		51.8

Note 1. Behavior descriptions 1 to 10 and the combining trait and property were used in Experiment 1. Behavior descriptions 1 to 16 and the combining trait and property were used in Experiment 2.

Note 2. All materials presented are best possible translations from Dutch.

Note 3. The averages indicated after behavior description 10 and 16 are averages of all preceding percentages.

Endnotes

[1]"The situation", or external cause of behavior can either be an entity / stimulus towards which the behavior is enacted (e.g., another person or an object such as a test), or circumstances (Heider, 1958; Kelley, 1967, 1973). In the current paper we will focus on entities as situational causes.

[2]In contrast to studies on STI's that used the probe recognition paradigm, Lupfer et al. (1995) did not find the expected differences in response times. However, other data (e.g., Uleman, Hon, et al., 1996; Wigboldus et al., 2003) suggest that this may be due to differences in motivation between the Lupfer et al. study and other

studies. In these other studies, participants' motivation was enhanced by either giving them feedback (Uleman, Hon, et al., 1996, Study 2) or promising an extra reward (Wigboldus et al., 2003) to answer quickly and accurately. In these studies, participants answered more quickly overall (faster than 900 ms as compared to slower than 1050 ms in the Lupfer et al. study). Only when pushed beyond their performance limits, participants will sacrifice speed (RT's) or accuracy or even both (Uleman, Hon, et al., 1996). In contrast, when participants are motivated this way and answer more quickly, no effect on incorrect responses is found (e.g., Uleman, Hon, et al., 1996, Study 2; Wigboldus et al., 2003).

[3]Although Lupfer et al. (1995) also used ambiguous focal sentences, these were always presented in combination with either trait-biased or situation-biased covariation information. Therefore, the behavior description they presented never allowed for the activation of both an STI and an SSI.

[4]McKoon and Ratcliff (1986) limit the number of combinations in which the probe refers to the implication of the description to 32 out of a total of 144. This is done to keep spontaneity at a high level. Although there is no reason to believe this will completely stop participants from making intentional inferences, by this McKoon and Ratcliff (1986) try to keep them from doing so. In the current study we assume spontaneity of STI's to have been demonstrated (Uleman, Newman, et al., 1996) and we use a less stringent ratio.

[5]This second analysis could not be used to study effects on error rates because random noise on the level of error rates per answer causes too many outliers.

[6]Different than in Experiment 1, we obtained a significant three-way interaction between Behavior Description, Trial Type and Probe Type, F (15, 1740) = 2.35, $p < .01$. To further examine this interaction, we analyzed all the simple effects of Trial Type for each of the 32 combinations of Behavior Description and Probe Type and found that it was caused by 2 behavior descriptions. Activation of a spontaneous inference was indicated by a significant simple effect of Trial Type for a combination

of a Behavior Description and a Probe Type. The analyses showed that for one behavior description ("Steven swims the lake"), activation of the STI was only marginally significant, F (1, 120) = 3.44, $p < .1$, while activation of the SSI was significant, F (1, 120) = 65.08, $p < .001$. Another behavior description ("Ron drops the fish") seemed to activate the corresponding STI, F (1, 120) = 49.23, $p < .01$, but not the corresponding SSI, $p > .1$. All other 14 of the 16 behavior descriptions activated both the corresponding SSI and STI, all *p*s < .05.

Chapter 3

Trait Attribution and Spontaneous Inferences: Different Paradigms, Different Effects of Processing Goals

In research on trait attribution (e.g., Gilbert & Malone, 1995; Gilbert, Pelham, & Krull, 1988; Krull & Erickson, 1995; Trope & Gaunt, 1999), social inferences are drawn relatively effortlessly (e.g., Gilbert et al., 1988; Krull, 1993). Therefore, these inferences might seem to be the same ones as those studied in research on spontaneous trait inferences (for an overview see, Uleman, Newman, & Moskowitz, 1996), which also occur effortlessly. However, this assumption is contradicted by the finding that social inferences as studied in research on trait attribution are influenced by processing goals (e.g., Krull, 1993; Lee & Hallahan, 2001), whereas this influence is neither expected nor found in research on spontaneous inferences (Carlston & Skowronski, 1994; Carlston, Skowronski, Sparks,1995; Chapter 2; Lupfer, Clark, & Hutcherson, 1990; Uleman, 1999; Uleman & Moskowitz, 1994; Uleman, Newman, et al., 1996). Because these two areas of research are different in several ways, the current literature does not allow for a direct comparison.

To bridge these differences, we performed two experiments studying the influence of processing goals on social inferences that were completely identical except for the way social inferences are measured. In the first study, we measured social inferences using the trait attribution paradigm, while in the second a paradigm from the area of spontaneous social inferences was used. Thereby, we hope to find direct evidence for the assumption that these two areas of research study different kinds of inferences that reflect different stages in the process of social inference.

Trait Attribution

In the area of research on trait attribution, research paradigms are used (e.g., Gilbert et al., 1988; Krull, 1993; Krull & Dill, 1996) that can be traced back to Jones' (Jones & Davis, 1965; Jones & Harris, 1967) seminal work on correspondent inferences. In these paradigms, participants are first presented with a behavior. For example, participants were shown a video tape of a woman behaving in an anxious manner. Then, they are asked to make a trait judgment about the actor (or, in later studies, e.g., Krull, 1993, a judgment about properties of the situation). Earlier studies (e.g., Jones and Harris, 1967) found that participants' judgments were dispositionally biased. Gilbert (Gilbert & Malone, 1995; Gilbert et al., 1988) showed that under cognitive load this bias was even stronger.

Based on findings like these, most current views on the process of social inference (e.g., Gilbert & Malone, 1995; Gilbert et al., 1988; Krull & Erickson, 1995; Trope, 1986; Trope & Gaunt, 1999) propose models that contain several stages. A prominent example of these models is the three-stage model of social inference by Gilbert (e.g., Gilbert & Malone, 1995; Gilbert et al., 1988). In the first stage of this model, people categorize the actor's behavior (e.g., after reading the behavior description "The student gets an A for the test", this behavior might be categorized as "smart"). In the second stage, people draw an initial dispositional inference (e.g., "The student is smart"). We will refer to these inferences as attributional inferences. Finally, in the third stage, situational information is used to correct the attributional inference and to come to a final inference (e.g., "The test may have been easy, so the student may not be all that smart"). The third stage requires ample cognitive capacity, whereas the first and second stage are relatively effortless (e.g., Gilbert et al., 1988). Since the correction of the third stage is almost never sufficient, the influence of processing goals remains in the final inference.

Krull (1993) shows that an opposite bias can also occur: A situational bias. He assumes that the default goal (at least in Western societies) is to make a dispositional attributional inference. However, after a manipulation of processing goals that instructed people to make a situational inference, a situational bias was found (Krull, 1993). Therefore, Krull and Erickson (1995) propose that in the second stage of social inference, an inference is drawn that depends on the processing goals of the observer: If the observer has the goal of forming an impression of the actor, a dispositional attributional inference will be drawn; if the observer has the goal of forming an impression of the situation[1] the actor is in, a situational attributional inference will be drawn. If an observer has both goals, Krull and Erickson assume that both a dispositional and a situational attributional inference will be drawn.

Inferences in the second stage – attributional inferences about the person or the situation - can be described as effortless (e.g., Gilbert & Malone, 1995; Krull & Erickson, 1995): Various studies show that even when performing a competing task (e.g., visual search tasks, digit rehearsal, gaze fixation, or strategic self-presentation), participants still draw these attributional inferences (e.g., Gilbert, McNulty, Guiliano, & Benson, 1992; Gilbert & Osborne, 1989; Gilbert et al., 1988; Krull, 1993; Osborne & Gilbert, 1992). Various other lines of research converge on the effortlessness of attributional inferences. First, trait attributions are regarded as a perceptual process (Kassin & Baron, 1985; Lowe & Kassin, 1980; McArthur & Baron, 1983) that is not effortful like the reasoning process that occurs in the third stage (Gilbert et al., 1988). Second, many studies show that trait attributions occur while encoding the behavior description (i.e., on-line), and even prove difficult to inhibit (see Hastie & Park, 1986). Finally, Bargh (1994, p. 26-27) describes this stage as relatively automatic, that is, it has several features of automaticity: Attributional inferences occur without awareness, and are relatively efficient and uncontrollable.

Spontaneous Social Inferences

In the area of research on spontaneous social inferences, very different research paradigms are used from those used in the area of trait attribution. These were developed to show that people can draw social inferences without having been asked to, that is, spontaneously. When observing the behavior of a target in a specific situation, people typically make spontaneous trait inferences (STI's; for an overview, see Uleman, Newman, et al., 1996). For example, the STI "smart" might become activated after reading the behavior description "The student gets an A for the test". In this research area, the paradigms used ensure that inferences are detected that were drawn spontaneously at the time of encoding of the behavior description.

Many of these paradigms (for an overview, see, Uleman, Newman, et al., 1996) take advantage of Tulving and Thomson's (1973) encoding specificity principle, which suggests that events that are encoded together (i.e., are associated in memory) can serve to retrieve each other. In these studies, participants are presented with short behavior descriptions (e.g., "The student gets an A for the test"). While reading this behavior description, the corresponding trait ("smart") or situation property ("easy") inference might be drawn spontaneously. Through implicit learning, this inference becomes associated with other elements around at the time of activation, as, for example, the behavior description, the actor or the behavior itself. By testing the strength of this association, these paradigms detect spontaneous social inferences.

An early paradigm employed for this purpose is the cued recall paradigm (e.g., Winter & Uleman, 1984). In this paradigm, participants are first presented with several behavior descriptions. Then, they are asked to recall each description while being cued with a trait word. For example, the trait "clumsy" was used as a cue to recall the behavior description "The reporter stepped on his girlfriend's feet during the foxtrot". Results showed that if the trait word was implied by a behavior description, participants recalled the description better. This suggests that participants spontaneously drew trait inferences while reading the behavior descriptions and that this inference got associated to the behavior description.

A multitude of later studies using this and other paradigms (see, Uleman, Newman, et al., 1996) show that STI's are relatively effortless (Uleman, Newman, et al., 1996): Other tasks do not seem to interfere with activation of STI’s (e.g., Uleman, Hon, Roman, & Moskowitz, 1996). Also, STI’s almost completely fit Bargh's (1994) four criteria of automaticity (Bargh, 1994): They are drawn without awareness, unintentionally, are highly efficient, and cannot easily be controlled. STI’s occur even without any direct intention to infer traits or form impressions (e.g., Carlston & Skowronski, 1994; Lupfer et al., 1990; Uleman, Newman, & Winter, 1992; Winter, Uleman, & Cunnif, 1985). STI's are largely unaffected by cognitive capacity (Uleman, Newman, et al., 1996). Different amounts of cognitive load (manipulated by the difficulty of numbers to be remembered) do not affect STI's (Winter et al., 1985). At very high load levels however, STI activation does seem to be hampered (Uleman et al., 1992) because of diminished comprehension of the behavior.

People not only make spontaneous inferences about properties of other people, but also about properties of the situation a person is in (e.g., Duff & Newman, 1997; Lupfer, Clark, Church, DePaola, & McDonald, 1995; Lupfer et al., 1990). For example, after reading the behavior description “The student gets an A for the test”, the SSI "easy" could become activated, as an inference about the test. Although many questions concerning spontaneous situational inferences (SSI's) still have to be answered, research suggests that SSI’s and STI's are quite similar processes (Chapter 2; Uleman, Newman, et al., 1996).

STI activation has been shown not to be influenced by temporary processing goals (e.g., Carlston & Skowronski, 1994; see, Uleman, 1999; Uleman, Newman, et al., 1996).[2] As long as the goal induces participants to pay attention to the contents of the behavior descriptions, STI’s are activated (Uleman & Moskowitz, 1994; Whitney, Waring, & Zingmark, 1992). For example, Carlston and Skowronski (1994) measured activation of STI's in three conditions. They found no difference in STI activation between participants under trait generation, general personality impression or memory instructions.

Similarly, in a recent study by Ham and Vonk (2003, Study 2), participants received the instruction to form themselves an impression of the actor or of the situation or they received no specific instruction. The behavior descriptions used in this research allowed for the activation of both an STI and an SSI (e.g., "The student got an A for the test"). The results of this study showed no influence of processing goals on spontaneous inference activation: Both STI's and SSI's were activated, independent of processing goal.

Different Paradigms, Different Effects of Processing Goals

The research area of trait attribution and that of spontaneous inferences seem to study the same phenomenon, but use very different methods. Both research areas have in common that they study social inferences that occur on-line when people observe behavior (e.g., Gilbert & Malone, 1995; Uleman, Newman, et al., 1996). Also, they both find that these inferences occur effortlessly (e.g., Gilbert & Malone, 1995; Uleman, Newman, et al., 1996), i.e., both types of inferences are found to occur while participants are performing various other tasks (e.g., Gilbert et al., 1988; Uleman, Hon, et al., 1996). Furthermore, both lines of research show that social inferences can be drawn not only about properties of the actor (traits), but also about properties of the situation the actor is in (e.g., Chapter 2; Krull & Malone, 1996; Lupfer et al., 1990; Uleman, Newman, et al., 1996).

Because of these similarities, inferences drawn in the second stage of social inference might seem to be identical to spontaneous inferences. Indeed, this assumption would fit most of the literature on three-stage models (e.g., Gilbert & Malone, 1995; Gilbert et al., 1988), and sometimes is found explicitly (e.g., Krull & Dill, 1996; 1998; Krull & Erickson, 1995).

However, notwithstanding the similarities between these two areas of research, there are also many differences. The two areas of research stem from different research traditions and use different paradigms to detect social inferences, different kinds of stimulus materials and different manipulations of processing goals. In some respects, results from the two research areas are not compatible. Importantly, while models and research in the area of trait attribution show an influence of processing goals on social inferences (e.g., Krull, 1993; Krull & Erickson, 1995), this influence is not found in the research area of spontaneous inferences (e.g., Uleman, Newman, et al., 1996).

Unfortunately, the differences and similarities between the concepts measured in the two research traditions are not easily comparable. Besides the entirely different ways in which social inferences are measured, two other relevant differences exist. First, different types of behavior descriptions have been used. In trait attribution or social inference research, behavior descriptions are used that consist of several pages of text (Gilbert et al., 1988) or even video material (Gilbert et al., 1988; Krull, 1993), describing one behavior. In spontaneous inference research, behavior descriptions are used that consist of several sentences (e.g., Carlston & Skowronski, 1994; Carlston et al., 1995), short sentences (e.g., Newman, 1991; Winter & Uleman, 1984) or symbolic pictures of behavior (Fiedler & Schenck, 2001), always describing several behaviors.

Second, as indicated earlier, different instructions have been used to manipulate processing goals. In trait attribution research, an extensive instruction has been used, especially adapted to the single behavioral episode (e.g., Krull, 1993). In spontaneous inference research, either general instructions (e.g., Carlston & Skowronski, 1994), not adapted to any single behavior description, or several short instructions were used, each adapted to a behavior description (Chapter 2; also see Lupfer et al., 1990).

To be able to directly compare these two lines of research, a more direct comparison is needed that retains the specific method each area uses to measure social inferences while eliminating other differences. However, these two methods cannot be combined in one study, because the dependent variables are fundamentally incomparable.

Therefore, in the current paper, we performed two studies that were completely identical except for the way social inferences were measured. In the first study, social inferences were measured as in spontaneous inference research, and, in the second study, as in the area of trait attribution. Both studies used (the same) short sentences as behavior descriptions because short sentences are needed to measure spontaneous inferences. And both studies used the same processing goal manipulation.

The instructions used in both studies to manipulate processing goals will be comparable to those used in the area of trait attribution. However, because we will use several behavior descriptions, some adaptation is necessary. Therefore, our instructions will consist of a general part and a specific part per behavior description. The general part will be a generalized version of the instructions used by Krull (1993). This instruction will focus participants' attention towards either the person or the situation involved in the behavioral field. The specific parts will be adapted to each behavior description. Before each behavior description, participants will read an instruction asking them to form themselves an impression of the specific situation or the actor in the behavior description.

In the first study, as in previous research (e.g., Carlston & Skowronski, 1994; Chapter 2, Study 2), we expect to find activation of STI's and SSI's, regardless of processing goal. In this paradigm, which measures spontaneous inferences, we do not expect an interaction with instruction. Obviously, a null-hypotheses as in this study cannot be tested. In the second study, where we use the trait attribution paradigm, however, we do expect to find an interaction of instruction x inference drawn. That is, a dispositional processing goal will lead to stronger dispositional inferences and a situational instruction to stronger situational inferences. To analyze the differential effect of processing goals between the two studies, we will perform a post-hoc meta-analysis on the two studies. In this meta-analysis, we expect to find a significant difference between the effects of instruction in the two studies.

Experiment 1

In this experiment, a probe recognition paradigm (McKoon & Ratcliff, 1986) was used to study the influence of processing goals on spontaneous social inferences about a property of the actor and of the situation (STI's and SSI's). We assume STI and SSI to be equally automatic processes (cf. Chapter 2) so, as explained above, we expected activation of both STI’s and SSI’s independent of temporary activated processing goals. This expectation also is in line with Uleman's (1999) characterization of spontaneous inferences.

In the probe recognition paradigm, participants read a behavior description after which a probe word is presented on screen. Participants are instructed to indicate whether this probe word was part of the sentence they just read. In the experimental trials of our study, the probe word represented a property (of the actor or the situation) that was implied by the description. In control trials, this probe was not implied by the description. For example, in an experimental trial, participants read the sentence "John gets an A for the test", then the word "easy" was presented on screen and participants were to indicate whether that word was part of the sentence. The probe word itself is not part of the behavior description, so the correct answer is negative. However, the STI or SSI activated by the sentence can interfere with quickly and correctly rejecting the probe. It is more difficult for participants to indicate that the probe was not in the description after reading a description that did imply the probe than after reading a description that did not (McKoon & Ratcliff, 1986). Therefore, as in earlier studies using this paradigm (Chapter 2, Study 1; Newman, 1991; Uleman, Hon, et al., 1996; Wigboldus, Dijksterhuis, & van Knippenberg, 2003), we expected the probe recognition paradigm to show an effect on response times and on accuracy of responses as a measure of activation of spontaneous inferences (for the difference between these two measures, see Chapter 2, Footnote 2).

Because we wanted to assess the influence of processing goals, we used behavior descriptions that allowed for both dispositional as well as situational social inferences. For example, the description “The student gets an A for the test” can activate the STI “smart” as well as the SSI “easy”. In a previous study (Chapter 2), the probe recognition paradigm showed an effect on response times both for the probe word representing an STI as well as for the probe word representing an SSI, indicating activation of both. In the present study, by instructing subjects to form an impression either of the actor or of the situation (e.g., the student or the test), we can examine if STI’s are stronger in the former case and SSI’s in the latter. In this respect, our stimulus materials are similar to those used in trait attribution research (e.g., Krull, 1993).[3]

Method

Participants. Participants were 79 (58 female, 21 male, M = 21.34 years old) students at the University of Nijmegen. All participants were native Dutch speakers. For a participation of 20 minutes they received € 2.5.

Materials. All participants completed a dispositional and a situational set of each 20 trials. Each set consisted of 10 experimental and 10 control trials. Each trial consisted of a behavior description and a probe word. Behavior descriptions and properties used in the two sets had previously been collected in a pretest (for an extensive description and overview of all items, see Chapter 2, Study 1). For example, the behavior description “John gets an A for the test” was used with the probe words “smart” as a trait and “easy” as a situation property. Other examples are “Will talks during the lecture” with “impolite” as a trait and “boring” as a property of the situation, and “Ben jumps over the fence” with respectively “athletic” and “low”. All behavior descriptions had a male actor whose first name served as subject of the sentence.

Each behavior was succeeded by a probe word that was either implied by the behavior (e.g., "John gets an A for the test" was succeeded by "smart"), in experimental trials, or, in control trials, not implied (e.g., "John gets an A for the test" was succeeded by "impolite"). The control trials consisted of the same behavior descriptions and probe words as the experimental trials, but the probes were rearranged such that each probe word was combined with a behavior description that did not imply it.

The dispositional and the situational trials (varied within subjects) used the same behavior descriptions but different probes. For the dispositional trials, the probe word was a property of the actor and for the situational trials of the situation. Thus, each participant saw all 10 behavior descriptions four times (once in experimental and once in control trials in both dispositional and situational sets) and all 20 probes (10 traits and 10 situation properties) twice (once in experimental and once in control trials).

In addition to these 40 trials, 60 filler trials were included. These filler trials were used for two reasons. First, if the probe words in all trials would be only properties of the actor or the situation, as is the case for the experimental and control trials, the verb in the description could be spent less attention to. The verb, however, is essential to grasp the meaning of each description. Therefore, 20 filler trials were included of which the probe word was a verb. Thus, of the total of 100 trials, 20 had a verb as a probe word.

Second, if the correct response on all trials would only be to answer "No", as is the case for all experimental and control trials, spending attention to the description would not be necessary to complete the task (see also McKoon & Ratcliff, 1986; Uleman, Hon, et al., 1996). Therefore, of the 60 filler trials, 50 were included in which the probe was a word that was literally in the behavior description, so that the correct response on half of the 100 trials was "Yes". For example, "George helped the elderly lady cross the street" was followed by the probe word "elderly".

We manipulated inference goals between subjects, by using two different sets of instructions; a dispositional, and a situational set. As described earlier, we adapted Krull's (1993) instructions to consist of an initial, introductory part and a specific part that was adapted to every new behavior description. Thereby, each set of instructions consisted of an initial instruction given in the introduction to the experiment, and 100 short, specific instructions given right before each behavior description.

In the dispositional and the situational set of instructions, the introduction informed participants about the role of dispositions or situational variables in behavior. In both conditions, participants were presented with an example behavior description; "Dan rubs his nose during the interview". The situational instruction told participants that it was their task to form themselves an impression of the situation described in the behavior descriptions they were going to read. For the example described, they were asked to "form yourself an impression of the interview. Would this be an interview that causes everybody to show this behavior?" The dispositional instruction told participants that it was their task to form themselves an impression of the person described in the behavior descriptions they were going to read. For the example described, they were asked to "form yourself an impression of Dan. Would Dan be a person that shows this kind of behavior more often?".

The specific part of the instructions was repeated before each behavior description. Before reading a description, participants in the dispositional inference goal condition read an instruction in the format of "Form yourself an impression of (the actor)". For instance, preceding the description "George jumped over the fence", participants were instructed "Form yourself an impression of George". The same format was used in the condition in which we activated a situational processing goal. For example, a situational processing goal was activated by means of the instruction "Form yourself an impression of the fence".

Procedure. The experiment was run on a computer for each participant individually. The task was explained and participants were motivated to answer both accurately and quickly; a reward of € 10 was promised to the participant who answered most accurately and quickly. In a practice round of 12 trials, participants were familiarized with the task. These trials consisted of the same kind of behavior descriptions and probes in the same proportions as the trials of the experimental task. Eight practice trials had a property (of the actor or the situation, depending on goal condition) as a probe. Participants' task was to indicate as accurately and quickly as possible whether the probe word had been in the description. Participants were instructed to press the 'a'-key to indicate 'no', meaning the probe had not been in the description and to press the '6'-key on the numeric part of the keyboard to indicate 'yes'. They were told to keep their left and their right index finger on the appropriate keys during the task. After the practice round, participants received feedback on the number of correct answers they had given. Then they were presented with either the dispositional or the situational general instruction, depending on condition, after which the 100 trials of the main task started.

In each trial of both the practice round and the main task, first a row of X's appeared in the middle of the screen for 1000 msec to focus the gaze of the participant. Then, the dispositional or the situational specific part of the instruction to manipulate processing goals was displayed for 3 seconds, in the middle of a blank screen. Next, the behavior description was displayed for 3000 msec, followed by a blank screen lasting 500 msec. Again a row of X's appeared on screen for 500 msec, this time followed by the probe. During the whole task the words 'yes' and 'no' remained visible on the right and left side of the screen. From the moment the probe was presented, participants could press the appropriate keys to give their answer. The probe remained visible until the participant had pressed one of both keys. After the answer was given, a blank screen was displayed for 1000 msec. Then the next trial started with the row of X's. Trials were presented in random order. After completing all 100 measurement trials, participants were thanked for their participation and debriefed.

Dependent variables. Responses and reaction times were recorded by the computer. Reaction times were measured with an accuracy of 16,67 ms.

Design. Participants were randomly assigned to one of the two goal conditions. In both conditions, the same behaviors and probe words were presented. The independent variables Trial (Experimental vs. Control) and Probe Type were manipulated within participants. The experiment thus consisted of a 2 (Instruction: Dispositional vs. Situational) x 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial Type: Experimental vs. Control) design, with the latter two variables varied within participants. Activation of spontaneous inferences will be indicated by an effect of Trial type: Slower response times on experimental trials indicate that spontaneous inferences have been activated while reading the behavior description and interfered with quickly rejecting the probe. Differences in the activation of STI's and SSI's will be indicated by an interaction of Trial Type and Probe Type. The effect of processing goals should show up as an interaction of Instruction, Trial Type and Probe Type. That is, this latter interaction would indicate that processing goals have an influence on the type of spontaneous inferences activated.

Results and Discussion

Reaction times. All participants had a low error rate (*M* = 2.3%, ranging from 0% to 7.5%). RT's were analyzed only if the reaction had been a correct one. As recommended by Ratcliff (1993), we analyzed our RT data by using two methods. First, an absolute cutoff criterion of < 200 ms and > 2000 ms was used. By using these cutoff points only 9 responses (0.3 %) had to be dropped from the statistical analysis. Second, an inverse transformation (1/x) of the RT's was used. The analyses reported hereafter are based on the cutoff criterion, which yielded converging results to the inverse transformation analysis.

The average response time per trial was submitted to a 2 (Instruction: Dispositional vs. Situational) x 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial

Type: Experimental vs. Control) MANOVA, with the latter two as within-subjects variables. Our expectancies were confirmed. We found activation of spontaneous inferences, indicated by a main effect for Trial Type, F (1, 77) = 38.73, $p < .01$. Participants responded slower to probe words that were implied by the behavior description (M = 686, SD = 140) and faster on control trails (M = 650, SD = 115). This effect emerged for both STI's and SSI's (interaction of Trial Type X Probe Type, p = .26). Participants responded slower on experimental trials both when the probe word was a trait (simple effect of Trial Type, F (1, 77) = 16.91, $p < .01$), as well as for probe words representing a situation property (simple effect of Trial Type, F (1,77) = 20.46, $p < .01$). These data, then, replicate the earlier finding (Chapter 2) showing that while reading the behavior descriptions the corresponding STI and SSI were both activated.

Activation of both the corresponding STI and SSI was found to be independent of the manipulation of instruction, indicated by a non-significant three-way interaction between Instruction, Probe Type and Trial Type, $F < 1$. So, participants responded slower to both dispositional and situational probe words that were implied by the behavior description, regardless whether the instruction had asked them to form an impression of the actor or of the situation.

Error rates. Error rates were highly skewed, as is most often the case in cognitive or perceptual tasks (Cohen & Cohen, 1975). Cohen and Cohen recommend a square root transformation for this kind of distribution to reduce skew. The square root of number of errors made was analyzed in a 2 (Instruction: Dispositional vs. Situational) x 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial Type: Experimental vs. Control) MANOVA. This analysis showed results comparable to the analysis of response times: The main effect of Trial Type was significant, F (1, 77) = 17.56, $p < .01$, while the interaction of Trial Type and Probe Type was non-significant, $F < 1$, indicating activation of both STI's and SSI's. Importantly, the three-way interaction between Instruction, Probe Type and Trial Type was non-significant, $F < 1$, suggesting no qualifying influence of processing goals on spontaneous inferences.

The current results replicate the results of an earlier study we performed (Chapter 2, Study 2), now using a completely different paradigm to measure activation of STI's and SSI's.[4] In this earlier study, an adapted version of the relearning paradigm developed by Carlston and Skowronski (1994) was used to detect STI's and SSI's. The analyses of response times as of error rates show the same results. Like the earlier findings, the results of the current study show co-occurring activation of STI's and SSI's, independent of goals. Thus, when a behavior description allows for both dispositional and situational inferences, both types of spontaneous inferences are activated.

Experiment 2

Experiment 1 confirms our expectancies that temporarily activated processing goals do not guide the activation of social inferences as measured in research on spontaneous inferences. This suggestion is in line with theorizing (e.g., Uleman, Newman, et al., 1996; Uleman, 1999) and empirical findings (e.g., Carlston & Skowronski, 1994; Chapter 2) in this research area. Of course, our conclusion is based on a null-effect. Contrastingly, in the area of research on trait attribution or social inference, processing goals do have an effect on social inferences. In Experiment 2, we will study the influence of processing goals on social inferences as measured in research on trait attribution.

Experiment 2 will be identical to Experiment 1 except for the assessment of social inferences. These will be measured using rating scales as in trait attribution research (e.g., Gilbert et al., 1988; Krull, 1993). We now expect instruction to influence the social inferences made: A dispositional instruction will lead to stronger dispositional and a situational instruction to stronger situational inferences. Also, we expect to find this interaction on response times for these rating scales: A dispositional instruction will lead to faster responses on trait rating scales, and a situational instruction to faster responses on rating scales about properties of the situation.

Method

Participants, materials and design. Ninety-three (55 female, 38 male, *M* = 22.72 years old) students of the University of Nijmegen participated in this experiment. All participants were native Dutch speakers. The same materials were used as in Experiment 1: The same instructions were used to manipulate processing goals, and all behavior descriptions (including all 60 filler behavior descriptions) and probes (traits and situation properties) were used again. The design was 2 (Instruction: Dispositional vs. Situational) x 2 (Inference Type: Dispositional vs. Situational), with the latter variable manipulated within participants.

Procedure. Seated behind a computer screen, participants individually went through the experiment, which was identical to Experiment 1 except for the measurement paradigm used. After a general introduction, a practice round explained the task of rating behavior descriptions. Next, participants were presented with either the dispositional or situational general part of the instruction, dependent on condition, after which they completed all trials.

Presentation of the specific instruction per behavior description and the subsequent behavior description was identical to Experiment 1. After each description, a trait rating and a situation property rating question were presented in counterbalanced order. On the trait rating question, participants indicated to what extent the actor possessed the trait. For example, after the behavior description "George gets an A for the test", participants were asked "How smart is George?" (1 "not at all smart", 5 "very smart"). On the situational inference question, participants rated the situation property. For example, after the behavior description "George gets an A for the test", participants were asked "How easy is the test?" (1 "not at all easy", 5 "very easy"). The response times on both questions were also recorded. Then the next instruction and behavior description were presented.

The experiment consisted of 70 trials instead of 100 trials as in Experiment 1. In the current paradigm, dispositional and situational trials were combined into one trial and there were no control trials. Therefore, of the 40 trials required in Experiment 1, only 10 remained that contained all behavior descriptions. Combined with the 60 filler trials, this led to a total of 70 trials. For each of those trials, four dependent variables were assessed: two ratings (of trait and situation property) and their two response times.

Results and Discussion

Mean responses across the 10 dispositional inference questions and the 10 situational inference questions were submitted to a 2 (Instruction: Dispositional vs. Situational) x 2 (Inference Type: Dispositional vs. Situational) MANOVA with Inference Type as a within-subjects variable. A main effect of Inference Type, F (1, 91) = 17.71, p < .01, indicated that, overall, traits were attributed to actors more strongly (M = 3.83, SD = 0.47) than were situation properties to situations (M = 3.53, SD = 0.49). The main effect of Instruction was not significant, F < 1.

More interestingly, Instruction affected the social inferences made, indicated by a significant interaction between Instruction and Inference Type, F (1, 91) = 7.83, p < .01. After a dispositional instruction, the correspondent trait was attributed more strongly (M = 3.85, SD = 0.35) to the actor than after a situational instruction (M = 3.60, SD = 0.57; simple effect of Instruction, F (1, 91) = 3.26 p = .04). Conversely, after a situational instruction, a situation property was attributed more strongly (M = 3.70, SD = 0.55) than after a dispositional instruction (M = 3.37, SD = 0.36; simple effect of Instruction, F (1, 91) = 12.49 p < .01).

Similar results were obtained in an analysis of response times on the dispositional and situational inference questions. An interaction of Instruction and Inference Type, F (1, 91) = 5.59, p = .02, indicated that after a dispositional instruction, dispositional inference questions were answered faster (M = 2.75 sec, SD = 0.93), than after a situational instruction (M = 2.88 sec, SD = 0.88); after a situational instruction, situational inference questions were answered faster (M = 2.77, SD = 0.75), than after a dispositional instruction (M = 3.03, SD = 0.93). Both main effects were non-significant (F's < 1).

Confirming our expectancies, in Experiment 2, we found that processing goal influenced the social inferences participants drew. After a dispositional processing goal instruction, participants drew stronger dispositional social inferences, and made these inferences more quickly than after a situational instruction; after a situational instruction, they drew stronger situational social inferences and made these more quickly than after a dispositional instruction. These results converge with Krull (1993; Krull & Dill, 1996; 1998), now using written behavior descriptions instead of video material.

Since Experiment 1 and Experiment 2 used different paradigms to measure social inferences, their dependent variables cannot be compared in a single analysis. To test our main hypothesis, we performed a meta-analysis on the two interactions of Instruction with Inference Type. The meta-analysis showed a significant difference between the effects found in the two studies, Z = 2.53, p < .01. The effect found in the second study (d = 0.58, var = 0.05) was bigger than the (non-significant) effect found in the first study (d = 0.06, var = 0.05).

General Discussion

The present results suggest that the area of trait attribution and the area of spontaneous inferences study different kinds of inferences that may reflect different stages in the process of social inference. Previously, the social inferences drawn in these two areas could not be directly compared because of various differences in the research paradigms used. The current two studies allow for a direct comparison of the effect of processing goals on social inferences as measured in these two areas of research.

The first study confirms that social inferences as measured in the area of spontaneous social inferences (STI's and SSI's) occur independent of processing goals.

The second study confirms that social inferences as measured in the area of trait attribution are dependent on processing goals of the social perceiver: With a dispositional processing goal, participants drew stronger dispositional inferences, and with a situational goal, stronger situational inferences. A meta-analysis confirms that the effect of processing goals is significantly different between the two studies. This indicates that, even though they have been found to occur relatively effortlessly (e.g., Krull, 1993), attributional inferences are not the same kind of inferences as spontaneous inferences because they are goal-dependent.[5]

Current findings shed more light on the distinction between the first and the second stage of three-stage models social inference. In the area of trait attribution research, three-stage models of social inference have focused on the second and third stage (e.g., Gilbert & Malone, 1995; Krull & Erickson, 1995). Little attention has been paid to the distinction between the first and second stage. In the area of spontaneous inference research, the inferences studied have not been considered in the perspective of these three-stage models.

Based on current findings, we suggest that STI's, and SSI's as well, represent the first stage in the three stages of social inference. In the first stage, behavior is interpreted and, automatically, all kinds of constructs are activated in a quick-and-dirty way, among them spontaneous inferences. Temporarily activated processing goals do not have an influence on the activation of these inferences. In this stage, various inferences can co-occur (see Chapter 2). Also, this stage is responsible for the emergence of spontaneous trait transference (Carlston et al., 1995; Mae, Carlston, & Skowronski, 1999; Skowronski, Carlston, Mae, & Crawford, 1998), because the activated inferences are not yet connected with a specific actor or object. Finally, we may assume that participants in Experiment 2 drew both STI’s and SSI’s, just as in Experiment 1. These spontaneous inferences could have served as the input for attributional inferences (cf., Zarate, Uleman, & Voils, 2001) drawn in the next stage.

In the second stage, attributional inferences as detected by paradigms used in the research area of trait attribution are drawn, guided by processing goals. Explicit inferential processes now connect activated inferences to specific actors or entities that the perceiver is motivated to form an impression of. In the third stage, correction of prior inferences takes place.

The suggestion that spontaneous and attributional inferences happen in different stages might fit a social cognitive neuroscience approach to attribution (Lieberman, Gaunt, Gilbert, & Trope 2002). This approach describes a reflexive and a reflective attributional system in the mind, based on neurological evidence. Spontaneous inferences might converge with the reflexive system, and attributional inference with the reflective system.

More specifically, the current suggestion also is in line with Uleman (1999, p. 153) who assumes that the inferences studied in the area of social inference research (e.g., Gilbert & Malone, 1995; Krull & Erickson, 1995; but also Trope, 1986; Trope & Gaunt, 1999) are of a different type than the inferences studied in the area of spontaneous inference research (e.g., Uleman, Newman, et al., 1996). Uleman (1999) distinguishes spontaneous from intentional inferences. Spontaneous inferences occur without the necessity of an impression formation goal, e.g., during "uneventful people watching" (Uleman, 1999). Intentional inferences, on the other hand, occur when one attends to other people with an impression goal in mind, e.g., during a job interview. Spontaneous inferences, Uleman assumes, are guided by chronically accessible constructs, whereas intentional inferences are guided by temporarily activated processing goals.

If we distinguish spontaneous from intentional inferences, it can be argued that the paradigms used in the research tradition of Krull and Gilbert (e.g., Gilbert et al., 1988; Krull, 1993; Lee & Hallahan, 2001; Webster, 1993, and also Krull & Dill, 1996; 1998) measure intentional inferences: If the inference is measured by directly asking participants to draw an inference, as in these studies, the inference measured is intentional, as Uleman (1999) notes. Spontaneous inferences, on the other hand, can only be detected using a paradigm that controls for the spontaneity of the inferences drawn, and this is exactly what STI and SSI paradigms accomplish. Thus, by using different types of paradigms, these lines of research seem to have measured different types of inferences.

So, even though inferences drawn in the second stage of the social inference process (Gilbert & Malone, 1995; Krull & Erickson, 1995) occur relatively effortlessly (Gilbert et al., 1988; Krull, 1993), are regarded as perceptual (Kassin & Baron, 1985; Lowe & Kassin, 1980; McArthur & Baron, 1983), are difficult not to make (Hastie & Park, 1986), and have several characteristics of automatic processes (Bargh, 1994), they are also goal-dependent (e.g., Krull, 1993; Lee & Hallahan, 2001). These inferences seem to perfectly fit Uleman's characterization of intentional inferences but not that of spontaneous inferences. The intentionality/ goal-dependency of attributional inferences is inherent to their fundamentally different function in the inference process: The process of connecting activating concepts to persons and situations is guided by what the perceiver is aimed to find out.

In future research on the social inference process, we argue that it would be fruitful to distinguish and directly compare spontaneous and attributional inferences. Moreover, a distinction between an activation and a binding (association) stage of spontaneous inferences (Skowronski et al., 1998; Zarate et al., 2001) could be made. Zarate (Zarate et al., 2001) found indications that chronically accessible processing goals (e.g., caused by cultural differences) influence spontaneous trait activation and spontaneous trait binding differently: As compared to Latinos, Anglos showed greater binding of trait concepts to actors.[6] In addition, the differential influence of chronically accessible versus temporarily activated processing goals on spontaneous and intentional inferences might be directly compared (see Uleman, 1999). Finally, future research studying both spontaneous and intentional inferences should also encompass the third, - correction - stage by manipulating cognitive load. This will provide an even more comprehensive view of the entire inference process.

Endnotes

[1]"The situation", or external cause of behavior can either be an entity / stimulus towards which the behavior is enacted (e.g., another person or an object such as a test), or circumstances (Heider, 1958; Kelley, 1967, 1973). In the current paper we focus on entities as situational causes.

[2]An apparent exception is study by Uleman and Moskowitz (1994), in which temporarily activated processing goals do seem to have an influence on STI's. However, unlike other studies this study did not just manipulate goals to be either dispositional or neutral. In this study, participants were given the goal to either make a social judgment or analyze sentence features. The goal to analyze sentence features caused STI's to be absent or at least infrequent. As Bargh (1989) indicates, STI's depend on the goal of spending attention to the trait-implying stimuli. Thus, as long as the processing goal does not keep participants from spending attention to the behavior description, STI’s seem to occur regardless of processing goals.

[3]In the area of research on spontaneous inferences, most studies have been aimed at showing activation of either STI’s or SSI’s. Therefore, in STI research, behavior descriptions are strongly dispositional cause implying (see Uleman, Hon, et al., 1996), whereas in SSI research, they are strongly situational cause implying (e.g., Lupfer et al., 1990).

[4]The design of the current study allows us to analyze whether certain participants drew STI’s while others drew SSI’s. Contrary to two earlier experiments in which we also studied activation of STI’s and SSI’s (Chapter 2, Study 1 and Study 2), in the current study Probe Type has been manipulated within participants. This allows us to examine if certain participants only drew STI’s, while others drew SSI’s. No correlation between the activation of STI’s and SSI’s was found, r = -.0572, p

= .514. Thus, it is not the case that participants are less likely to draw STI's when they draw SSI's and vice versa.

[5]Interestingly, in the area of trait attribution research, findings by Krull and Dill (1998, Study 2) not only show an influence of processing goals on social inferences (identical to Experiment 2, and, e.g., Krull, 1993), but also suggest that for happy behavior, spontaneous inferences occurred, independent of processing goals (identical to Experiment 1). This was indicated by fast responses on situational inference questions (e.g., "Was the individual discussing a sad topic?") without situational instructions, and on dispositional inference questions (e.g., "Does the individual have a sad personality?") without dispositional instructions. Since these responses were as fast as those on inference questions following corresponding instructions (e.g., a situational inference question preceded by situational instructions), Krull and Dill (1998) reason that these inferences were spontaneous and occurred independent of processing goals. However, this suggestion is based on a single behavior description (happy behavior video). Also, a paradigm was used that does not guarantee spontaneity of the inferences measured (see Uleman, Newman, et al., 1996): Directly asking participants to draw an inference (as was done in these studies) gives rise to intentional inferences, as Uleman (1999) notes.

[6]Earlier research (e.g., Duff & Newman, 1997; Newman, 1993) suggests that the cultural difference of individualism (or, more accurately, idiocentrism; Triandis, Bontempo, Villareal, Asai, & Lucca, 1988) leads to differences in activation of both STI's and SSI's. This indicates that future research assessing an activation and a binding stage of spontaneous inferences (as Zarate et al., 2001) could benefit from also measuring SSI activation.

Chapter 4

Social Inferences Dissected: Spontaneous and Intentional Components

Will talks during the lecture.

What inference do you draw: “Impolite” or “boring”? The answer to this question depends on (a) intentions, (b) cognitive capacity, and (c) in which stage of the social inference process you are.

Current models of social inference (e.g., Gilbert & Malone, 1995; Gilbert, Pelham, & Krull, 1988; Krull & Erickson, 1995; Trope & Gaunt, 1999) assume that social perceivers go through three stages when drawing a social inference. In the first stage, people categorize the actor's behavior (e.g., after reading the behavior description "Will talks during the lecture", this behavior might be categorized as "impolite"). In the second stage, people draw an initial inference (e.g., a dispositional inference; "Will is impolite"), guided by processing goals: If the observer has the goal of forming an impression of the actor, a dispositional inference will be drawn; if the observer has the goal of forming an impression of the situation[1] the actor is in, a situational inference will be drawn (e.g., “The lecture is boring”). Finally, in the third stage, a correction takes place: In this stage, second stage inferences are corrected for the influence of the situation (in case of an actor inference) or the actor (in case of a situation inference), if sufficient attentional resources are available (e.g., "Will may have been impolite, so the lecture may not be all that boring").

In a typical study within this research area, Krull (1993) manipulated processing goals and cognitive load and then showed his participants a videotape of a woman behaving anxiously while being interviewed. Participants were instructed to form themselves an impression of the woman (dispositional processing goal) or the interview (situational processing goal). After watching the videotape, participants were asked to indicate how anxious this woman was and how anxiety provoking they believed the interview to be. Results showed an interaction of processing goals and cognitive load: After dispositional instructions, the woman was rated as more anxious and the interview as less anxiety provoking with cognitive load than without, and, under situational instructions, the opposite pattern was found. Thus, participants reported inferences that follow their processing goals; without load, the effect of processing goals was reduced because participants were able to correct their inferences.

Presumably, inferences as assessed by this paradigm are intentional inferences (Uleman, 1999) and, hence, are guided by the perceiver's intent, that is, to form an inference of the actor or the situation.

In a different research tradition (for an overview, see Uleman, Newman, & Moskowitz, 1996), spontaneous inferences have been examined. When observing the behavior of a target in a specific situation, people typically make spontaneous trait inferences (STI's; Uleman Newman, et al., 1996). For example, the STI "impolite" might be drawn when reading the behavior description "Will talks during the lecture". Spontaneous inferences about properties of the situation a target is in (spontaneous situational inferences; SSI's, e.g., "boring" as an inference about the lecture) also occur (e.g., Duff & Newman, 1997; Chapter 2; Lupfer, Clark, & Hutcherson, 1990). Generally, STI's and SSI's are quite similar processes (Chapter 2; Uleman, Newman, et al., 1996) that are both activated when observing behavior that allows for both types of inferences (Chapter 2) and happen independent[2] of processing goals (e.g., Carlston & Skowronski, 1994; Chapter 2; see Uleman, 1999; Uleman, Newman, et al., 1996).

In the previous chapter, we directly compared the effects of processing goals across these two research traditions: In one study, we assessed STI's and SSI's, using a probe recognition paradigm (McKoon & Ratcliff, 1986); in another we assessed social inferences using the trait attribution paradigm. Importantly, in all other respects, the design and materials of these two studies were the same. We manipulated processing goals as in trait attribution research. As expected, the first experiment (using a spontaneous inferences paradigm) showed no influence of processing goals, whereas the second (using a trait attribution research paradigm) did show this influence. Specifically, in the first study, we found activation of both STI's and SSI's, independent of processing goals. In the second study, participants under dispositional processing goal instructions made more extreme inferences and manifested shorter response times on trait rating questions than under situational instructions, and vice versa for situation property rating questions.

Based on these results, in Chapter 3, we proposed a refinement of the first two stages of social inference models: In the first stage, spontaneous inferences are activated, independent of processing goals. In this stage, behavior is interpreted and, automatically, all kinds of constructs are activated in a quick-and-dirty way, among them spontaneous inferences. Also, various inferences can co-occur (see Chapter 2). Furthermore, this stage is responsible for the emergence of spontaneous trait transference (e.g., Carlston, Skowronski, & Sparks, 1995), because the activated inferences are not yet connected with a specific actor or object. In the second stage, activated attributes are attributed to the actor or situation, guided by processing goals: Activated inferences are connected to specific actors or entities that the perceiver has the intention to form an impression of. These inferences are detected by paradigms used in the research area of trait attribution.

In our previous studies (see Chapter 3), we compared the effects of processing goals across the two research paradigms (i.e., trait attribution versus spontaneous inference paradigms). We did not address the effects of cognitive load; concomitantly, we did not include the third stage of social inference in our refinement of social inference models. Presumably, in the correction stage, inferences made in the second stage are corrected. When a trait has been attributed to an actor, the attribution may be corrected for the influence of the situation. Conversely, when a property of the situation has been inferred, the inference may be corrected for the influence of traits of the actor. Thereby, as indicated by Heider (1958), these dispositional versus situational (about entities, see Footnote 1) inferences are compensatory: Following the discounting principle (Kelley, 1973), dispositional and situational attributions operate in hydraulic fashion such that when behavior is under the control of a situational cause, the perceiver tends to infer little about the unique character of the target and vice versa.

In the first stage of social inferences, on the other hand, activation of actor traits and situation properties do not compete with each other, according to our refined model. In this stage, both STI's and SSI's may be activated (Chapter 2); either one of them is not reduced by the other. Because the activation is automatic, we assume that it is not affected by load. That is, when behavioral information allows for both types of inferences, as in our studies, both will be activated in the first stage, regardless of load.

In the present studies, thus, we aim to expand our previous work by including a load manipulation in addition to a manipulation of processing goals. Because measurements of intentional and spontaneous inferences are fundamentally incomparable (see Chapter 3), we will perform two studies that are identical except for the way social inferences are measured. In the first study, where we use the trait attribution paradigm (e.g., Gilbert et al., 1988) to detect intentional social inferences, we expect to find an interaction of goal x load x inference drawn. That is, a dispositional processing goal will lead to stronger dispositional inferences and a situational instruction to stronger situational inferences, and this effect will be greater under cognitive load because the correction stage is not completed in these conditions. Thus, we expect to replicate studies from this research area (specifically, Krull, 1993), now using stimulus materials and manipulations that can be used in an identical second experiment assessing spontaneous inferences, allowing a direct comparison between the two paradigms. In the second study, we expect to find activation of STI's and SSI's, regardless of processing goal and cognitive load. More precisely, in this paradigm, which measures spontaneous inferences, we do not expect to find an interaction with processing goals and cognitive load. To analyze the differential effect of processing goals and load between the two studies, we will perform a post-hoc meta-analysis. In this meta-analysis, we expect to find a significant difference between the effects of goal x load x inference drawn in the two studies. Furthermore, we expect to find that dispositional and situational inferences in the first study operate in hydraulic fashion, and, therefore, to find a negative correlation. On the other hand, in the second study, we expect to find that activation levels of STI's and SSI's are not correlated. In another meta-analysis, we expect to confirm that these two correlations are different.

Experiment 1

In this study, social inferences will be measured using rating scales as in attribution research (e.g., Gilbert et al., 1988; Krull, 1993). Our stimulus materials will be adapted to make the study comparable with STI/ SSI research in which a series of short sentences is used. We will present participants with behavior descriptions, and then ask two inference questions: A trait rating and a situation property rating. We will use behavior descriptions that allow for both dispositional as well as situational social inferences. For example, the description "Will talks during the lecture" can activate the dispositional inference "impolite" as well as the situational inference "boring". In this respect, our stimulus materials are similar to those used in trait attribution research (e.g., Krull, 1993).[3] We used the same materials and procedure as in earlier research (see Chapter 3, Study 2), but added a manipulation of cognitive load.

We expect to find a main effect of goal instruction, as in earlier research (Chapter 3, Study 2), and an interaction with load. A dispositional instruction will lead to stronger dispositional and weaker situational inferences, while a situational instruction will lead to stronger situational and weaker dispositional inferences; without load, these effects of processing goals will be weaker than with load.

Method

Participants. Ninety-seven (66 female, 31 male, M = 22.07 years old) students of the University of Nijmegen participated. All participants were native Dutch speakers.

Procedure and materials. After a general introduction, participants completed a practice task (for details, see Chapter 3), and then the main task started. In each trial of this task, participants were presented with a behavior description (e.g., “George gets an A for the test”), followed by a trait rating and a situation property rating question in counterbalanced order. On the trait rating question, participants were to indicate – as accurately and quickly as possible – to what extent the actor possessed the trait (e.g., “How smart is George”, 1, “not at all smart” to 7, “very smart”). Similarly, on the situation inference question, participants rated the situation property (e.g, “How easy is the test”, 1, “not at all easy”, to 7, “very easy”). This way, participants responded to 48 behavior descriptions, of which 6 experimental[4] and 42 filler trials. These filler trials were included only to keep the stimulus material used in the current experiment identical to Experiment 2. After completing all trials, participants were thanked and debriefed.

As in earlier research (see Chapter 3), processing goals were manipulated between subjects, by using two different sets of instructions; a dispositional and a situational set. Adapting Krull’s (1993) instructions, each set of instructions consisted of an initial general instruction given in the introduction to the experiment, and 48 short, specific instructions given immediately before each behavior description. The general introduction informed participants about the important role of dispositional or situational (depending on condition) variables in behavior. The specific instructions preceded each behavior description, for example, in case of the description "George jumped over the fence", participants were instructed "Form yourself an impression of George" (dispositional inference goal) or "Form yourself an impression of the fence" (situational inference goal).

Cognitive load was manipulated before the main task started. Participants in all conditions were told that a certain word of the behavior description in the upcoming task would be underlined. Half of the participants were instructed to remember these words and asked to report later the words they remembered. After every sixth trial, these participants were asked to type in all of the six words they had seen. The other half of the participants was not instructed to do anything with underlined words. The underlined words were either the actor's name or the situation / entity (e.g. "George jumped over the fence" or "George jumped over the fence"). By choosing these words, we made sure that participants under cognitive load spent attention to the information needed for the correction process (see Gilbert, et al., 1988), so that undercorrection cannot be due to insufficient attention to the information to be corrected for.[5]

Results and Discussion

Mean responses across the 6 dispositional inference questions and the 6 situational inference questions were submitted to a 2 (Instruction: Dispositional vs. Situational) x 2 (Load: Load vs. No load) x 2 (Inference Type: Dispositional vs. Situational) MANOVA with Inference Type as a within-subjects variable. In Table 4.1, all means and standard deviations across this design are presented. Confirming earlier research (Chapter 3, Study 2; Krull, 1993), Instruction directly affected the social inferences made, indicated by an interaction between Instruction and Inference Type, F (1, 93) = 27.60, $p < .01$. After a dispositional instruction, the correspondent trait was attributed more strongly (M = 5.32, SD = 0.73) to the actor than after a situational instruction (M = 4.72, SD = 0.84; simple effect of Instruction, F (1, 93) = 6.35 p = .013). Conversely, after a situational instruction, a situation property was attributed more strongly (M = 5.177, SD = 0.868) than after a dispositional instruction (M = 4.18, SD = 0.79; simple effect of Instruction, F (1, 93) = 21.56, $p < .01$).

Table 4.1 *Mean Response on Dispositional and Situational Inference Questions in Experiment 1 as a Function of Goal and Load*

	Inference Question	
Processing Goal	Dispositional	Situational
Dispositional goal		
Load	5.49_{a} (0.67)	3.92_{a} (0.65)
No load	4.96_{b} (0.72)	4.72_{b} (0.80)
Situational goal		
Load	4.45_{c} (0.83)	5.39_{c} (0.76)
No load	$5.18_{a,b}$ (0.65)	4.82_{b} (0.94)

Note. Responses were made on 7-point rating scales (higher responses indicate stronger dispositional or situational inferences). Standard deviations are presented between brackets. Within each column, means with non-common subscripts are significantly different ($p < .05$).

As predicted, this effect was qualified by Load, indicated by an interaction of Instruction, Load and Inference Type, F (1, 93) = 33.60, $p < .01$. Dispositional inferences (trait scales) were stronger after dispositional instructions under cognitive load than without cognitive load, while after situational instructions the opposite pattern was found, indicated by a simple interaction of Instruction and Load, F (1, 93) = 15.08, $p < .01$. On the other hand, situational inferences (situation property scales) were more extreme after situational instructions under cognitive load than without cognitive load, while dispositional instructions caused the opposite pattern, indicated by a simple interaction of Instruction and Load, F (1, 93) = 16.55, $p < .01$. This pattern of results is comparable to earlier findings by Krull (1993).

As in our earlier study using these stimulus materials (Chapter 3, Study 1), overall, a main effect of Inference Type, F (1, 93) = 7.26, $p < .01$, indicated that traits were attributed to actors more strongly (M = 5.12, SD = 0.81) than were situation properties to situations (*M* = 4.51, *SD* = 0.94). Furthermore, the main effect of Instruction was not significant, F (1, 93) = 2.46, p = .12, nor was that of load or their interaction, both *F*s < 1.

As expected, we found a negative overall correlation between activation of intentional dispositional and situational inferences, r = -.26, p = .01. This indicates that the stronger participants drew dispositional inferences, the weaker they drew situational inferences and vice-versa. Though probably present (in e.g., Krull, 1993; Krull & Dill, 1996; 1998), this correlation has not been reported earlier.

In sum, confirming our expectancies, we found that the social inferences participants drew were guided by an interaction of processing goal and cognitive load. Also, dispositional and situational inferences were negatively correlated. Current effects of goal and load converge with Krull (1993; Krull & Dill, 1996; 1998), now using behavior descriptions, manipulations and a procedure that can be used in an identical experiment in which spontaneous inferences will be measured, and, thereby, allowing for a direct comparison of the effects of processing goal and cognitive load on intentional and spontaneous inferences.

Experiment 2

In this experiment, a probe recognition paradigm (McKoon & Ratcliff, 1986) will be used to study the influence of processing goals and cognitive load on spontaneous social inferences an actor or situation (STI's and SSI's). As explained earlier, we expected activation of both STI’s and SSI’s independent of processing goals and cognitive load.

We used the same procedure – a probe recognition paradigm - as in earlier research (Chapter 3, Study 1), but added a manipulation of cognitive load. In this paradigm, participants read a behavior description after which a probe word is presented on screen. Participants are instructed to indicate whether this probe word was part of the sentence they just read. In the experimental trials of our study, the probe word represented a property (of the actor or the situation) that was implied by the description. In control trials, the probe was not implied by the description. For example, in an experimental trial, participants read the sentence "John gets an A for the test", then the word "easy" (or “smart”) was presented on screen and participants were to indicate whether that word was part of the sentence. The probe word itself is not part of the behavior description, so the correct answer is negative. However, the STI or SSI activated by the sentence can interfere with quickly and correctly rejecting the probe (McKoon & Ratcliff, 1986). Therefore, response times and accuracy of responses (for the difference between these two measures, see Chapter 2, Footnote 2) are a measure for the activation of spontaneous inferences (Newman, 1991; Uleman, Hon, Roman, & Moskowitz, 1996; Wigboldus, Dijksterhuis, & van Knippenberg, 2003).

In two earlier studies (Chapter 2, Study 1; Chapter 3, Study 1), the current paradigm showed slower response times on experimental trials versus control trials both for probe words representing STI’s as well as SSI’s, indicating activation of both, regardless of processing goal. In the current study, we expect to replicate this finding. Importantly, we expect that both STI’s and SSI’s are made regardless of cognitive load.

Method

Participants. Participants were 93 (64 female, 29 male, *M* = 21.03 years old) students at the University of Nijmegen. All participants were native Dutch speakers. For a participation of 20 minutes they received € 2.5.

Procedure and materials. As is earlier research (Chapter 3, Study 1) and Experiment 1, after a general introduction, participants completed a practice task and then the main task started. In each trial of this task, participants were presented with behavior descriptions (e.g., “George gets an A for the test”). In the current paradigm (identical to Chapter 3, Study 1), the probe word was subsequently presented on screen. As in Experiment 3.1, the dispositional and the situational trials (varied within subjects) used the same behavior descriptions but different probes. For the dispositional trials, the probe word was a property of the actor (e.g., “smart”) and for the situational trials of the situation (e.g., “easy”). Participants’ task was to indicate as accurately and quickly as possible whether the probe had been in the description by pressing the ‘a’-key meaning ‘no’, or the ‘6’-key meaning ‘yes’. This way, participants responded to the same 48 different behavior descriptions as used in Experiment 1 (6 experimental and 42 filler descriptions). In the current paradigm, the 6 experimental behavior descriptions that were used once in Experiment 1 were used four times: In 6 experimental and 6 control trials that used a trait as a probe, and in 6 experimental and 6 control trials that used a situation property as a probe. Filler trials were needed because of characteristics of the probe recognition paradigm, for example, to also include trials on which participants press the ‘yes’ button (for specifics see Chapter 3, Study 1). After completing all trials, participants were thanked and debriefed.

Dependent variables. Responses and reaction times were recorded by the computer. Reaction times were measured with an accuracy of 16,67 ms.

Design. The experiment consisted of a 2 (Instruction: Dispositional vs. Situational) x 2 (Load: Load vs. No load) x 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial Type: Experimental vs. Control) design, with the latter two manipulated within subjects. Activation of spontaneous inferences will be indicated by a main effect of Trial type: Slower response times on experimental trials indicate that spontaneous inferences have been activated while reading the behavior description and interfered with rejecting the probe. Differences in the activation of STI’s and SSI’s will be indicated by an interaction of Trial Type and Probe Type. The interaction of processing goals and cognitive load found in Experiment 1 would now be indicated by a four-way interaction of Instruction, Load, Probe Type and Trial Type.

Results

Reaction times. All participants had a low error rate (*M* = 2.15%, ranging from 0% to 28.57%). RT's were analyzed only if the reaction had been a correct one. As recommended by Ratcliff (1993), we analyzed our RT data by using two methods. First, an absolute cutoff criterion of < 200 ms and > 2000 ms was used. By using these cutoff points, 28 responses (1.25%) had to be dropped from the analysis. Second, an inverse transformation (1/x) of the RT's was used. The analyses reported hereafter are based on the cutoff criterion, which yielded converging results to the inverse transformation analysis.

The average response time per trial was submitted to a 2 (Instruction: Dispositional vs. Situational) x 2 (Load: Load vs. No load) x 2 (Probe Type: Trait vs. Situation Property) x 2 (Trial Type: Experimental vs. Control) MANOVA, with the latter two as within-subjects variables. As expected, we found activation of spontaneous inferences, indicated by a main effect of Trial Type, F (1, 89) = 18.09, $p < .01$, $\eta^2 = 0.17$. Participants responded slower to probe words that were implied by the behavior description (*M* = 810, *SD* = 187) and faster on control trails (*M* = 768, *SD* = 168). This effect emerged for both STI's and SSI's (interaction of Trial Type X Probe Type, $F < 1$, $\eta^2 < .001$). These data, then, replicate earlier findings (Chapter 2; Chapter 3, Study 2) showing that while reading the behavior descriptions, the corresponding STI and SSI were both activated.

As expected, this effect was independent of instruction, cognitive load, or their interaction (both three-way and the four-way interactions were non-significant, all *F*s < 1, and all η^2s < .01). So, participants responded slower to both dispositional and situational probe words that were implied by the behavior description, regardless whether the instruction had asked them to form an impression of the actor or of the situation, and regardless of whether their cognitive resources were limited or not.

Cognitive load did have an effect on response times in general, indicated by a main effect of Load, F (1, 89) = 9.26, $p < .01$, $\eta^2 = 0.094$. Participants under cognitive load responded slower (*M* = 821, *SD* = 168) than participants without (*M* = 704, *SD* = 170). This suggests that the null effects of load on social inference activation were not caused by an ineffective manipulation.

Since Probe Type was manipulated within participants, we were able to examine if certain participants only drew STI's, while others drew SSI's. Replicating earlier research (Chapter 3, Study 1), no correlation between the activation of STI's and SSI's was found, $r = .15$, $p = .15$. Thus, it is not the case that participants are less likely to draw STI's when they draw SSI's and vice versa.

Error rates. Because error rates were highly skewed, we used a square root transformation to reduce skew (Cohen & Cohen, 1975). The square root of number of errors made was analyzed in a 2 (Instruction) x 2 (Load) x 2 (Probe Type) x 2 (Trial Type) MANOVA. This analysis showed results comparable to the analysis of response times: The main effect of Trial Type was significant, $F\ (1, 89) = 5.23$, $p = .023$, $\eta^2 = 0.06$, while the interaction of Trial Type and Probe Type was non-significant, $F < 1$, $\eta^2 = 0.01$, indicating activation of both STI's and SSI's. Importantly, the four-way interaction between Instruction, Load, Probe Type and Trial Type was non-significant, $F < 1$, $\eta^2 < .001$, as were all other effects (all *F*s < 1, and η^2s < .01) suggesting no qualifying influence of processing goals or cognitive load on spontaneous inferences.

Meta analysis. Since Experiment 1 and Experiment 2 used different paradigms to measure social inferences, their dependent variables cannot be compared in a single analysis. So, to test our hypotheses, we performed several meta-analyses. First, we compared the effects of both goal and load manipulations across the two studies. A meta-analysis on the interaction of Instruction x Load with Inference Type showed a significant difference, $Z = 4.61$, $p < .01$: The effect found in the first study ($d = 1.17$, $var = 0.05$) was bigger than the (non-significant) effect found in the second study ($d = 0.18$, $var = 0.04$). Also, the effect of Instruction on Inference Type differed between the two studies, $Z = 4.05$, $p < .01$. The effect found in the first study ($d = 1.06$, $var = 0.05$) was bigger than the (non-significant) effect found in the second study ($d =$

0.20, *var* = 0.04). Finally, the correlation between dispositional and situational inferences in Experiment 1 (*z'* = -0.26) was different from the (non-significant) correlation (*z'* = 0.15) in Experiment 2, $Z = -2.83$, $p < .01$.

General Discussion

Until now, it has not been entirely clear whether the same inferential processes are assessed in the research traditions of trait attribution and spontaneous inferences. Because both of our studies were identical except for the way social inference were measured, they allow for a direct comparison of the combined effect of processing goals and cognitive load on social inferences across two research areas. The first study confirms that social inferences as measured in trait attribution research are dependent both on processing goals of the social perceiver and on cognitive capacity: With a dispositional processing goal, participants drew stronger dispositional inferences, and with a situational goal, stronger situational inferences. Without cognitive load, the influence of processing goals was smaller, presumably because participants corrected their initial inferences. On the other hand, the findings of our second study – both the analyses of response times and of error rates – suggest that social inferences as measured in the area of spontaneous social inferences (STI's and SSI's) are activated independent of processing goals and cognitive load. This suggestion fits earlier research and theorizing. The null effects of processing goals replicate earlier studies. Similarly, it has been shown previously that load does not affect STI's (see Chapter 2, Study 2; Chapter 3, Study 1 for STI's and SSI's, and see Carlston & Skowronski, 1994; Lupfer et al., 1990; Uleman, Newman, & Winter, 1992; Winter, Uleman, & Cunnif, 1985; see also, Uleman, Newman, et al., 1996 for STI's only). Our present study is the first to show that SSI's are not affected by load either. This finding provides additional evidence that STI's and SSI's are comparable phenomena, as we have argued (Chapter 2). Moreover, our present results indicate that the emergence of both STI's and SSI's is not affected by load either. Thus, with the present materials that allow for both STI's and SSI's, the data suggest that making both types of inferences is not any more cognitively demanding than making just one type of inference.

As expected, a meta-analysis showed that the effects of processing goals and cognitive load between the two studies were significantly different. Also, replicating earlier findings (Chapter 3), another meta-analysis showed that the separate effect of processing goal also differed between the two studies.

Our results suggest two distinct types of processes with different characteristics. This is also suggested by our correlational analyses. These confirm our expectation that dispositional and situational social inferences in a trait attribution paradigm are negatively correlated (Experiment 1), whereas STI's and SSI's show no correlation (Experiment 2). That is, in the first study, the more participants inferred a trait, the less they inferred a situation property and vice versa. So, these explicit inferential processes reflect a Heiderian (1958) logic of attribution: The causal strength of the dispositional factor is weaker as the causal strength of the situational factor increases, and vice versa.

Contrastingly, STI's and SSI's are activated co-occurringly (if the behavior allows for both), independent of each other. Uleman (1999, p. 151) has suggested that even mutually inconsistent spontaneous inferences can be activated at the same time. Several STI's and SSI's in our experiments actually were mutually inconsistent to some extent. For example, the STI "athletic" and the SSI "low" were used with the behavior description "John jumped over the fence". In a Heiderian (1958) perspective, the more athletic John is, the higher the fence can be. And the lower the fence is, the less athletic John needs to be. In this perspective the spontaneous inferences "low" and "athletic" may be seen as contradicting. Nonetheless both were activated, which reflects that this process does not follow Heider's (1958) compensatory principle.

Current results confirm trait attribution research (e.g., Gilbert et al., 1988; Krull, 1993) that shows that second stage inferences occur independent of cognitive load. This indicates that, just as spontaneous inferences (e.g., Uleman, Newman, et al., 1996), intentional inferences can occur relatively effortlessly. Because of this effortlessness, second stage inferences may often seem to be similar to spontaneous inferences. Indeed, this assumption implicitly underlies most of the literature on three-stage models (e.g., Gilbert & Malone, 1995; Gilbert et al., 1988), and sometimes is described explicitly (e.g., Krull & Dill, 1996; 1998; Krull & Erickson, 1995). Our results show that second stage inferences - though drawn effortlessly - are intentional in nature, and not spontaneous, as they are guided by processing goals (see also, Chapter 3).

Our results corroborate and expand our refinement of three-stage models of social inference. Based on earlier research (Chapter 2; Chapter 3), we have suggested that in the first stage of the social inference process, both STI's and SSI's are activated, independent of processing goals. Based on the present results, we add the suggestion that this activation is independent of cognitive load, and that STI's and SSI's occur independent of each other. In this stage, multiple concepts (among them STI's and SSI's) which are unrelated or even inconsistent are activated almost completely automatically (see Bargh, 1994). Importantly, the activated concepts are not yet attached to any specific actor or stimulus.

In the second stage, intentional inferences are drawn, dependent on processing goals. These intentional inferences are explicitly triggered by a trait (or situation property) rating question or by the perceiver's goals. Inferential processes now connect activated inferences to specific actors or situations which social perceivers are motivated to form an impression of. When a perceiver is motivated to form an impression of an actor, activated traits are associated with and attributed to the actor. When a perceiver has a situational processing goal, situational attributions emerge, based on activated situational inferences.

Our distinction between spontaneous activation (first stage) and intentional inferences (second stage) deviates from Smith and DeCoster's (2000) dual-process model perspective on attributional inferences. Smith and DeCoster differentiate a low-effort processing mode that draws on association, and occurs automatically, from a high-effort mode that draws on symbolically represented rules, is structured by language and logic, and occurs optionally when capacity and motivation are present. They suggest that second stage inferences (correspondent inferences in the model by Gilbert & Malone, 1995) fit a low-effort processing mode while the third stage (attributional thinking) takes place in high-effort mode. We propose that spontaneous inferences fit a low-effort mode, and that it is the first stage rather than the second where low-effort processing occurs. In the (goal dependent) second and the (load dependent) third stage, relatively high-effort processing takes place.

Finally, our refined model of the social inference process assumes that, in the third stage, attention is turned to the entire behavioral field. Explicit inferential processes triggered in the second stage continue and examine if the inference requires correction. In this stage, information is processed in a thoughtful, controlled way, so this stage can only be completed when sufficient attentional resources are available. Although mutually inconsistent concepts could co-exist in the first stage, in both the second and the third stage, some concepts are inhibited by explicit inferential processes while the activation of others is increased. In some cases, one inference is reduced because it runs counter to another (e.g., a situational correction: When John is seen as less smart when the test is easy). In other cases, multiple inferences may be attributed as long as they are not inconsistent, as described by Reeder's (Reeder, Vonk, Ronk, Ham & Lawrence, 2003) Multiple Inference Model (e.g., when an action is seen as both helpful and obedient). In still other cases, perceivers bear in mind two competing inferences without deciding which one is most accurate (e.g., when an actor might be either friendly or ingratiating). In this case, completion of the attribution is postponed until new evidence comes along, as described by Fein (1996; Fein, Hilton, & Miller, 1990). These inferential processes account for the correlation between dispositional and situational inferences in the second and third stage. The absence of a correlation between STI’s and SSI’s reflects the absence of these processes in the first stage.

Endnotes

[1]"The situation", or external cause of behavior can either be an entity / stimulus towards which the behavior is enacted (e.g., another person or an object such as a test), or circumstances (Heider, 1958; Kelley, 1967, 1973). In the current paper we focus on entities as situational causes.

[2]An apparent exception is study by Uleman and Moskowitz (1994), in which temporarily activated processing goals do seem to have an influence on STI's. However, unlike other studies this study did not just manipulate goals to be either dispositional or neutral. In this study, participants were given the goal to either make a social judgment or analyze sentence features. The goal to analyze sentence features caused STI's to be absent or at least infrequent. As Bargh (1989) indicates, STI's depend on the goal of spending attention to the trait-implying stimuli. Thus, as long as the processing goal does not keep participants from spending attention to the behavior description, STI’s seem to occur regardless of processing goals.

[3]In the area of research on spontaneous inferences, most studies have been aimed at showing activation of either STI’s or SSI’s. Therefore, in STI research, behavior descriptions are strongly dispositional cause implying (see Uleman, Hon, et al., 1996), whereas in SSI research, they are strongly situational cause implying (e.g., Lupfer et al., 1990).

[4]In earlier research (Chapter 3, Study 1 and Study 2), we used 10 experimental trials. In the current two studies, we limited this number to 6.

[5]To analyze any effects that underlining the actor or the situation might have had (except for serving as part of the load manipulation), we performed a preliminary analysis that assessed the within-participants variable Underlined Word (Actor vs. Situation). Comparable to the analyses in the Results and Discussion section, the mean

responses across the 6 dispositional inference questions and the 6 situational inference questions were submitted to a 2 (Instruction: Dispositional vs. Situational) x 2 (Load: Load vs. No load) x 2 (Inference Type: Dispositional vs. Situational) x 2 (Underlined Word: Actor vs. Situation) MANOVA with the last two variables within-subjects. Since this analyses showed no effects of Underlined Word, all F's < 1, we excluded the variable from further analyses.

Chapter 5

General Discussion

The aim of the current thesis is to compare social inferences across the research traditions of trait attribution (e.g., Gilbert & Malone, 1995; Krull & Erickson, 1995) and spontaneous inferences (see, Uleman, Newman, et al., 1996), and thereby, to come to a refinement of current models of the social inference process that encompasses both research areas. Previously, these two research traditions were incomparable because of various differences. In the current three empirical chapters, we bridged these differences. As earlier research had not yet studied both STI's and SSI's, this was the first difference to be bridged, since in the research area of trait attribution, dispositional and situational inferences had been studied together (e.g., Krull, 1993).

In Chapter 2, we found that activation of both an STI and an SSI is possible. In Study 2.1, we used a probe recognition paradigm (McKoon & Ratcliff, 1986), and found activation of both STI's and SSI's. Similarly, the results of Study 2.2 - in which we used a newly developed paradigm (an adaptation of the relearning paradigm; e.g., Carlston & Skowronski, 1994) - showed co-occurring activation, and, furthermore, indicated that SSI's, just as STI's (see Uleman, Newman, et al., 1996), are not affected by temporary processing goals. So, SSI's seem to occur just as automatically as STI's. Thus, given stimulus materials that allow for inferences about the actor as well as the situation, the social perceiver can draw both an STI and an SSI, independent of processing goal. As a lot of behavior in the real world allows for both a dispositional and a situational inference (e.g., Krull & Dill, 1996), co-occurring activation of STI and SSI may not be rare.

For the first time in the research area of spontaneous inferences, the research presented in Chapter 2 has investigated co-occurring activation of STI's and SSI's.

Next, we could directly compare STI's and SSI's to dispositional and situational intentional inferences, and assess the effects of the two major factors in the social inference process across the two research traditions: In Chapter 3, we investigated the influence of processing goals, and, in Chapter 4, the effects of processing goals and cognitive load on intentional and spontaneous inferences.

In Chapter 3, we found that processing goals guide intentional inferences, whereas spontaneous inferences occur regardless of processing goals. Previously, the influence of processing goals on social inferences drawn in these two areas could not be directly compared because of various differences between the two research traditions. As the two studies in this chapter were identical except for the measurement of social inferences, these studies do allow for this comparison. Study 3.1 suggested that social inferences as measured in the area of spontaneous social inferences (STI's and SSI's) occur independent of processing goals. Study 3.2 showed that social inferences as measured in the area of trait attribution are dependent on processing goals of the social perceiver: With a dispositional processing goal, participants drew stronger dispositional inferences, and with a situational goal, stronger situational inferences. A meta-analysis confirmed that the effect of processing goals is significantly different between the two studies.

In Chapter 4, we again found evidence that suggests that the two research traditions study different inferential processes. As in Chapter 3, the two studies of this chapter were identical, except for that in Study 4.1 intentional and in Study 4.2 spontaneous inferences were measured. Study 4.1 confirmed that social inferences as measured in trait attribution research are dependent on both processing goals and on cognitive capacity: With a dispositional processing goal, participants drew stronger dispositional inferences, and with a situational goal, stronger situational inferences. Without cognitive load, the influence of processing goals was smaller, presumably, because participants corrected their initial inferences. On the other hand, Study 4.2 suggested that social inferences as measured in the area of spontaneous social inferences (STI's and SSI's) are activated, regardless of goals and load. A meta-analysis showed that the effects of goals and load between the two studies were significantly different.

Another finding of Chapter 4 also suggested that these two research traditions study distinct processes with different characteristics: Dispositional and situational social inferences in the trait attribution paradigm were negatively correlated, whereas STI's and SSI's showed no correlation. That is, in Study 4.1, the more participants inferred a trait, the less they inferred a situation property and vice versa. So, these explicit inferential processes reflect a Heiderian (1958) logic of attribution: The causal strength of the dispositional factor is weaker as the causal strength of the situational factor increases, and vice versa. The fact that spontaneous inferences did not show a correlation suggests that these processes do not follow Heider's compensatory principle.

A Refined Model of the Social Inference Process

Corroborated by the findings of each individual chapter, we propose a refinement of the social inference models (e.g., Krull & Erickson, 1995) that encompasses the research traditions of trait attribution and spontaneous inferences (see Figure 5.1). In short, this refinement assumes that, in the first stage, spontaneous inferences are activated, independent of processing goals and cognitive load, whereas, in the second stage, intentional inferences are attributed to the actor or situation, guided by processing goals, and, in the third stage, these intentional inferences are corrected if ample cognitive capacity is available.

Specifically, we propose that, in the first stage, behavior is interpreted and, automatically, all kinds of constructs are activated in a quick-and-dirty way, among them spontaneous inferences. Temporarily activated processing goals and cognitive capacity do not have an influence on the activation of these inferences. In this stage, multiple concepts (among them STI's and SSI's) which are unrelated or even inconsistent (see Chapter 2) are activated almost completely automatically (see Bargh, 1994). In addition, this stage is responsible for the emergence of spontaneous trait transference (e.g., Carlston et al., 1995), as the activated inferences are not yet uniquely connected with a specific actor or object.

In the second stage, intentional inferences are drawn, dependent on processing goals. These intentional inferences are explicitly triggered by a (trait or situation property) rating question or by the perceiver's goals. Inferential processes now connect activated inferences to specific actors or situations which social perceivers are motivated to form an impression of. When a perceiver is motivated to form an impression of an actor, activated traits are associated within and attributed to the actor. When a perceiver has a situational processing goal, attributions about the situation emerge, based on activated situational inferences.

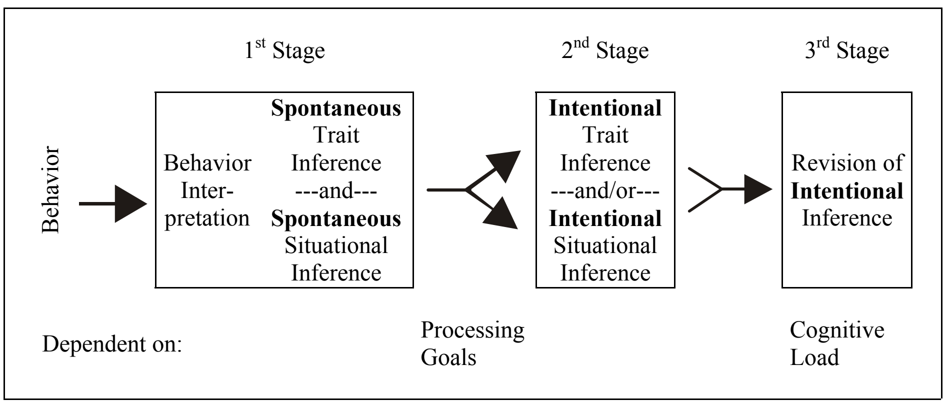

Figure 5.1. The refined social inference process incorporating intentional and spontaneous inferences.

In the third stage, attention is turned to the entire behavioral field. Explicit inferential processes triggered in the second stage continue and examine if the inference requires correction. In this stage, information is processed in a thoughtful, controlled way, so this stage can only be completed when sufficient attentional resources are available. Although mutually inconsistent concepts could co-exist in the first stage, in both the second and the third stage, some concepts are inhibited by explicit inferential processes while the activation of others is increased. In some cases, one inference is reduced because it runs counter to another (e.g., a situational correction: When John is seen as less smart when the test is easy). In other cases, multiple inferences may be attributed as long as they are not inconsistent, as described by Reeder's (Reeder, Vonk, Ronk, Ham, & Lawrence, 2003) Multiple Inference Model (e.g., when an action is seen as both helpful and obedient). In still other cases, perceivers bear in mind two competing inferences without deciding which one is most accurate (e.g., when an actor might be either friendly or ingratiating). In this case, completion of the attribution is postponed until new evidence comes along, as described by Fein (1996; Fein, Hilton, & Miller, 1990). These inferential processes account for the correlation between dispositional and situational inferences in the second and third stage. The absence of a correlation between STI's and SSI's reflects the absence of these processes in the first stage.

Thus, contrary to earlier insights (e.g., Gilbert, 1998; Krull & Erickson, 1995), we argue that second stage inferences are not spontaneous inferences. Results of Study 4.1 confirm trait attribution research (e.g., Gilbert et al., 1988; Krull, 1993) that shows that second stage inferences happen independent of cognitive load. This indicates that just as spontaneous inferences (e.g., Study 4.2, and see, Uleman, Newman, et al., 1996), intentional inferences can occur relatively effortlessly. Because of this effortlessness, second stage inferences may have seemed to be similar to spontaneous inferences. Indeed, this assumption implicitly underlies most of the literature on three-stage models (e.g., Gilbert & Malone, 1995; Gilbert et al., 1988), and sometimes is described explicitly (e.g., Gilbert, 1998; Krull & Dill, 1996; 1998; Krull & Erickson, 1995). Current results (Study 3.2 and 4.1) confirm that second stage inferences - though drawn effortlessly - are intentional in nature, and not spontaneous, as they are guided by processing goals.

The suggestion that spontaneous and intentional inferences happen in different stages might fit a social cognitive neuroscience approach to attribution (Lieberman, Gaunt, Gilbert, & Trope 2002). This approach describes a reflexive and a reflective attributional system in the mind, based on neurological evidence. Spontaneous inferences might converge with the reflexive system, and intentional inference with the reflective system.

More specifically, the current suggestion also is in line with Uleman (1999, p. 153) who assumes that the inferences studied in the area of social inference research (e.g., Gilbert & Malone, 1995; Krull & Erickson, 1995; but also Trope, 1986; Trope & Gaunt, 1999) are of a different type than the inferences studied in the area of spontaneous inference research (e.g., Uleman, Newman, et al., 1996). Uleman (1999) distinguishes spontaneous from intentional inferences. Spontaneous inferences occur without the necessity of an impression formation goal, for example, during "uneventful people watching" (Uleman, 1999). Intentional inferences, on the other hand, occur when one attends to other people with an impression goal in mind, e.g., during a job interview. Spontaneous inferences, Uleman assumes, are guided by chronically accessible constructs, whereas intentional inferences are guided by temporarily activated processing goals.

Our distinction between spontaneous activation (first stage) and intentional inferences (second stage) deviates from Smith and DeCoster's (2000) dual-process model perspective on attributional inferences. Smith and DeCoster differentiate a low-effort processing mode that draws on association, and occurs automatically, from a high-effort mode that draws on symbolically represented rules, is structured by language and logic, and occurs optionally when capacity and motivation are present. They suggest that second stage inferences (correspondent inferences in the model by Gilbert & Malone, 1995) fit a low-effort processing mode while the third stage (attributional thinking) takes place in high-effort mode. We propose that spontaneous inferences fit a low-effort mode, and that it is the first stage rather than the second where low-effort processing occurs. In the (goal dependent) second and the (load dependent) third stage, relatively high-effort processing takes place.

Furthermore, we suggest another extension of three-stage models of social inference. In line with Smith and DeCoster (2000), we propose that the first stage (low-effort) processes and the (high-effort) processes of the second and third stage can happen simultaneously rather than in sequence as is assumed by social inference models (e.g., Gilbert & Malone, 1995; Krull & Erickson, 1995). Associative (low-effort) processing continually activates concepts that are linked to the observed behavior (e.g., STI's and SSI's), even while the perceiver engages in high-effort processes (e.g., considers the possibility of alternative causes, that is, draws intentional inferences and corrects them).

A New Implicit Paradigm to Detect Inferences or Associations

The new paradigm we developed (Study 2.2; an adaptation of the relearning paradigm by Carlston & Skowronski, 1994) might also prove valuable for the detection of many other inferences or associations. In this paradigm, participants first are presented with the contents of cells in a grid. In a second round, participants are presented with an identical grid with different contents. Now, participants are asked to remember what is presented in each cell. Better remembrance for a certain cell indicates that a participant had more possibilities to learn what was presented in that cell. This indicates that a participant (spontaneously) drew an inference or made an association for that particular cell in the first round that relates to the contents of that same cell in the second round. Thereby, a participant has had the chance to learn the combination of cell and contents twice. In the current application of this paradigm (Study 2.2), we used it to detect both STI's and SSI's. We found participants remembered contents better, when in the first round, a behavior description had been presented (e.g., "John drinks his beer in one gulp") in a certain cell that implied the trait (e.g., "thirsty") that was presented in the same cell in the second round, indicating participants spontaneously inferred the trait (or situation property), while reading the behavior description.

Other applications of this implicit inference or association detection paradigm could be numerous, as any kind of relation between contents of a cell in the first and second round could be detected. In addition, any kind of stimulus can be presented in a cell. For example, associations between cultural groups and stereotypes could be measured. For this, in the first round, anything that relates to a certain cultural group could be presented (e.g., pictures or first names), while, in the second round, cells contain stereotypic traits which participants are then asked to remember. Any relation between cell contents in the first and second round should lead to better remembering and be detected by the paradigm.

Two Research Traditions United

By encompassing both social inferences as measured in trait attribution and spontaneous inference research, the current thesis united two separated research traditions. Although, in both traditions, many assumptions about the role of spontaneous inferences in the social inference process have been made (e.g., Bargh, 1994; Gilbert, 1998; Gilbert & Malone, 1995; Krull & Erickson, 1995; Uleman, 1999), previously, no research directly compared spontaneous and intentional inferences in light of three-stage models of social inference. Moreover, the research tradition of spontaneous inference research mainly studied social inferences of traits (see Uleman, Newman et al., 1996) but not both dispositional and situational inferences as in the research tradition of trait attribution (e.g., Krull, 1993), thereby disabling a comparison. The current thesis has united the two research areas by making these comparisons.

A fundamental issue that remains unsolved in the research area of spontaneous inferences is the following: It remains undecided what STI's (and also SSI's) refer to (Uleman, Newman et al., 1996). Some research suggests that STI's can be associations between an activated trait (or situation property) and whatever was around at the moment of activation, like, for example, the communicator of a message, as indicated by the spontaneous trait transference phenomenon (Carlston et al., 1995). Other research suggests that STI's are connected to both specific names and behaviors (e.g., van Overwalle, Drenth & Marsman, 1999) or even faces (Todorov & Uleman, 2003). Moreover, as discussed in Chapter 1, the new paradigm we developed (Study 2.2) indicates that activated STI's or SSI's can even get connected to something as abstract as a cell in a grid. Contrastingly, in trait attribution research, it is quite clear what social inferences refer to: Inferences are explicitly drawn about an actor or a situation. In future research, this issue might be assessed by disentangling spontaneous associations (of activated inferences) from spontaneous inferences. Thereby, models of the social inference process might be refined even further.

Concluding Remarks

Overall, current thesis shows that the implicit measures used in spontaneous inference research (see Uleman, Newman, et al., 1996) and the explicit measures used in trait attribution research (e.g., Krull, 1993) are not simply another way of assessing the same social inferences. Rather, these measures tap into different processes with different characteristics that fit into different stages of the social inference process.

Finally, again, imagine you are watching the episode of your favorite television show in which your favorite character Ron wears only his pants (and his chest hair) at the brightly lit set. The current thesis examined the process a social perceiver goes through when forming an inference, by comparing social inferences across trait attribution and spontaneous inference research. We showed that, first, you spontaneously might have inferred both the STI "macho" and the SSI "warm". Then, you may have followed your intent (e.g., to form an impression of Ron), and attributed the trait "macho" to Ron, and, less so, the situation property "warm" to the set. Next, if you gave yourself the (cognitive processing) time, you may have corrected your mainly dispositional, intentional inference for the high temperature of the set.

Early attribution theory noted dispositional biases in social inferences: Behavior “tends to engulf the total field” (Heider, 1958, p. 54). Later, Jones and Harris (1967, p. 22) underlined that “this describes the results without really explaining them”, and Gilbert (Gilbert & Malone, 1995) proposed a model of the social inference process, which Krull (Krull & Erickson, 1995) extended to include situational inferences. In a separated research tradition, spontaneous social inferences were studied (see Uleman, Newman, et al., 1996), following Asch’s (1946, p. 258) notion that when we look at a person “immediately a certain impression of his character forms itself in us”. The current thesis compared social inferences across these two research traditions and united their notions by extending the model of the social inference process to encompass both intentional and spontaneous inferences.

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Summary

The current thesis examines the process of thought social perceivers go through when drawing a social inference: The social inference process. Currently, there are two separate research traditions that study social inferences. In attribution research, social inferences have been studied and described extensively. This research area developed several models of the social inference process that mostly converge in assuming that social perceivers to go through three stages when drawing a social inference: First, people categorize the behavior of an actor; second, people draw an initial inference, guided by processing goals; and, third, a correction of this initial inference takes place, if sufficient cognitive capacity is available. Also, social inferences have been studied in the area of spontaneous inference research. However, because of various differences, these research areas are incomparable.

The current thesis bridged differences between these two research traditions, to compare directly the social inferences studied in each area, and to come to a refinement of current models of the social inference process that encompasses both research areas.

The first difference we bridged was that we compared spontaneous trait inferences (STI's) to spontaneous situational inferences (SSI's), since, in trait attribution research, dispositional and situational inferences had been studied together, whereas spontaneous inference research studied either STI's or SSI's, but never both.

In Chapter 2, we performed two studies that examined spontaneous inferences about behaviors that allow for both a trait inference and an inference about a situation property. For example, we studied spontaneous inferences drawn when reading the behavior description "John gets an A for the test": Social perceivers might infer the STI "smart", as an inference about John, the SSI "easy", as an inference about the test, or even both. In Experiment 2.1, using a probe recognition paradigm, we found activation of both STI's and SSI's. In Experiment 2.2, we used a newly

developed paradigm, and, additionally, manipulated processing goals to be either dispositional (e.g., “Form yourself an impression of John”) or situational (e.g., “Form yourself an impression of the test”). Again, we found activation of both STI's and SSI's, independent of temporarily activated processing goals. These two studies show that, spontaneously, social perceivers can draw both a trait inference and a situational inference. Next, we could directly examine STI’s and SSI’s versus dispositional and situational inferences as studied in attribution research, and compare the effects of the two major factors in models of the social inference process - processing goals and cognitive load - across the two research traditions.

In Chapter 3, we compared the effects of processing goals on social inferences across the two research areas. Therefore, we performed two studies that were identical except for the paradigm used to measure social inferences, thereby bridging differences between the two areas. As expected, Experiment 3.1 (using a spontaneous inference research paradigm) showed no influence of processing goals, whereas, Experiment 3.2 (using an attribution research paradigm) did show this influence. Participants drew stronger (attributional) dispositional inferences after dispositional processing goal instructions than after situational instructions and vice versa for situational inferences. Thereby, these results indicate that processing goals guide inferences as measured in attribution research, whereas spontaneous inferences occur regardless of processing goals.

In Chapter 4, we compared the effects of both processing goals and cognitive load on attributional versus spontaneous inferences. As in Chapter 3, the two studies of current chapter were identical, except for the paradigm to measure social inferences. Experiment 4.1 (measuring attributional inferences) showed that goals guided inferences, and that this influence was weaker without load. These results fit three-stage models of the social inference process: Second stage inferences are goal-dependent, and the third-stage correction process is dependent on ample cognitive capacity. Furthermore, we found that (attributional) trait and situational inferences were negatively correlated. Contrastingly, Experiment 4.2 (measuring spontaneous inferences) revealed no influence of load or goals, and STI's and SSI's were not correlated. As the results of Chapter 3, current results indicate that the two research traditions study distinct processes with different characteristics.

In Chapter 5, corroborated by the findings of present research, we proposed a refined view on models of the social inference process that encompasses both research traditions: In the first stage, multiple spontaneous inferences are activated, independent of processing goals and cognitive load, and independent of each other. In the second stage, perceivers attribute intentional inferences to the actor or the situation, guided by processing goals. In the third stage, these goal-dependent inferences are corrected, if ample cognitive capacity is available. The explicit inferential processes of the second and third stage reflect a Heiderian logic of attribution: The causal strength of the dispositional factor is weaker as the causal strength of the situational factor increases, and vice versa. The absence of a correlation between STI's and SSI's reflects the absence of these processes in the first stage. Finally, this chapter describes implications of this refined model, and the merits of the newly developed paradigm (used in Study 2.2), and discusses the way in which the current thesis unites attribution and spontaneous inference research.

Samenvatting

Dit proefschrift bestudeert het denkproces van een sociaal waarnemer bij het maken van een sociale gevolgtrekking: Het proces van sociale gevolgtrekkingen. In de huidige literatuur bestaan twee onderzoekstradities die sociale gevolgtrekkingen bestuderen. Binnen de onderzoekstraditie van attributie-onderzoek worden sociale gevolgtrekkingen uitvoerig bestudeerd en beschreven. Dit onderzoeksgebied ontwikkelde diverse modellen van het proces van sociale gevolgtrekkingen, waarvan de meesten er in overeenstemmen dat zij veronderstellen dat sociale waarnemers sociale gevolgtrekkingen maken in drie stappen: Ten eerste categoriseren mensen het gedrag van een handelend persoon; ten tweede maken mensen een initiële gevolgtrekking, gestuurd door hun verwerkingsdoelen; en ten derde vindt een correctie van deze initiële gevolgtrekking plaats, indien voldoende cognitieve capaciteit beschikbaar is. Ook worden sociale gevolgtrekkingen bestudeerd binnen de onderzoekstraditie van spontane sociale gevolgtrekkingen. Maar vanwege diverse verschillen zijn deze onderzoekgebieden niet direct vergelijkbaar.

Het huidige proefschrift overbrugt verschillen tussen deze twee onderzoekstradities zodat de sociale gevolgtrekkingen die ieder gebied bestudeert direct met elkaar vergeleken kunnen worden. Zodoende kunnen we tot een verfijning komen van huidige driefasen-modellen van het proces van sociale gevolgtrekkingen die beide onderzoekstradities omvat. Een eerste, belangrijk verschil dat we overbrugden is dat we spontane gevolgtrekkingen over eigenschappen van personen (Spontaneous Trait Inferences; STI’s) vergeleken met spontane gevolgtrekkingen over eigenschappen van situaties (Spontaneous Situational Inferences; SSI’s). Attributieonderzoek bestudeerd namelijk zowel dispositionele als situationele gevolgtrekkingen, terwijl onderzoek naar spontane gevolgtrekkingen alleen òf STI’s òf SSI’s bestudeerde, maar nooit allebei.

In Hoofdstuk 2 hebben we dan ook twee studies uitgevoerd die beide spontane gevolgtrekkingen bestuderen over gedrag dat zowel een dispositionele als een situationele gevolgtrekking toestaat. Zo bestudeerden we spontane gevolgtrekkingen gemaakt bij het lezen van de gedragsbeschrijving “Jan krijgt een 10 voor het tentamen”. Hierbij zouden sociale waarnemers spontaan de STI “slim” kunnen maken als een gevolgtrekking over Jan, maar ook de SSI “makkelijk”, als een gevolgtrekking over het tentamen. In Experiment 2.1 vonden we bewijs van activatie van zowel STI’s als SSI’s. Hierbij gebruikten we een onderzoeksparadigma dat vaak gebruikt werd om STI’s te meten: het zogenaamde ‘probe recognition paradigm’. In Experiment 2.2 gebruikten we een compleet ander, zelf-ontwikkeld onderzoeksparadigma om de activatie van spontane gevolgtrekkingen te meten in een studie waarin we tevens verwerkingsdoelen manipuleerden. Daarbij kregen proefpersonen een dispositioneel verwerkingsdoel met bijvoorbeeld de instructie “Vorm je een indruk van Jan”, en een situationeel doel met de instructie “Vorm je een indruk van het tentamen”. Net als in het vorige experiment vonden we activatie van zowel STI’s als SSI’s, en wel onafhankelijk van verwerkingsdoelen. Deze twee studies laten zien dat sociale waarnemers spontaan zowel een gevolgtrekking kunnen maken over een eigenschap van de persoon als over een eigenschap van de situatie waarin deze zich bevindt. De volgende stap in deze lijn van onderzoek kon nu gemaakt worden: Een directe vergelijking van STI’s en SSI’s met dispositionele en situationele gevolgtrekkingen zoals bestudeerd in attributieonderzoek, en van de invloed van de twee belangrijkste factoren in modellen van het process van sociale gevolgtrekkingen – verwerkingsdoelen en cognitieve belasting – op sociale gevolgtrekkingen tussen beide onderzoekstradities.

In Hoofdstuk 3 vergeleken we ten eerste de effecten van verwerkingsdoelen op sociale gevolgtrekkingen tussen de twee onderzoeksgebieden. Daartoe voerden we twee nagenoeg identieke studies uit, die slechts verschilden in het onderzoekparadigma dat zij benutten om sociale gevolgtrekkingen te meten. De ene studie gebruikte een paradigma om spontane gevolgtrekkingen te meten, de andere een paradigma uit attributieonderzoek. Op deze manier overbrugden we alle andere verschillen tussen deze onderzoeksgebieden. Zoals verwacht liet Experiment 3.1 (met een paradigma om spontane gevolgtrekkingen te meten) geen invloed zien van verwerkingsdoelen, terwijl Experiment 3.2 (met een paradigma uit de onderzoekstraditie van attributie) wél deze invloed liet zien. In dit laatste onderzoek maakten proefpersonen namelijk sterkere dispositionele gevolgtrekkingen onder dispositionele verwerkingsdoel-instructies dan onder situationele en hun situationele gevolgtrekkingen vertoonden precies het tegenovergestelde patroon. Deze resultaten geven aan dat verwerkingsdoelen wél gevolgtrekkingen zoals bestudeerd in attributieonderzoek beïnvloeden, maar dat spontane gevolgtrekkingen onafhankelijk van verwerkingsdoelen optreden.

In Hoofdstuk 4 vergeleken we de effecten van verwerkingsdoelen en ook cognitieve capaciteit op attributionele versus spontane gevolgtrekkingen. Net zoals in Hoofdstuk 3 waren beide studies in het huidige hoofdstuk identiek op het paradigma na waarmee sociale gevolgtrekkingen gemeten werden. Experiment 4.1 (waarin attributionele gevolgtrekkingen werden gemeten) liet zien dat verwerkingsdoelen gevolgtrekkingen stuurden, en dat deze beïnvloeding kleiner is zonder cognitieve belasting. Deze resultaten sluiten aan bij driefasenmodellen van het proces van sociale gevolgtrekkingen: Tweede fase gevolgtrekkingen zijn afhankelijk van verwerkingsdoelen, en de correctieprocessen van de derde fase zijn afhankelijk van cognitieve capaciteit. Ook liet deze studie zien dat (attributionele) dispositionele en situationele gevolgtrekkingen negatief gecorreleerd zijn. Experiment 4.2 (waarin spontane gevolgtrekkingen gemeten werden) daarentegen liet geen invloed van verwerkingsdoelen of cognitieve belasting zien, en STI’s en SSI’s waren ongecorreleerd. Aansluitend bij de resultaten van Hoofdstuk 3, geven de resultaten van dit hoofdstuk aan dat de twee onderzoekstradities verschillende processen met andere eigenschappen bestuderen.

In Hoofdstuk 5 stellen we een verfijning voor van driefasenmodellen van sociale gevolgtrekkingen, gebaseerd op de resultaten van de drie empirische hoofdstukken. Deze verfijning integreert beide onderzoekstradities: In de eerste fase worden meerdere spontane gevolgtrekkingen gemaakt, onafhankelijk van verwerkingsdoelen en cognitieve belasting, en onafhankelijk van elkaar. In de tweede fase attribuëren sociale waarnemers intentioneel gevolgtrekkingen aan actor of situatie, gestuurd door verwerkingsdoelen. In de derde fase worden deze doelafhankelijke gevolgtrekkingen gecorrigeerd, indien voldoende cognitieve capaciteit aanwezig is. De expliciete, inferentionele processen van de tweede en derde fase weerspiegelen een logica van attributie die de principes van Heider volgt: De causale kracht van de dispositionele factor is zwakker naarmate de causale kracht van de situationele factor sterker is en andersom. De afwezigheid van een correlatie tussen STI's en SSI's weerspiegelt de afwezigheid van deze processen in de eerste fase. Tenslotte beschrijft dit hoofdstuk de belangrijkste implicaties van dit verfijnde model, de voordelen van het nieuw-ontwikkelde paradigma dat gebruikt werd in Experiment 2.2, en bespreekt het de manier waarop het huidige proefschrift de onderzoekstradities van attributie en spontane gevolgtrekkingen verenigt.

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Jaap Ham,
Maart 2004.

Curriculum Vitae

Jaap Robert Cornelis Ham werd geboren op 22 januari 1971 in Eindhoven. Hij legde de basis voor zijn wetenschappelijke carriere door kleuter- en basisschool van de Vrije School Eindhoven te doorlopen. Om 'echt iets te gaan leren' startte hij hierna aan het Eckart College in dezelfde plaats. In 1989 behaalde hij daar het VWO-diploma. Nadat hij een jaar Technische Natuurkunde aan de TUE had gestudeerd en zogenaamde 'Mauerspechten' de Berlijnse Muur had zien omhakken, begon hij in 1990 met de studie Psychologie. Daarnaast startte hij in 1989 adviesbureau Ham Computers.

In 1998 studeerde hij af in de Sociale Psychologie, op een scriptie over de invloed van intergroepscontext op de productie van de linguistic expectancy bias. Aansluitend werd hij aan diezelfde vakgroep onderzoeker in opleiding. Naast het doen van onderzoek gaf hij les, begeleidde hij studenten, werkte samen met lokale en buitenlandse onderzoekers, en voerde hij diverse bestuurlijke taken uit. In deze periode schreef hij het voor u liggende proefschrift. Vanaf 1 maart 2004 werkt hij als post-doctoraal medewerker aan de Universiteit Utrecht en doet onderzoek naar processen van sociale rechtvaardigheidsoordelen.

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