

Verbalization and Communication Effects on Mental Representations and Judgments

by

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"Saying it made a kind of truth."

Richard Powers, The Echo Maker

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Chapter 1

General Introduction

Abstract

Ways and means of verbalization and communication are diverse and so are their effects on mental representations and judgments. Accordingly, the present thesis aimed at investigating effects of verbalization and communication on mental representations and judgments from various angles using a multimethod approach. Three different papers are presented: In the first paper, two experiments demonstrate the saying-is-believing effect using visual target material: Participants remembered a target person's everyday behavior (Experiment 1) and a forensically relevant event (Experiment 2) presented in videos in accordance with their audience-tuned message. Participants' communication had a greater impact on their mental representations in the evaluation of a previously presented event when they experienced a socially shared reality with their audience. The research reported in the second paper investigated the impact of linguistic abstraction used in communicated descriptions on mental representations in the linguistic category model framework. In this experiment, participants applied the level of linguistic abstraction from their descriptions of behavioral events to abstraction levels in their mental representations of the events, only when they communicated with an in-group (vs. out-group) audience. For the first time, an 'abstracting-is-believing' effect, depending on the audience's group membership, was revealed. In the third paper, two experiments examined retrieval ease effects on subsequent memory judgments in the applied field of eyewitness memory. It was demonstrated that centrality of recalled information can have a strong impact on individuals' memory judgments: When recalled information was peripheral, participants' mnemonic certainty declined. In summary, the present five experiments provide evidence that mental representations and mnemonic judgments of individuals can be profoundly shaped by their own verbalization and communication of events.

Overview of the dissertation study

One of the key challenges in everyday life is determined by the formation of subjectively valid mental representations of the world that surrounds us. We need to interpret and evaluate other people's behaviors to, for example, adjust our own behavior and avoid situations that might become uncomfortable or even pose a risk to us. Many experiences we encounter are ambiguous. When we see a man in front of a shopping mall shouting at a woman, we might interpret this behavior as an act of aggression during a couple's argument, as part of a street art act, or maybe even as a commercial for the local hearing aid dealer.

One way of dealing with the ambiguity of such encounters and forming a subjectively valid representation is to talk about one's experiences. Telling others about experienced events is a ubiquitous means for the social construction and validation of the connotation associated with these encounters. Despite the fact that people frequently want or even need to make sense of such ambiguous encounters and use communication to disambiguate such situations, language, seen as the "the most important and refined symbol system for communication, is almost totally missing from social psychological theorizing" (Fiedler, 2007, p. 1). In the present thesis, the term *communication* refers to the (assumed) presence of an audience or addressee while *verbalization* represents the expression of cognitive incidents such as thoughts, ideas, feelings, or memory judgments in words. Put differently, in the sense these terms are used in the present thesis, verbalization does not necessarily require the presence of an audience while communication does include an audience. Communication content consists of everything a sender delivers to a recipient, crucially including verbalized propositions (see Kashima, Klein, & Clark, 2007), which is the focus of the present experiments.

In the above example, we could approach another woman who is standing in front of the mall for a cigarette break and has probably perceived the scene from the beginning.

Taking into account her relaxed posture, we might infer that she does not perceive the shouting as aggressive. Starting a conversation, we might tell her that we have seen the male artist shout at the female artist in a rather funny act and infer from our audience's reaction that our message was in accordance with her interpretation of the scene. Critically, when we describe the event later that day in an email to a friend who has not been present at the scene, our mental representations of the event are likely biased towards the evaluative tone from our previous message and depict the shouting man rather as a funny street artist than as an aggressive husband. Our mental representations have thus been shaped by the view we expressed in our message to the audience on the basis of the assumed audience's attitude towards the scene, that is, we ended up believing what we have said.

Tailoring a message to an audience's attitude is referred to as *audience tuning* (Higgins, 1992) and the effect of audience tuning on subsequent mental representations is called the saying-is-believing effect (Higgins & Rholes, 1978). Recent research strongly suggests that the effect depends on the extent to which communicators are motivated to create a shared reality with their audience about the topic (see Echterhoff, Higgins, & Levine, 2009). The effect has predominantly been investigated with text as target material. Two experiments reported in Chapter 2 extend audience-tuning effects on subsequent mental representations to the applied field of eyewitness memory research by using videos as target material.

How communication about events can influence communicators' own mental representations about the events has been shown by research in various areas (Adaval & Wyer, 2004; Ruscher, Hammer, & Hammer, 1996; for reviews see Chiu, Krauss, & Lau, 1998; Marsh, 2007), but not yet for the field linguistic abstraction. Perceivers might often describe the same event or behavior at varying levels of linguistic abstractness (Semin & Fiedler, 1988, 1991). Usually, the more a behavior is described in abstract terms, the more

the behavior is attributed to stable characteristics of the individual performing the behavior and less to the situation (see Wigboldus & Douglas, 2007). Building on shared-reality research, it was assumed that the association between linguistic abstraction in communicated descriptions and subsequent mental representations depends on the audience's appropriateness for shared-reality creation, specifically, on the audience's membership in the communicators' in-group *vs.* out-group.

Coming back to our example, if we perceived the woman in front of the mall as sufficiently appropriate to create a shared view on the event we likely stick to the level of communicated language abstraction while writing the email to our friend. This would for example be the case when we perceived our audience as a member of our in-group. In case we observed a distinct feature on the woman's nametag indicating that she works for a political party opposite to our own political opinion, we would perceive her as a member of an out-group. We would then likely not use the same level of linguistic abstraction from our message to her in our email to our friend. The experiment reported in Chapter 3 investigated effects of linguistic abstraction in descriptions on mental representations of the events described. It was found that the relationship between linguistic abstraction in descriptions and in mental representations critically depended on the group membership of the audience: This relationship was significant only when participants communicated with an in-group (*vs.* out-group) audience. We were thus able to demonstrate an 'abstracting-is-believing' effect.

Returning to the example from the beginning, one might now assume that the man shouting at the woman was not a street art act but instead the beginning of a violent scene. It turns out that we are among the witnesses the police investigators want to interrogate. Parties involved in such interrogations frequently judge the credibility of witnesses on the basis of their apparent memory certainty. In order to reconstruct the scene the interrogators ask very specific questions to highly peripheral aspects that we find difficult to answer. Accordingly,

we exhibit low memory certainty in an already uncomfortable situation. On the other hand, another witness is asked to recall the same peripheral information but the interrogator also asks this other witness about very central aspects of the event which she can easily recall. Therefore, the other witness experiences higher mnemonic certainty than we do even though the amount of recalled peripheral information did not differ. Two experiments reported in Chapter 4 examined the role of centrality of information in the formation of memory judgments. It was found that individuals who recalled relatively more peripheral (vs. central) information judged their memory certainty as lower.

To sum up, in all the presented experiments, participants took the role of a sender, that is, they verbalized certain aspects of a previous encounter. In the experiments presented in Chapters 2 and 3, participants communicated with an audience about visually perceived events, in Chapter 4 participants verbalized aspects or answered questions about more or less central content regarding a previously encountered video. Together, the five experiments reported in this thesis demonstrate in multiple ways how mental representations and memory judgments about behaviors and events can be influenced by individuals' own communication and verbalization.

Chapter 2

*Communication Effects on Eyewitness Memory*¹

¹ This chapter has been published as Hellmann, J. H., Echterhoff, G., Kopietz, R., Niemeier, S., & Memon, A. (2011). Talking about visually perceived events: Communication effects on eyewitness memory. *European Journal of Social Psychology, 41*, 658–671.

Abstract

Communicators' tuning of a message about a social target to their audience's evaluation can shape their representation of the target. This audience-tuning effect has been demonstrated with ambiguous text passages as input material. We examined whether the effect also occurs when communicators learn about the target's behaviours from visual (nonverbal) input material. In Experiment 1, participants watched a soundless video depicting ambiguous behaviours of a target, described the video to an audience who liked (vs. disliked) the target, and subsequently recalled the video. Both message and recall were biased towards the audience's judgement. In Experiment 2, the video depicted a forensically relevant event, specifically ambiguous behaviours of two persons involved in a bar brawl. Participants tuned their event retellings to their audience's responsibility judgement and remembered the event accordingly. In both experiments, the effect of the audience's judgement on recall was statistically mediated by the extent to which the message was tuned to the audience. The more participants experienced a shared reality with their audience the stronger was the message-recall correlation (Experiment 2). We conclude that the audience-tuning effect for visually perceived information depends on the communicators' creation of a shared reality with their audience.

A key challenge in forming representations of the social world is to interpret and evaluate other people's behaviours (e.g. Heider, 1958; Jones & Davis, 1965). For instance, when we have briefly observed a man approaching and gesturing at a passer-by in a dark alley at night, we might wonder whether this is, for example, an unexpected encounter between two friends, an appeal for help, or an act of aggression. Also, during a date with a potential romantic partner, it might be unclear whether the other's gaze aversion is due to lack of romantic interest, reflection about the incipient relationship, or simply shyness.

One way of dealing with this ambiguity and forming a subjectively valid representation is to talk to others about one's experiences. Telling others about one's experiences is a ubiquitous means for socially constructing and validating the meaning assigned to these experiences (e.g. Bruner, 1990). Testifying to this ubiquity, a recent diary study revealed that 62% of the events recorded by participants had already been told to others by the evening of the day they occurred (Pasupathi, McLean, & Weeks, 2009). Furthermore, research in various domains shows that communication about events can shape communicators' own representations and memory of the events (Adaval & Wyer, 2004; Ruscher, Hammer, & Hammer, 1996; Tversky & Marsh, 2000; for reviews see Chiu, Krauss, & Lau, 1998; Marsh, 2007). For example, by talking about other people's behaviours communicators jointly create impressions about social actors with their communication partner (Ruscher et al., 1996). Also, when readers retell the behaviours of a story character from a favourable (*vs.* unfavourable) perspective, their later memory contains more favourable than unfavourable descriptions about the character (Tversky & Marsh, 2000).

Of relevance to the present research, it has been found that communicators' impressions and mental representations of other people can be shaped by the process of audience tuning (Echterhoff, Higgins, & Groll, 2005; Higgins & Rholes, 1978; McCann & Higgins, 1992). Audience tuning refers to the communicator's adaptation of a message

towards the audience's viewpoint, perspective, or attitude regarding the communication topic (Higgins, 1992). Given that the audience seems to have a clear position towards the topic, then audience tuning offers the possibility for reducing the ambiguity of observed events and behaviours. As numerous studies have shown, after communicators have tuned a message about a target person's ambiguous behaviours to an audience's (positive or negative) attitude towards the target person, they often end up with cognitive representations of the target that are consistent with the view expressed in their previous, audience-tuned message (Echterhoff et al., 2005; Echterhoff, Higgins, Kopietz, & Groll, 2008; Higgins & Rholes, 1978; for reviews see Echterhoff, Higgins, & Levine, 2009; McCann & Higgins, 1992).

This audience-tuning effect on speakers' subsequent representations, also known as the saying-is-believing effect (Higgins & Rholes, 1978), has been investigated in a paradigm in which participants read a short essay consisting of text passages which describe various ambiguous behaviours of a target person. In this paradigm, participants are instructed to describe the depicted target person to an audience who already had the chance to form an impression about the target person. Participants also learn that their audience either likes or dislikes the target person. Those who communicate with an audience who likes (*vs.* dislikes) the target person describe the target in a more positive way. Saying has become believing when communicators' mental representations about the original target material, assessed with a surprise free recall task, match the tone of their audience-tuned messages. The effect of the audience's judgement on the evaluative tone of communicators' later cognition has been found to be statistically mediated by the evaluative tone of their own messages (see Higgins & McCann, 1984). This evidence suggests that the effect is driven by communicators' audience-oriented message production rather than merely by their knowledge of the audience's attitude (for further evidence on the role of message production, see Higgins, Echterhoff, Crespillo, & Kopietz, 2007; Higgins & Rholes, 1978).

The saying-is-believing effect has been established with several variations in methodology (for a review, see Echterhoff et al., 2009), such as introducing the audience's attitude or judgement before or after the presentation of the original target material (e.g. Kopietz, Hellmann, Higgins, & Echterhoff, 2010). However, there is a striking limitation of extant research, which has constrained its ecological validity and applied relevance: The original input information about the communication topic was restricted to text passages that depict evaluatively ambiguous behaviours of a target person. These text passages were carefully designed to allow positive or negative interpretations of the target's behaviour with equal likelihood (for examples, see Echterhoff et al., 2005, 2008; Higgins & Rholes, 1978).

The Role of the Modality of the Original Stimulus Material

The use of written text material in saying-is-believing studies has some external validity. For example, we may learn about politicians' or other public figures' behaviours by reading about them in newspapers or magazines, and form impressions and evaluations about them based on this written verbal input. In everyday life, however, it is much more common to experience socially relevant events through direct observation, primarily by means of visual perception. We constantly observe other people in our environment and form impressions about them based on visual input information. Impressions of sources are more often shaped by what we visually perceive like physical, especially facial, appearance, gestures, movements, and other nonverbal behaviours than by what we read about them (Brownlow, 1992). Also, people frequently talk about behavioural observations with others, and they often know, or guess, their audience's viewpoint or attitude towards observed actors (e.g. Stukas, Bratanova, Peters, Kashima, & Beatson, 2010).

Reading a written description differs in relevant aspects from making an observation in the visual modality. For instance, written reports about behaviours are, by dint of being symbolically coded, more removed from the original event. Also, reading and understanding

written descriptions of behaviours require cognitive processes that are not needed in making observations. Observation may yield representations that feel more immediate and true to the original event than the representations achieved through the process of reading text material. In everyday life, the apparent authenticity, or realism, of visual information is exploited by advertising, and public opinion professionals, who strongly rely on pictures, icons and video images to convey compellingly ‘real’ representations of products and people (e.g. Messaris, 1997).

Hence it is important to investigate whether the saying-is-believing effect extends to representations based on visually perceived social behaviours and events. Do observers actually tune their retellings of visually perceived events and behaviours to their audience? Do such audience-tuned retellings also shape speakers’ own representations of the original experience? Extending saying-is-believing research to nonverbal input information would increase both face validity and external validity.

Saying-is-Believing Effects with Visual Stimulus Material

There are reasons to suspect that the saying-is-believing effect found with ambivalent text passages as input material might not occur with visual stimuli like a video clip depicting ambiguous behaviours. Research on the picture-superiority effect (Paivio & Csapo, 1973) suggests that pictorial or picture-like material is encoded in a richer and more efficient way and is often better retrieved than verbal material (see also Weldon, Roediger, & Challis, 1989). In one pertinent study, participants reproduced the story of a movie more completely and accurately than those who read a printed version of the same story (Beentjes & van der Voort, 1991). Even when the memory test is entirely verbal, memory is typically better when test items were previously presented visually rather than verbally (Madigan, 1983). Enhanced memory for the original input material could reduce biasing influences, including those that might emerge from audience tuning.

Furthermore, the processing of visual information about people's behaviours has distinctive characteristics that may impede or even prevent saying-is-believing effects. It is known that observers quickly draw inferences about a target's personality traits from the target's nonverbal behaviour (e.g. Borkenau & Liebler, 1992) and visual, particularly facial, appearance (Todorov, Mandisodza, Goren, & Hall, 2005). Such inferences are held with high confidence (e.g. Hassin & Trope, 2000), and remain influential over time (e.g. Berry & Wero, 1993; Todorov et al., 2005). Furthermore, interpretations and impressions from visual stimuli are not only subjectively compelling and robust—they can be surprisingly accurate (Ambady, Bernieri, & Richeson, 2000; Penton-Voak, Pound, Little, & Perrett, 2006) and highly consensual, that is, shared by observers (e.g. Ambady & Rosenthal, 1993). Once formed, initial impressions can provide an anchor from which subsequent judgements are derived (see Ambady et al., 2000). Also, spontaneous trait inferences from a target's behaviour have been found to be more pronounced with visual than with verbal input information (Fiedler & Schenck, 2001). These lines of research suggest that visual, observation-driven impression formation has distinctive features that could forestall or reduce the impact of social influences, including the saying-is-believing effect. In other words, people might rely on what they see in the first place, such that 'seeing is believing' may take precedence over saying is believing.

However, we argue that a saying-is-believing effect can also occur with visual stimulus material. Our argument rests on the notion that the effect reflects a fundamental human motivation to create a 'shared reality' with others, especially when the original input experiences are ambiguous and thus allow different interpretations (Echterhoff et al., 2009; Hardin & Higgins, 1996). Shared reality refers to a commonality with others' mental states, such as beliefs, attitudes, and feelings about a target referent (Echterhoff et al., 2009). Sharing others' beliefs, thoughts and judgements enables us to judge the qualities and

properties of objects and events, to evaluate other people, and to form general beliefs about the world. The achievement of shared reality satisfies fundamental epistemic and affiliative needs; that is, the need to obtain clear and unambiguous knowledge, and the need to connect to and form and maintain relationships with others.

Studies employing written stimulus material have demonstrated that the saying-is-believing effect occurs to the extent to which speakers create, through audience tuning, a shared reality with their audience (e.g. Echterhoff et al., 2005; for a review see Echterhoff et al., 2009). The shared reality account emphasises the important function that is served by adapting one's own representation of a target event to an audience's position. Tuning both the message and one's own mental representation to an audience's position serves core epistemic and affiliative motives: Communicators can disambiguate an initially ambiguous event and thus better understand the event's properties, valence and meaning, which satisfies epistemic needs; and they can feel closer and connected to their audience, which satisfies affiliative needs.

A shared-reality account yields the following prediction: When communicators are sufficiently motivated to create a shared reality with their audience, audience tuning shapes their cognition regardless of the modality of the initial input material. This prediction is consistent with the general notion that motivational forces can be sufficiently powerful to harness various cognitive processes (e.g. Kunda, 1990). As outlined above, observations of social events and behaviours are often ambiguous in that they are open to different inferences and evaluations. As members of an 'ultrasocial' species (Campbell, 1983), humans are particularly interested in understanding social events, and often want to form or maintain affiliations with others. Hence, their motivation to create a shared reality with a communication partner about social events should be relatively high.

If established, a saying-is-believing effect with visual stimulus material about social events would have applications in the domain of eyewitness testimony and memory. Eyewitnesses perceive events visually and frequently share their experiences with others (e.g. Paterson & Kemp, 2006). Legal cases show that individuals' evaluative interpretations of visually perceived events, including interpretations of a suspect's behaviours, can become crucial for police investigations (Memon & Wright, 1999).

The Present Research

We designed two experiments that tested whether the saying-is-believing effect occurs even with visual stimulus material. In Experiment 1, the input material was a video clip that depicted several mundane behaviours of a target person. The material was evaluatively ambiguous as the behaviours could be interpreted to indicate, with approximately equal likelihood, positive traits (e.g. fun-loving) or negative traits (e.g. childish). Participants described what they had seen to an audience who either liked or disliked the target person. After a brief delay they were asked to remember the original scenes in a surprise free recall task.

In Experiment 2, we adapted the saying-is-believing paradigm to the applied field of eyewitness memory. Participants watched a video depicting forensically relevant behaviours of two males culminating in a bar brawl. Similar to Experiment 1, the behaviours were evaluatively ambiguous with regard to the responsibility for the incident. Participants learned that their audience (a presumable witness of the brawl) believed that one of the two males (the main target person) was (*vs.* was not) responsible for the brawl and were asked to retell the incident to their audience. As in Experiment 1, a surprise free recall task was administered.

The core hypotheses were the same for both studies: Regarding message production, we predicted that participants would tune the communicated description of the observed

social events to their audience's evaluation of the target person. In Experiment 1, participants should describe the target person in the video more positively for an audience who likes (*vs.* dislikes) the target. In Experiment 2, participants should describe the target person as relatively more responsible for a forensically relevant event when communicating with an audience who believes that this person is responsible (*vs.* not responsible). These predictions refer to what communicators are saying—the first part of the phrase ‘saying is believing’. Importantly, for both studies we predicted additionally that participants would also believe what they communicated: Participants' subsequent representations of the target person should also, later on, be influenced by their audience-tuned message. In other words, saying should shape believing. Specifically, we predicted that (a) the participants' evaluative representation of the target in the free recall task should be more positive when the audience holds a positive (*vs.* negative) judgement towards the target; for Experiment 2 we predicted analogously that the target should be described relatively more responsible to an audience who believes that this person is indeed responsible (*vs.* not responsible); and that (b) this audience-judgement effect on the free-recall evaluation should be statistically mediated by the evaluative representation of the target in the communicated message.

Experiment 1

Method

Participants and Design. Participants were 54 undergraduate students (28 female, 26 male, mean age=23.9, SD=3.37) from Bielefeld University, Germany. They received a reimbursement of € 3 or partial course credit. The experiment had a single-factor between-subjects design with two conditions (audience judgement: positive *vs.* negative). The overall valence (evaluative tone) of the message and recall protocols served as the main dependent variables (DVs) in the analyses.

Materials and Procedure. The experiment was based on the standard saying-is-believing paradigm (Higgins & Rholes, 1978). To minimise interactions with the experimenter, all materials were presented on a computer using MediaLab (Jarvis, 2005). Instead of the usual text passages describing a target person's behaviour we used a video showing the behaviour of a target person. In this video a male target person in his mid-twenties acted and interacted in various social situations. As with the classic text material, the scenes were designed to be ambiguous, so that, depending on the audience's evaluation, participants could describe the target person in a positive or negative way. For instance, on a playground the target person uses a slide twice, which could be described as both infantile and fun loving (for a description of all scenes from the video in Experiment 1, see Appendix A). In early studies investigating the saying-is-believing effect, the target person was named 'Donald' (e.g. Higgins & Rholes, 1978). Because Donald is rather uncommon as a first name in Germany (where Experiment 1 was administered) participants learned that the target person was called 'Michael' (see Echterhoff et al., 2005, 2008).

The experiment was ostensibly about interpersonal communication and perception. Participants were asked to watch the short video clip described above (lasting 4 minutes and 36 seconds) about ambiguous everyday behaviours associated with the target person, supposedly a student volunteer in a long-term research project. Participants were told that the clip was randomly chosen and assigned to each participant from one out of twelve different persons. In fact, there was only one video, which was shown to every participant. Thus, all participants were presented with the same information and told that it was their task to write a description of Michael for another student volunteer in this research project, Thomas, who would be their audience. It would in turn be Thomas's task to identify Michael on the basis of the participant's description. Participants received the audio instructions via desktop speakers to eliminate experimenter effects and to ensure that the attitude of the audience was

not presented in an obvious or blatant manner (for the importance of the subtlety of these instructions, see Todorov, 2002; also see Echterhoff et al., 2008, Exp. 3). The audio instructions participants received were worded as follows:

Your audience is called Thomas. His task is to identify Michael on the basis of your description. Thomas knows Michael personally. Thus, don't use Michael's name in your description. Thomas has spent some time with Michael. He was able to form his own impression about Michael. It seems that Thomas likes [vs. dislikes] Michael.

Following these instructions, participants were presented with the short video clip. Immediately thereafter, participants were asked to produce their description of Michael for the audience. The communication context was highlighted by a 'send' button, which actually stored the message to the computer's hard disk. After sending their message to the audience, participants were engaged in an unrelated 20-minute filler task before a surprise free recall task about the scenes from the video. The instructions for the recall task were as follows:

Now we would like to ask you to remember Michael's behaviour that you have seen in the video at the beginning of this study. This is NOT about the description that you produced for the audience but about what you saw in the video.

Finally, a post-experimental suspicion check was administered. This check was funnelled, that is, it started with a general free-format question and proceeded to more specific response options. Participants were then thanked and debriefed.

Measures. Two coders, blind to the respective condition, rated the overall valence of the message and the recall protocols on an 11-point scale, ranging from -5 (extremely negative) to +5 (extremely positive). Message and recall protocols were presented to the coders in random order. Coders broke down each protocol into passages corresponding to the passages in the target video and assigned scores for positive or negative evaluative descriptions. The coders were asked to rate the description regarding the overall likeability of the target person. They considered the protocol as a whole and then decided whether it was negative, neutral, or positive. Intercoder correlations were high for the ratings of the message valence, $r(52) = .86, p < .001$, and the recall valence, $r(52) = .92, p < .001$. We computed means of the coders' valence ratings for the message and recall protocols. These means were then taken for all subsequent analyses.

Results and Discussion

All statistical tests reported are two-tailed.

Message Valence and Recall Valence. As predicted, participants tuned their messages about the target person towards the presented attitude of their audience, $t(52) = 2.67, p = .010, d = 0.73$. Specifically, participants who had produced their messages for an audience who liked the target person described 'Michael' in a more favourable way than did participants who had sent a message about the target person to an audience who disliked him (see Table 1).

Importantly, participants' recall protocols revealed that they remembered the original target information in accordance with their audience's view of the target person, $t(52) = 2.18, p = .033, d = 0.60$ (for example passages from message and recall protocols, see Appendix B).

Table 1. Experiment 1: Message and Recall Valence as Functions of Audience Judgement

Protocol	Audience Judgement			
	positive		negative	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Message	0.98	1.75	-0.28	1.71
Recall	0.30	1.42	-0.63	1.69

Note. Message and recall valence scores each are the mean ratings of two independent coders on a bipolar 11-point scale ranging from -5 (*extremely negative*) to +5 (*extremely positive*).

Message-Recall Associations. We also tested whether the observed effect can be regarded as a saying-is-believing effect, that is, we examined the contribution of the communication of a biased message (in addition to knowledge of the audience's judgement) to the effect. To this end, we analysed a potential mediation of audience-judgement on recall valence by message valence. All four standard conditions for mediation as suggested by Baron and Kenny (1986) were met: (1) The independent variable (IV) audience judgement (contrast coded: negative= -1; positive= +1) had a significant effect on the DV recall valence, $\beta = .29$, $t(52) = 2.19$, $p = .033$, and (2) on the proposed mediator (message valence), $\beta = .35$, $t(52) = 2.67$, $p = .010$. Furthermore, (3) message valence significantly predicted the DV, $\beta = .59$, $t(52) = 5.27$, $p < .001$; and finally, (4) in a multiple regression analysis with both audience judgement and message valence as predictors of the recall valence the effect of audience judgement was reduced to non-significance, $\beta = .10$, $t(52) = 0.81$, $p = .423$ whereas the effect of message valence on recall valence remained significant, $\beta = .56$, $t(52) = 4.65$, $p < .001$. For an illustration of this mediation analysis see Figure 1. Importantly, the

indirect effect of the audience judgement on the recall valence via the message valence was significant in a Sobel test, $z = 2.28$, $p = .023$ (see Sobel, 1982) and in a bootstrapping procedure with 10,000 resamples (see Preacher & Hayes, 2004), which yielded a 99% confidence interval around the indirect effect, $ab = .319$, excluding zero (.009–.815). These results suggest that the audience-judgement effect on communicators' recall is driven by their communication of an audience-congruent message.

To sum up, in Experiment 1, we presented visual input information about the target person instead of text passages that have been used in previous audience-tuning research. The ambivalent input material used in the initial saying-is-believing study (Higgins & Rholes, 1978) and many related social cognition studies (e.g. Higgins, Rholes, & Jones, 1977) has over time been associated with the recurrent name of the target person, Donald. Hence, one might refer to our creation as a 'visual Donald'. The findings revealed a saying-is-believing effect for communicators' representations of the visual Donald. After watching the target person performing various ambiguous everyday behaviours participants disambiguated this information by taking into account their audience's evaluation in the production of their message. After this audience tuning participants then remembered the target person's behaviours in an audience-congruent manner in the surprise free recall task—that is, they exhibited a saying-is-believing effect. As indicated by the mediation analysis, the audience-judgement effect on the recall-based evaluation of the target person was driven by communicators' audience-tuned messages rather than mere knowledge of the audience's judgement (for similar evidence in studies with text material, see Higgins & McCann, 1984).

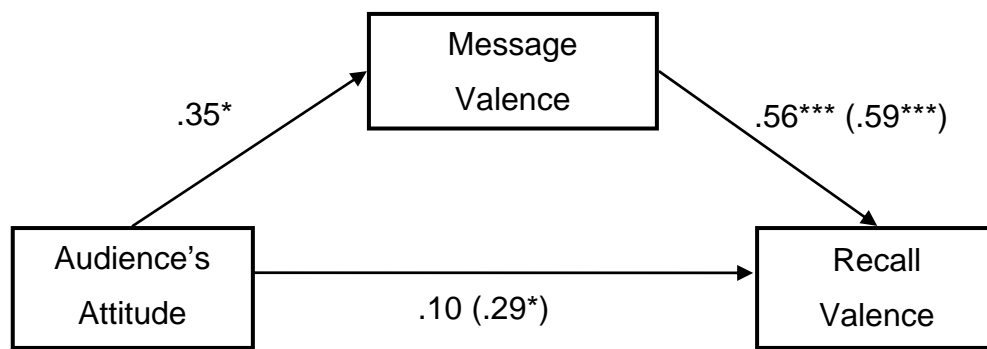


Figure 1. Experiment 1: Mediation analysis with the audience judgement toward the target person as IV (contrasting negative [-1] and positive [+1]), message valence as the mediator, and recall valence as the DV. Path coefficients are standardized coefficients from (multiple) regression analyses. The numbers in parentheses represent the direct effect (bivariate β -coefficients) of each of the two predictors (audience judgement and message valence) on recall valence before the respective other predictor was included. * $p < .05$, and *** $p < .001$.

Experiment 2

Experiment 1 demonstrated, for the first time, a saying-is-believing effect for visually perceived behaviour of a target person and thus extended the generality and ecological validity of the effect. We designed Experiment 2 to further extend the generality of the effect and its applied relevance. Specifically, we examined whether audience-tuned communication also affects communicators' representations of a forensically relevant incident, specifically, the evaluation of observed suspects elicited in a surprise free-recall task.

To answer this question we produced a video depicting two target persons who eventually are involved in a bar brawl. Both behave in ambiguous ways that make it difficult to obtain a clear and definite evaluation. In a forensically relevant situation such as a bar brawl, an important goal is to assess the responsibility of the involved parties. The likeability

or attitudinal judgements employed so far in saying-is-believing studies (also in the present Experiment 1) are of limited applicability for this type of event (cf. Kopietz, Echterhoff, Niemeier, Hellmann, & Memon, 2009). In Experiment 2, we therefore manipulated the responsibility judgement of the audience. A responsibility judgement takes into account both the person and the situation, and is more relevant than a likeability judgement to a forensically relevant incident.

Apart from the judgement type there is another aspect that should be taken into account in this context. Eyewitnesses often feel that it was difficult to perceive all relevant details of an incident such as a crime or car crash and to obtain a sufficiently complete picture of relevant details, for example, due to the speed of the events, or a limited observer perspective (e.g. Lindsay, Read, & Sharma, 1998; Yarmey, 1986). Hence, eyewitnesses may have doubts regarding the quality and accuracy of their own memory (Gabbert, Memon, & Wright, 2007; Leippe, Eisenstadt, & Rauch, 2009). Such metacognitive judgements of memory quality, in turn, can be a key moderator of social influence on memory (Strack & Bless, 1994; see Bless, Strack, & Walther, 2001). Supporting this view, Strack and Bless (1994, Exp. 2) found that participants' memory was biased to a greater extent by a subtle communicative manipulation when participants were led to assume that encoding the target material was difficult (*vs.* not difficult). The researchers induced this assumption by presenting some items, which were not even part of the eventual memory test, subliminally during the study phase (i.e. for only 0.04 seconds and backward-masked). When all items were presented supraliminally and there was thus no reason to perceive encoding as difficult, social influence on memory decreased.

This research suggests that participants' metacognitive judgements of encoding conditions could moderate communication effects on memory. To control for this possibility, we varied the ostensible completeness of the original input information: Participants in the

low-completeness condition learned that, due to the character of the incident, it was difficult to obtain full video coverage. Participants in the high-completeness condition learned that it was easy to capture the incident completely on video.

In Experiment 2, we also tested an additional prediction derived from shared-reality theory (Echterhoff et al., 2009): Participants who experience a high (*vs.* low) shared reality with their audience should rely more on their own audience-tuned communication when forming their own representation of the target person. Thus, we predicted a stronger association between message and recall when the experience of shared reality is high (*vs.* low). To examine this prediction, we included measures to assess participants' experienced shared reality in Experiment 2. In the present paradigm, there are two critical stages for shared reality: Communication (*i.e.*, message production) and free recall. Communication is assumed to be the critical phase of shared-reality creation, and the result of this process is assessed by the evaluative bias in free recall. As in previous research (*e.g.* Echterhoff et al., 2005, 2008), we thus administered the shared-reality measures at a time that was closest to both critical stages, that is, between message production and free recall.

Furthermore, we switched the position of the audience-attitude manipulation in the experimental procedure. Whereas in Experiment 1, the manipulation was placed before the video presentation, in Experiment 2, it followed the video presentation. One reason for this change was a concern about ecological validity. In real life it is unlikely that eyewitness are already aware of a specific audience whom they will retell an incident, let alone the audience's responsibility judgement about the incident, before the occurrence of an incident. Typically, eyewitnesses become aware of the circumstances of a retelling, including the audience's identity and judgement, after they have witnessed an incident (see Gabbert, Memon, & Allan, 2003).

Placing the audience-attitude manipulation after the video also allowed us to test more rigorously our explanation for a possible audience-tuning effect with visual input material. Research on social impression formation (Adaval, Isbell, & Wyer, 2007) suggests that visual images of a target person help perceivers see connections between the person's various behaviours, and form a coherent impression about the person. In Experiment 1, participants already knew their audience's judgement during the perception of the target material. Thus, the video images of the target person could have strengthened emerging audience-congruent impressions, which could result in, or contribute to, the obtained audience-congruent recall bias (cf. Kopietz et al., 2010). Such a process would operate even before the act of (audience-tuned) communication. Manipulating the audience judgement after the perception of the video allows us to rule out this alternative mechanism.

Method

Participants and Design. Participants were 77 undergraduate students (48 female, 29 male) at the University of Aberdeen (Mean age = 22.7 years, SD = 7.26). They received a reimbursement of £5 or partial course credit. Three of the participants guessed the true purpose of the experiment and were excluded from further analyses, resulting in the sample described above. The experiment had a 2 (audience judgement: Person A responsible vs. not responsible) X 2 (ostensible completeness of the video: high vs. low) between-subjects design. The overall responsibility for the incident of the message and recall protocols served as the main DVs in the analyses.

Materials and Procedure. The procedure was based on the standard saying-is-believing paradigm and Experiment 1 with the following exceptions: In Experiment 2, participants were told that they were going to see a video that is based on a real incident (i.e. a bar brawl). The video clip we used in Experiment 2 was the one shown to participants by Kopietz et al. (2009) and lasted 4 minutes 51 seconds. This clip depicted scenes in a bar,

mainly featuring two male target persons (participants were asked to refer to them as A and B). The scenes finally led to a physical conflict between these two target persons. The video material was designed to be ambiguous so that the incident could be described in either way, supporting either of the two target persons as being responsible for starting the fight. (For more details on the video clip, see Appendix C). In the video, either of the two target persons experienced some frustration, so that both had reasons to be agitated and confrontational. Participants were told that their task would be to describe the video's content to a witness (henceforth referred to as the 'audience') of the real brawl via a computer-based intercom system. The audience was ostensibly a student who was unfamiliar with the content of the video. It would be the audience's task to tell us, that is, the experimenters, based on the participants' description whether we had depicted the incident including the fight correctly in the video. Then the ostensible completeness of the video coverage was manipulated: Participants learned that, due to the nature of the incident, it was either easy or difficult to obtain complete video coverage (high *vs.* low completeness). All participants then saw the same video.

Next, participants heard the following audio instructions delivered via speakers that were placed next to the computer the experimental session was held on: 'Now we ask you to describe what happened in the bar. Recall that your audience is a student that witnessed the incident.' The audience's evaluation of one of the two target persons was manipulated by adding the following phrase: 'It may be good to know that this student seems to believe that Target Person A is [*vs.* is not] responsible for what happened.'

Participants then created a message for their audience in a text area as per Experiment 1. After unrelated filler tasks, which lasted about 15 minutes, participants answered five rating items (all ranging from 1 = 'not at all' to 8 = 'totally') designed to measure the experienced shared reality with their audience: (1) 'To what extent do you agree

with your audience's opinion about the incident?'; (2) 'How important is it for you that you conform to your audience's judgement about the incident?'; (3) 'To what extent do you feel connected with your audience through your communication?'; (4) 'To what extent do you agree with your audience's judgement about the incident?' and (5) 'To what extent did your audience's judgement help you to form an impression about the incident?' Responses to the five items were sufficiently consistent (Cronbach's $\alpha = .79$) and were averaged to form an index of experienced shared reality.

Finally, participants were presented with a surprise free-recall task. They were asked to recall as much from the original video as accurately as possible. It was explicitly stated that the task was not about recalling the description that they had sent to the audience earlier on, but about the witnessed incident as depicted in the video. Like in Experiment 1, a postexperimental suspicion check was administered.

Measures. Whereas Experiment 1 focused on the evaluation of another person's personality characteristics, we were now concentrating on a more forensically relevant event in Experiment 2. Thus, we developed a coding scheme to rate the responsibility of either of the two target persons for the bar brawl. Two coders were instructed to read each protocol and then decide to what extent each of the target persons was described as being responsible for what happened on a total scale of -5 (totally responsible) to +5 (totally not responsible).

Because the instructions focused on Person A we expected that, on average, Person A would generally be judged as being more responsible. However, for this kind of material a relative judgement might be more important than an absolute judgement, that is, whether Person A was judged more or less responsible than Person B in the testimonies that the participants provided. Therefore, we computed relative message responsibility and relative recall responsibility scores based on participants' descriptions of the incident and the two target persons: The responsibility score that was given to Person A was subtracted by the

score that was assigned to Person B (A–B), resulting in a new scale ranging from -10 (maximum relative responsibility of Person A) to +10 (maximum relative responsibility of Person B). Intercoder correlations for these difference measures were sufficiently high, for message protocols, $r(75) = .82, p < .001$ and for recall protocols, $r(75) = .79, p < .001$. The means derived from both coders' difference measures for message and recall were the main DVs for the subsequent analyses.

To investigate if there was a correlation between the accuracy and the magnitude of the evaluative bias in the protocols, we computed our standard unipolar measure for the magnitude of the audience-congruent responsibility bias (see, e.g. Echterhoff et al., 2005). To obtain this measure, the responsibility scores in the 'Person A is responsible'-judgement condition were multiplied by -1 whereas responsibility scores in the 'Person A is not responsible'-judgement condition remained unchanged. Thus, the more the tone of a protocol was evaluatively biased in the direction of the audience's evaluation the more positive this unipolar bias score became (see Echterhoff et al., 2005, 2008).

Accuracy Coding. Following standard practice of eyewitness memory research we also assessed the accuracy of information in participants' recall protocols. We coded the protocols for accurate reproductions based on the procedure used by Memon, Wark, Holley, Bull, and Koehnken (1996; also see Kopietz et al., 2009). Idea units from participants' recall protocols were classified as either correct reproductions (i.e. units representing details or elements that were clearly present in the video) or errors (i.e. units representing details or elements that were clearly not present in the video). For the analyses, we computed a combined measure by deducting errors from correct details. For example, the sentence 'Person A (1) was sitting (1) alone (1) at a table (1)' incorporates four correct details. We note that the coding for recall accuracy did not take into account evaluative direction or

valence. Thus, this coding does not capture whether information was consistent or inconsistent with the audience's judgement.

Two independent coders blind to experimental conditions each rated half of the recall protocols that were randomly assigned to them. Ten recall protocols were scored by each coder to assess intercoder reliability. The correlations of the overall accuracy scores between the two coders were high, $r(8) = .96, p < .001$.

Results and Discussion

All statistical tests are two-tailed, unless reported otherwise.

Message Responsibility and Recall Responsibility. As expected, participants tuned their messages towards the audience's judgement (see Table 2, message column). An ANOVA with the relative message responsibility as DV revealed a main effect of audience judgement, $F(1, 73) = 4.22, MSE = 9.75, p = .043, \eta_p^2 = .055$; that is, participants described the incident in a way that Person A was relatively more responsible when they communicated with an audience who thought that Person A was responsible (vs. not responsible) for what happened. Thus, the participants' communication about a forensically relevant event was tuned in the direction of their audience's opinion. No effects emerged for ostensible completeness and the interaction, all $F_s < 1.01, ns$.

Importantly, in the free recall participants also remembered the original material biased in the direction of their audience's responsibility judgement (see Table 2, recall column), as indicated by a significant main effect for audience's judgement, $F(1, 73) = 5.85, MSE = 8.02, p = .018, \eta_p^2 = .074$. Thus, participants not only tuned their communication to suit the audience judgement, but also biased their testimonies in the direction of their initial communication. Again, there was no main effect for completeness, $F(1, 73) = 1.89, p = .173$ and no interaction effect, $F < 1$.

Mediation Analysis. As in Experiment 1, we examined a possible mediation of the audience-judgement effect on responsibility in the free recall by message responsibility. All conditions suggested by Baron and Kenny (1986) were met (see Figure 2): (1) The evaluative tone in subjects' free recall of the incident (their responsibility attributions in the free recall format) was significantly related to the audience's judgement, $\beta = .27$, $t(75) = 2.05$, $p = .019$; (2) participants tuned their description of the incident towards the audience's judgement, $\beta = .23$, $t(75) = 2.40$, $p = .044$, and (3) the responsibility attributions expressed in the message to the audience were associated with the ones in the free recall, $\beta = .64$, $t(75) = 7.17$, $p < .001$. Importantly, when (4) the audience's judgement (contrast-coded: Target Person A is responsible = -1, Person A is not responsible = +1) and the difference measure of the message's valence (A-B) were both included as predictors of recall responsibility (difference measure: A-B), only the message responsibility as predictor remained statistically significant, $\beta = .61$, $t(75) = 6.70$, $p < .001$, whereas the effect of audience judgement was reduced to non-significance, $\beta = .13$, $t(75) = 1.40$, $p = .165$. The indirect effect was significant in the Sobel test, $z = 1.94$, $p = .026$ [one-tailed] (see Sobel, 1982) and in the bootstrapping procedure (see Preacher & Hayes, 2004) with 10 000 resamples which yielded a 95% CI around the indirect effect, $ab = .407$, excluding zero (.02-.85). These findings suggest that the effect of the audience's judgement on recall was mediated by participants' message, which reflected the audience's opinion.

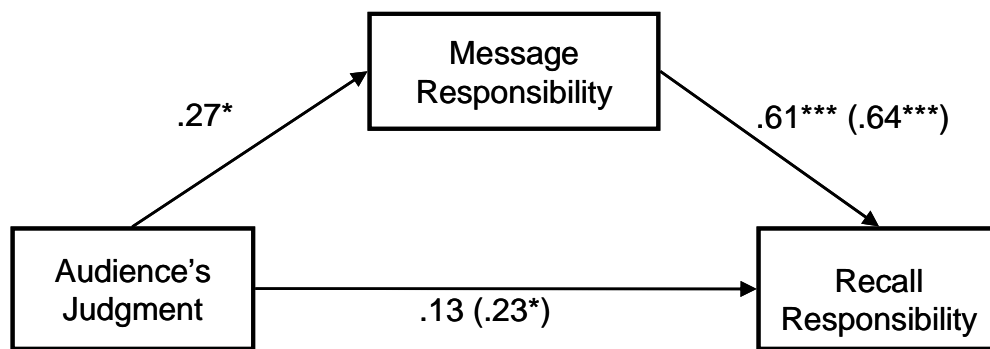


Figure 2. Experiment 2: Mediation analysis with the audience's responsibility judgement toward Target Person A (contrasting responsible [-1] and not responsible [+1]), message responsibility (A-B) as the mediator, and recall responsibility (A-B) as the DV. Path coefficients are standardized coefficients from (multiple) regression analyses. The numbers in parentheses represent the direct effect (bivariate β -coefficients) of each of the two predictors (audience judgement and message responsibility) on recall responsibility before the respective other predictor was included. $*p < .05$, and $***p < .001$.

Table 2. Experiment 2: Message and Recall Responsibility as Functions of Audience Judgement and Ostensible Completeness of the Video

Ostensible Completeness of Video	Protocol							
	Message				Recall			
	Audience Responsibility Judgement							
	A not responsible		A responsible		A not responsible		A responsible	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Complete	-0.97	3.50	-2.75	2.98	-0.50	3.25	-1.70	2.73
Incomplete	-2.00	3.32	-3.15	2.68	-1.03	2.76	-2.95	2.59

Note. Message and recall responsibility scores each are the relative ratings of the attributed responsibility to both Target Persons (A–B) based on the mean ratings of two independent coders on bipolar 11-point scales ranging from -5 (extremely responsible) to +5 (extremely not responsible). Thus, more negative values reflect a relatively higher responsibility attribution to Target Person A.

Recall Accuracy. To examine if there were any differences between the experimental conditions regarding the accuracy of the protocols we calculated an ANOVA based on our accuracy measure (see Procedure), which revealed neither a significant main effect nor an interaction effect, all $F_s < 1$, ns . More importantly, there was also no statistically significant correlation between the combined recall accuracy score and the recall responsibility bias, $r(75) = .12$, $p = .285$. Apparently, the evaluative bias in free recall was not associated with the accuracy of recalled pieces of information about the video. This finding is consistent with evidence from saying-is-believing studies with verbal input material (Echterhoff et al., 2008).

Experienced Shared Reality. We explored a potential moderation of the effect of message responsibility on recall responsibility by participants' experienced shared reality. Consistent with common practice (see Aiken & West, 1991), we first centred the two continuous predictors (message responsibility and experienced shared reality) by a z-transformation, computed an interaction term by multiplying both predictors, and calculated a hierarchical multiple regression on recall responsibility.

We found a significant interaction of Message Valence X Experienced Shared Reality, $\beta = .22$, $t(73) = 2.35$, $p = .022$. We further examined this interaction using simple-slope tests at one standard deviation below and above the mean for both continuous variables (see Aiken & West, 1991). The effect of message valence was stronger when participants scored high on the experienced shared reality, $B = 2.21$, $SE = 0.29$, $t = 7.53$, $p < .0001$, than when they scored low on the experienced shared reality, $B = 1.08$, $SE = 0.42$, $t = 2.57$, $p = .012$ (see Figure 3). According to Aiken and West (1991), the two simple slopes differ from each other to the extent to which the coefficient of the product from the multiple regression analysis is significant, $t(73) = 2.35$, $p = .022$.

The 2X2 ANOVA with the index of experienced shared reality as DV yielded no main or interaction effects, all F s < 1, *ns*. Thus, there was no evidence that participants' experienced shared reality with the audience was affected by the audience's responsibility judgement or the ostensible completeness of the video coverage.

In sum, Experiment 2 replicates and extends Experiment 1, which showed a saying-is-believing effect for complex visual material. Participants, taking the role of eyewitnesses described the witnessed incident in an audience-congruent manner, and later recalled the event based on their audience-tuned description. As in Experiment 1 and consistent with previous findings (Higgins & McCann, 1984) the audience-judgement effect on recall was mediated by participants' message. The audience-tuning effect on subsequent recall in Experiment 2 was independent of participants' belief regarding the completeness of information they received. The association between message and recall was stronger for participants who experienced a higher shared reality with their audience.

For the reasons outlined above, the shared-reality measures were placed in between message production and free recall. We acknowledge that while this placement seemed to be the most reasonable in the present paradigm, it may have drawn participants' attention towards the possibility of adapting their own judgement with that of their audience. However, this issue does not seem to pose a serious challenge to the contribution of the present research. First of all, the saying-is-believing effect for visual input material was already found in Experiment 1, which did not employ the shared-reality measure. Furthermore, given that the measure of experienced shared reality consisted of explicit, self-report rating items, one would expect that assumptions or inferences arising from completing these items are explicit and declarative as well. However, as reported above, less than 4% of the participants formulated corresponding guesses in the post-experimental suspicion check.

In a recent study, Kopietz et al. (2009) found that tuning event retellings towards a co-witness's attitude about the likeability of a suspect shapes eyewitnesses' memory and judgement. It is possible that co-witnesses judge a suspect on the likeability dimension, reflected by utterances like 'the person seemed quite nice'. However, for forensically relevant events, be it a car crash or a violent brawl, a responsibility judgement is more relevant and common. People are fundamentally driven to determine the causes of events (e.g. Heider, 1958), and this tendency is especially pronounced for unusual, negative events (Bohner, Bless, Strack, & Schwarz, 1988). Indeed, witnesses often interpret incidents and the behaviours of the persons involved in terms of responsibility (see Brewer, 1977; Shaver, 1985). Hence, the use of a responsibility judgement as the audience's position in Experiment 2 substantially increases the ecological validity and applied relevance of the present approach.

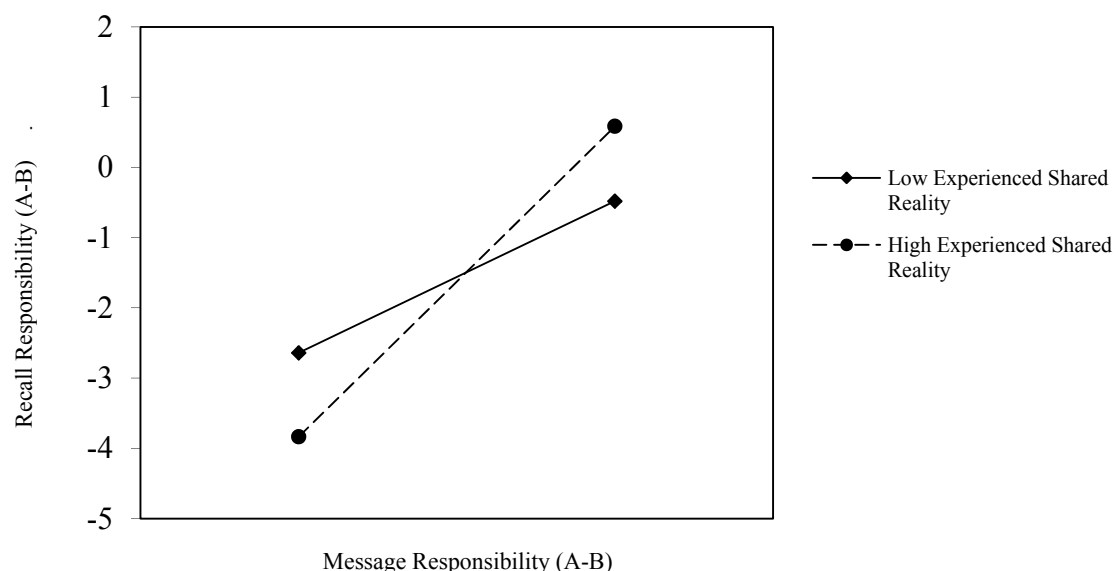


Figure 3. Experiment 2: Experienced shared reality moderating the effect of message responsibility on recall responsibility. Experienced shared reality and message responsibility were based on z-transformed scores.

General Discussion

In two experiments, we found a saying-is-believing effect (Higgins & Rholes, 1978) with visual input information, presented in the form of a video clip depicting ambiguous behaviours of a target person (Experiment 1) and an ambiguous event (Experiment 2). After participants had tuned their messages describing the video to their audience's judgement about the target, their own evaluations of the target, elicited by free recall of the video, were biased towards the audience's position. The effect of the audience's judgement on recall was statistically mediated by the amount of message tuning, indicating the critical role of verbal communication in the effect. Experiment 2 extended the approach to forensically relevant events. It yielded additional evidence regarding the underlying mechanism: The message-recall correlation was significantly higher for communicators who experienced a greater (*vs.* lower) shared reality with their audience (see Echterhoff et al., 2009).

Importance of the Extension to Visual Material

The present studies extend previous research on audience-tuning effects, which has employed text material. This extension is important for several reasons. The findings suggest that the creation of a shared reality through communication can be sufficiently powerful to override potential effects of impression formation from nonverbal, visual information. As several lines of research suggest, visually based impression formation about social targets is often characterised by high speed, confidence, robustness, and intersubjective consensus (e.g. Ambady et al., 2000; Ambady & Rosenthal, 1993; Todorov et al., 2005). If one assumes that such processes can be elicited in the present saying-is-believing paradigm, then one might expect them to constrain the saying-is-believing effect. By this view, 'seeing is believing' would leave no room for saying is believing. However, the present studies provide clear evidence for the saying-is-believing effect despite these potential constraints.

This evidence supports the prediction from shared-reality theory, which holds that people's motivation to create a shared reality with a communication partner about social events should be sufficiently high to produce saying-is-believing effects across different modalities and types of input material. In our studies, the impact of shared-reality creation was arguably so strong that potential effects of other processes of impression formation from visual information did not take precedence. Finding the effect when participants learned about the audience's responsibility judgement after witnessing the incident in Experiment 2 testifies to the strength of the motivation to share reality. Thus, even when participants could form evaluations of the target independent of their audience's judgement during observation, they subsequently aligned their evaluations with the audience's evaluation. This finding suggests that the influence of sharing reality was sufficiently powerful to override initial evaluations (also see Kopietz et al., 2010).

Furthermore, compared to verbal descriptions, video-filmed material is closer to naturally observed 'raw' behaviours (see Fiedler & Schenck, 2001). Behaviours are captured to a greater extent as 'originally perceived' by video-filmed sequences than by text passages. Verbal descriptions have already undergone various transformations and are loaded with linguistic presuppositions, connotations, and attributional biases (e.g. Semin & Fiedler, 1988). Extending research on audience tuning and its effects on subsequent memory to nonverbal input information therefore increases the face validity and external validity of this body of research. After all, in everyday life, people predominantly observe and interact with others face to face in social environments.

Due to the modality of the input material, the present experiments also provide more compelling evidence than did previous studies to rule out a potential alternative explanation of audience-tuning effects on memory. In all previous studies, which relied on written input material, the audience-tuning effect could be facilitated by confusions between the original

information about the target and the audience-tuned information (for a discussion, see Echterhoff et al., 2008). By this view, communicators may recall what they have said, rather than what they originally read, because both types of information consist of text and thus have similar features. This similarity can make effective source monitoring difficult, that is, interfere with a successful discrimination between information from two different sources (see Johnson, Hashtroudi, & Lindsay, 1993). Notably, such source confusions are less likely with visual (vs. verbal) input material because visual material is less similar to the audience-tuned verbal message. Hence, the present evidence is less easily reconciled with a source confusion account than are previous findings.

Relation to Studies of Social Influence on Event Memory

There is now ample evidence that memory for observed events is susceptible to social influence (Gabbert et al., 2003; Roediger, Meade, & Bergman, 2001; Skagerberg & Wright, 2008; for reviews see Echterhoff & Hirst, 2009; Wright, Memon, Skagerberg, & Gabbert, 2009). In classic studies on postevent misinformation participants falsely remember seeing items like tools or soft drinks, which were not present in the original event but merely suggested by an interviewer (for a review, see Loftus, 2005). Also, it has been shown that a witness's event memory can be influenced by a co-witness who claims the existence of event details like a piece of jewellery that an observed person was presumably wearing (e.g. Gabbert et al., 2003). In these demonstrations people receive, often false or biased, information about an observed event from social sources and subsequently incorporate this information into their own memory representation of the event.

The present type of influence differs from this prominent line of research in two main respects. First, the influence in our studies is based on an evaluative judgement (about likeability or responsibility), not on details, items or single pieces of event information such as a tool, soft drink, or piece of jewellery. Our studies were not designed to reveal whether

single pieces of event memory were false or correct; rather, they were designed to detect a higher-level, holistic evaluative bias in participants' free recall (for a related distinction, see Brainerd & Reyna, 2002).

Second, the person who is influenced in our studies is the sender, or speaker, not the recipient, or audience, of communication. Our studies show that memory for observed events can also be influenced through active, self-produced communication. The possibility that speakers' memory can be biased by their own communication about the original event is arguably less prominent in people's lay theories about memory than is the notion that speakers may bias others' (i.e. recipients') memory. People may suspect being unduly influenced when another person provides her or his version of a jointly experienced event. In contrast, they may not suspect that their own talking about the past may exert unwanted influences. We note that previous studies on the influence of actively communicated or self-generated information (e.g. Lane & Zaragoza, 2007; Marsh, Tversky, & Hutson, 2005; Pickel, 2004; Schooler & Engstler-Schooler, 1990) assessed the accuracy of item memory, not higher-level biases that were the focus of our research.

Appreciating the specific type of influence that we have examined is also useful for understanding two null effects obtained in the present studies. First, in Experiment 2, the evaluative recall bias was not significantly correlated with measures assessing the accuracy of item memory, including the amount of accurate reproductions from the video-filmed incident. This finding is not surprising given the distinction that we have drawn above. Even when an eyewitness's memory report contains relatively many correct event details, it may still be evaluatively biased for or against a suspect. Conversely, the mere lack of an evaluative bias in a memory report does not guarantee that the report contains many correct event details. In other words, single details in a testimony might be objectively correct, but the testimony as a whole can still reflect a co-witness's beliefs about the witnessed incident.

Second, the presumable completeness of the video depicting the incident did not affect the evaluative recall responsibility in Experiment 2. This null finding is not surprising either in light of the above distinction: Whereas the independent variable, ostensible completeness, refers to pieces of information or event details, the dependent variable, the evaluative tone in the recall, refers to a higher-level appraisal of a suspect in the incident. No matter whether participants believe that the video provides them with complete or incomplete information about the event, they are still faced with the ambivalence of the targets' behaviours. In other words, believing that the video coverage was highly exhaustive does not dispense with the uncertainty regarding the evaluation, specifically the responsibility, of the target persons.

As this discussion indicates, the uncertainty regarding the informational basis about an event, which affects the susceptibility to social influence on memory (see Bless et al., 2001), should be distinguished from the uncertainty regarding the evaluation of the event, which underlies epistemic needs and the creation of shared reality through audience tuning (Kopietz et al., 2010). Finding no effect of the video's ostensible completeness on our index of experienced shared reality is consistent with this view. These considerations suggest future studies that examine whether the hypothesised types of uncertainty differentially affect the creation of shared reality in communication.

Applied Relevance and Future Perspectives

Eyewitnesses face high demands. Incidents for which eyewitness testimony is sought, such as accidents or crimes, are often characterised by high degrees of complexity, speed and unexpectedness, and can cause discomfort and stress in the witness. Under such circumstances clear and truthful testimony is difficult to achieve. Still, eyewitness testimony can be highly important, especially when it is the only source of evidence. Hence, in an eyewitness context, the epistemic needs to reduce uncertainty, to achieve a clear and reliable

representation of the event, and to reach cognitive closure (Webster & Kruglanski, 1997) should be particularly high. Eyewitnesses should embrace options to fulfil these epistemic needs, including the creation of a shared reality with others, for instance co-witnesses, by means of communication.

In the present studies, the critical role of verbal communication was indicated by the findings of statistical mediation analyses, specifically evidence for mediation of the audience-judgement effect on recall by the message communicated to the audience. We acknowledge, however, that this finding is correlational in nature and therefore does not provide the most rigorous evidence for the causal contribution of message production. Future research should attempt an additional, experimental test of whether the effect depends on message production by including a control condition in which participants prepare to communicate, but do not actually produce their message (see Higgins et al., 2007; Higgins & Rholes, 1978).

The findings reported here and related effects warrant preliminary recommendations for forensic practice: Legal practitioners should be aware that eyewitnesses' memory reports and judgements can be affected not only by information communicated to these witnesses by others, but also by telling someone else about the witnessed event. As a general recommendation, investigators should try to conduct an interview with a witness as soon as possible after an event and before the witness converses with anyone else (also see Gabbert, Hope, & Fisher, 2009). Given the role of shared reality in the phenomenon, unwanted biases from event retellings are more likely when eyewitnesses talk to someone who qualifies (*vs.* does not qualify) as an appropriate partner for creating a sheared reality. Members of one's in-group, trustworthy co-witnesses, or close friends should be granted this quality.

Appendix A

Experiment 1: Descriptions of the original target information (film scenes).

1. Michael, a young adult male, skims through a leaflet by a discount supermarket chain. Thereupon he opens his wallet, and discovers that he does not have any money.
2. Michael waits behind a young female at an ATM. She lost a bill and he runs after it and hands her the bill back. He asks her for her telephone number, but she refuses. He looks disappointed.
3. Michael exits a discount supermarket (same chain as the leaflet; scene 1) with a full carrier bag.
4. He empties the bag in a kitchen until he gets a phone call. He looks at his watch and then nods.
5. Michael meets a young woman outside, handing her a cup of coffee and indicates the number two with his fingers. The woman looks astounded and gives him a coin.
6. Michael and the female person walk down a street. Michael finds a coin and looks very pleased.
7. The two walk inside a park. Michael runs towards a playground and uses a slide. The female person indicates that he should return to her.
8. The female person throws a sheet of paper in the direction of a bin. She misses the bin but does not care about it. Michael tells her to come back in order to pick up the paper and to throw it into the bin. She does so then.
9. Michael gestures excessively at a memorial stone. The female person is not interested.

Appendix B

Example passages from message and recall protocols (Experiment 1).

Condition (audience judgement)	Origin of Protocol	
	Message	Recall
Positive	“He likes walks in parks but is also interested in small things in his environment and he is well able to grasp them.”	“He is showing zest for life and light heartedness.”
Negative	“His infantile way of dealing with things is apparent; he is spontaneous and makes use of every opportunity to make his mark even if he has to pretend to know something or to be someone.”	“M. seems to be indecisive, but also self-opinionated and childish. He seems to be very egocentric.”

Note. These passages refer to scenes of the video that could be interpreted as either *infantile* or *fun-loving*.

Appendix C

Experiment 2: Descriptions of the original target information (film scenes).

1. Person A sits at a table in a bar, drinks beer, and texts a message on his mobile phone.
2. A young woman enters the bar.
3. As the woman arrives in front of the table of Person A she starts talking to him. He responds and she sits down opposite to him. They talk to each other and start an argument.
4. Three young men enter the bar.
5. The couple is still arguing. The three young men pass the couple's table and take seats at a table to the right of the bar. One of the men gets three beers from the bar for the group.
6. The couple is seen in the foreground again. The argument gets worse, the woman gestures wildly and finally stands up, turns around, and leaves the bar. Person A follows her.
7. Soon, Person A comes back into the bar and returns to his table.
8. The three men watch football on TV and drink beer. They are worried about the way their team is playing. Person B gets upset and bangs with his fist on the table.
9. Now Person A finishes his fourth beer.
10. Person A orders a new beer at the bar. When he takes his wallet out of his trousers a man bumps into him. Person A loses his balance and complains with a lifted arm. The man that bumped into him apologizes to Person A.
11. An unknown man is in a toilette. After washing his hands he shakes his hands and sprays water at Person B. Person B angrily steps back. The "sprayer" apologizes to Person B.
12. Person A goes to the bar to order a new beer. Person B also steps to the bar. While Person A looks for money in his wallet, Person B talks to his friends at the table. The waitress accidentally spills some beer over Person A. Persons A and B have not seen what

had happened and turn to each other quickly. They engage in a short argument. Both of them push each other. Other guests step in between the two and separate them.

Chapter 3

*Linguistic Abstraction Effects on Communicators' Mental Representations*²

² A version of this chapter has been submitted as Hellmann, J. H., & Echterhoff, G. (2011). *Abstracting is believing: When linguistic abstraction shapes communicators' mental representations*. Manuscript submitted for publication to *Social Psychological and Personality Science*. <http://spp.sagepub.com/>

Abstract

Linguistic abstraction is a central dimension in the description of events. We examined whether descriptions of varying abstractness shape communicators' mental representations of observed behaviors. Such communication effects have been shown for other dimensions (e.g., evaluative content in saying-is-believing studies) but not for linguistic abstraction level. Building on shared reality research, we predicted that the association between abstraction in communicated descriptions and subsequent memory (elicited by free recall) would depend on the audience's appropriateness for shared-reality creation (manipulated by membership in the communicator's in-group *vs.* out-group). We found that abstraction level in the descriptions predicted the abstraction level in free recall only when participants communicated with an in-group (*vs.* out-group) audience. The findings suggest that non-shared-reality goals were more prevalent in the out-group (*vs.* in-group) audience condition. In sum, the present study demonstrates an 'abstracting-is-believing' effect, which depended on communicators' shared-reality motivation.

Abstractness (*vs.* concreteness) is one dimension that is of central importance for our cognitive representations (Collins & Quillian, 1969), including mental representations of behaviors and persons (Carlston, 1994). Perceivers often can describe the same event or behavior at varying levels of abstractness (e.g., Semin & Fiedler, 1988, 1991). Assume, for example, a perceiver observes a schoolyard scene in a low-income neighborhood in which the boy Jack quickly extends his leg so that his foot touches a girl's ankle. This event can be described rather concretely ("Jack kicks the girl") or more abstractly ("Jack dislikes the girl" or "Jack is aggressive"). Such linguistic abstraction has caught the attention of social psychologists for several reasons. On the one hand, abstraction may reflect a speaker's expectancies regarding the observed actors, including expectancies based on the actor's category membership (e.g., Maass, Milesi, Zabbini, & Stahlberg, 1995; Wigboldus, Semin, & Spears, 2000). In the example, the dispositional description "Jack is aggressive" may convey, without the speaker intending to do so, stereotypic expectations based on categories like "male", "young", or "working class". On the other hand, linguistic abstraction can also be used intentionally as a tool to portray actors positively or negatively (Douglas & Sutton, 2003), or to explain events to a novice (Fiedler, Bluemke, Friesse, and Hofmann, 2003). In a study by Douglas and Sutton (2003, Exp. 1), for example, participants chose more abstract descriptions for positive behaviors of their friends and negative behaviors of their enemies than for negative behaviors of their friends or positive behaviors of their enemies. Thus, speakers can employ linguistic abstraction as a communicative tool for reaching interpersonal goals, such as downplaying negative behaviors performed by liked individuals.

The linguistic category model (LCM; Semin & Fiedler, 1988, 1991) introduced four different linguistic categories that vary on the abstraction level regarding the description of behaviors: While descriptive action verbs (DAV) represent the most concrete category and simply refer to the behavior shown in a specific situation, interpretative action verbs (IAV)

are used for a more general description of behavioral actions. State verbs (SV) indicate a psychological state without directly referring to the single behavioral episode in question. The highest level of linguistic abstraction in the LCM is represented by adjectives (ADJ) which refer to stable personality characteristics or dispositions of a person. Usually, the more abstract a behavior is described the more it is attributed to stable personality characteristics of the performing individual and less to the specific situation (for a recent overview, see Semin, 2012).

We conducted the present research to investigate an important possible consequence of linguistic abstraction in communication about actors' behaviors: the impact on the speaker's own subsequent thinking about the actor. In other words, we examined whether descriptions of varying abstractness can lead similar mental representations of behaviors in communicators. Such effects of verbalization have been shown for other dimensions (e.g., evaluative content in saying-is-believing studies) but not for linguistic abstraction level.

Communication and Verbalization Effects on Communicators' Cognition

Numerous studies using different paradigms have shown that people's mental representations of an experience can be profoundly shaped by how they verbally describe the experience to others (e.g., Adaval & Wyer, 2004; Echterhoff, Higgins, Kopietz, & Groll, 2008; Hellmann, Echterhoff, Kopietz, Niemeier, & Memon, 2011; Higgins & Rholes, 1978; Tversky & Marsh, 2000; for reviews, see Chiu, Krauss, & Lau, 1998; Marsh, 2007). In studies using the saying-is-believing paradigm, for example, participants usually first receive an essay containing ambiguous behaviors of a target person and are then asked to describe this target for an audience who either likes or dislikes the target. The results obtained in these experiments typically show that participants tune their description (i.e., the message) to match the audience's attitude toward the target. Critically, participants' subsequent judgments about the target and their own memory for the original information about the

target are consistent with their previous message and thus audience-congruent as well. By now, this audience-tuning effect on communicators' subsequent cognition and memory has been replicated in numerous studies (for reviews, see Echterhoff, Higgins, & Levine, 2009; Higgins, 1992).

In the area of linguistic abstraction audience characteristics such as group membership have been taken into account for descriptions of behavioral events or participants' own political views (e.g., Douglas & McGarthy, 2001; Fiedler et al., 2003; Rubini & Sigall, 2002; Wigboldus, Spears, & Semin, 2005). Rubini and Sigall (2002), for example, discovered that individuals who wanted to be liked described their own political view more abstractly to an audience that shared their political view as compared to an audience of several people with mixed political attitudes. However, effects of linguistic abstraction on subsequent mental representations of the described events have not yet been demonstrated.

Building on shared-reality research, we predicted that the association between abstraction in communicated descriptions and subsequent memory depends on the audience's appropriateness for shared-reality creation, specifically, the audience's membership in the communicators' in-group vs. out-group. Shared reality theory (Hardin & Higgins, 1996), recently reformulated by Echterhoff et al. (2009), provides an explanation of audience-tuning effects by considering participants' effort to elaborate a shared reality with their audience. The authors define shared reality as the experience of a commonality with others' inner states about the world. Within the saying-is-believing paradigm, this experience corresponds to the achievement of a common understanding and evaluation with the audience about the original target information.

The occurrence of the saying-is-believing effect appears to depend on the motives of the speakers, in particular, whether they are motivated to create a shared reality with the

audience. To demonstrate the role of shared-reality motivation in the saying-is-believing effect, Echterhoff and colleagues (2008) asked German participants to describe the target person to a Turkish audience (a minority out-group in Germany) or to a German audience. Both the Turkish audience and the German audience either liked the target or disliked him. Participants in both the in-group-audience and out-group-audience conditions tuned the evaluative tone of their descriptions of the target to their audience's attitude. Importantly, however, there was no saying-is-believing effect after communicating with the out-group audience. According to Echterhoff et al. (2008), the key difference was in the motive underlying audience tuning: Creating a shared reality with a German in-group audience versus complying with (politeness, egalitarian) norms with the Turkish out-group audience.

On the level of linguistic abstraction, communicators should also be motivated to create a shared reality only with an audience they perceive as appropriate for the formation of a common view. In other words, they should only be motivated to create a shared reality with an audience from the in-group (*vs.* out-group). Still, when individuals want to experience a commonality with the other's inner states about the world, they might intend to make a communication task as easy as possible for their (in-group) audience, but should also utilize the abstraction level of their descriptions for the formation of mental representations regarding the events described.

The Present Research

The present study examined whether and when the degree of abstraction in communicators' mental representations of behavioral events depends on the degree of linguistic abstraction used by communicators in describing the events. Regarding the "when" question, we manipulated the group membership of the audience to which communicators addressed their description. We presented the audience either as in-group or as out-group member. The in-group member was a regular German student whereas the out-group member was presented

as a German member of a student fraternity. Student fraternities are seen highly critical by regular German students who usually lack motivation to be obliging towards members of fraternities. In contrast, typical German students are motivated to be polite towards foreign members of society (e.g., Echterhoff et al., 2008). We intended to avoid a potential confound of out-group membership with language comprehension by introducing a native German fraternity member as out-group audience.¹

The degree of abstraction was assessed based on the LCM (Semin & Fiedler, 1988). We elicited the communicators' mental representations by means of a standard free recall task, which requires a verbal report of one's memory. Because both the communicated description and free recall came in verbal format, we could use the LCM-based coding for both variables.

Our main prediction was that participants would use the level of linguistic abstraction for the formation of their own mental representations only when they selected descriptions for the in-group audience. This pattern should not occur when participants described events for a member of the out-group.

Method

Participants and Design. The experiment consisted of a 2(audience's group membership: in-group vs. out-group) X 2(behavior valence: positive vs. negative) mixed design, with the former as between-participants factor. In total, $N = 46$ participants completed the experiment, with a mean age of 25.63 years ($SD = 5.00$). Three participants did not indicate their gender, 15 were male, 28 female. The data of one participant who remembered less than three events were excluded from the analyses, resulting in the sample described above. None of the participants indicated to be a member of a student fraternity.

Materials and Procedure. The experiment was administered online, using an online survey platform. Participants were asked to provide demographic information including their

mother tongue. After that, information about the experiment was presented: Participants learned that they were going to see illustrations depicting actions of a person (Person A). There were four different descriptions underneath each picture of what Person A was doing. The degree of abstraction varied for each picture according to the LCM (Semin & Fiedler, 1988) from the very concrete descriptive action verbs to the abstract category of adjectives (also see, e.g., Douglas & Sutton, 2003). Participants were instructed to select one of these descriptions for their audience, whose task in turn would be to identify the correct picture on the basis of the description selected by the participant. Participants learned that their audience did not know the descriptions. There were 4 images with positive and 4 images with negative actions each (for examples, see Appendix).

After that, participants filled out the Self-Construal Scale (Singelis, 1994; German translation by Hannover, Kühnen, & Birkner, 2000) which consists of subscales on independent and interdependent self-construal. Next, participants indicated how much they wanted the audience to be able to choose the correct picture and to what extent they adapted the descriptions toward the audience, each on a 7-point scale (1 = 'not at all'; 7 = 'very much'). For the analysis, the composite of these two items was used. Another question referred to how much participants thought that the audience was similar to them, also on a 7-point scale.

For the surprise free recall task, eight short text boxes were provided and participants were asked to remember the content of the pictures from the beginning of the study and type into the boxes what they have seen in the beginning of the study. The interval between the descriptions and the recall task was about five minutes. In the end, participants were given the opportunity to provide comments, they were debriefed, and an email address was presented for any remaining questions about the experiment. Participants were free to generate a code for which they would receive partial course credit in exchange.

Results

Results are two-tailed except when noted otherwise.

Abstracting-is-Believing Effect. We calculated the mean abstraction levels of descriptions and recalls. Next, we performed a moderation analysis of audience's group membership between mean description abstraction and mean abstraction in recall. We centered the description abstraction by z -transformation. Next, we calculated the product of condition [contrast coded: in-group audience: -1; out-group audience: +1] and description abstraction and calculated a hierarchical multiple regression on recall abstraction. The overall relationship between description abstraction and recall abstraction was revealed, $\beta = .311$, $t(42) = 2.173$, $p = .035$. Importantly, we found a significant interaction of Description Abstraction X Audience Group Membership, $\beta = -.463$, $t(42) = -3.405$, $p = .001$. We probed this significant interaction using simple-slope tests with one standard deviation below and above the mean for description abstraction (see Aiken & West, 1991). These simple-slope tests confirmed that there was only a significant relationship between description and recall abstraction in the in-group audience condition, $B = 0.458$, $SE = 0.126$, $t = 3.651$, $p = .001$. There was no such relationship in the out-group audience condition, $B = -0.101$, $SE = 0.106$, $t = -0.955$, $p = .345$ (see Figure 1).

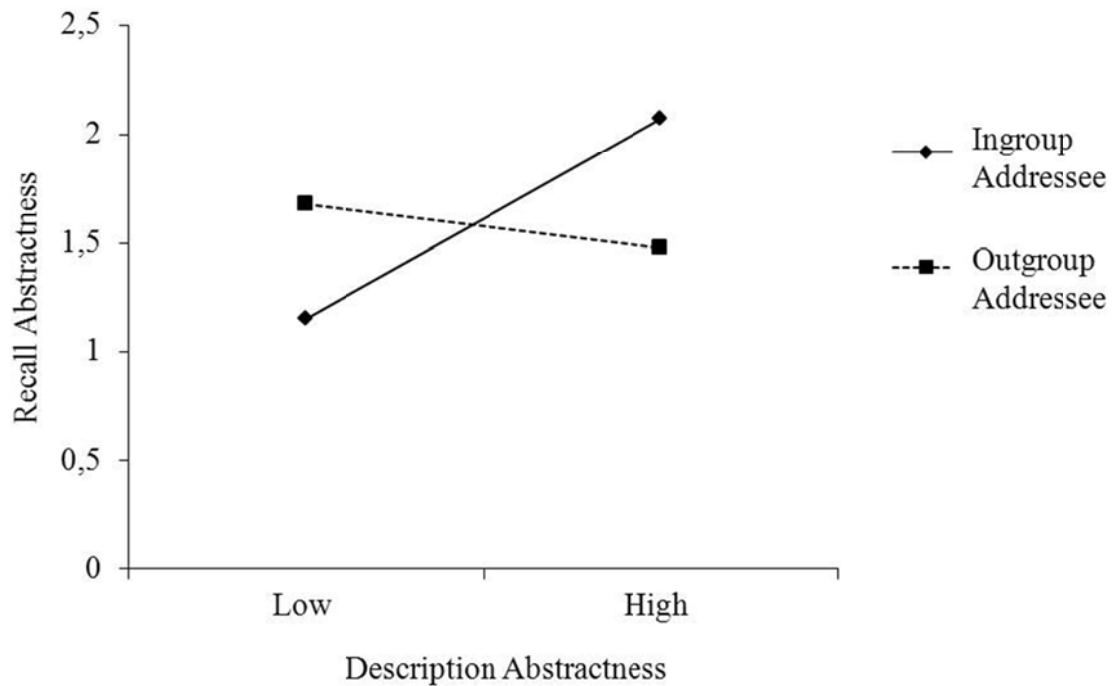


Figure 1. Group membership moderating the effect of mean description abstractness on mean recall abstractness. Mean description abstractness and mean recall abstractness were based on z-transformed scores.

When this moderation analysis was calculated for positive and negative events separately, the same pattern of results emerged: For the negative events, the Description Abstraction X Audience Group Membership-interaction was significant, $\beta = -.425$, $t(42) = -3.127$, $p = .003$. Only the simple slope in the in-group audience condition was significant, $B = 0.453$, $SE = 0.132$, $t = 3.426$, $p = .001$, whereas the slope in the out-group audience condition was not, $B = -0.107$, $SE = 0.121$, $t < -1$, *ns*. Also for the positive events, the interaction was significant, $\beta = -.329$, $t(42) = -2.214$, $p = .032$. Again, the relationship was only significant in the in-group audience condition, $B = 0.392$, $SE = 0.161$, $t = 2.439$, $p = .019$, but not in the out-group audience condition, $B = -0.066$, $SE = 0.131$, $t < -1$, *ns*.

In addition to the calculations at the aggregated level, we examined the association between the linguistic abstraction in the communicated description and free recall at the

level of single items. Because we were interested in the potential change of abstraction level between description and recall and not so much the direction of change, we calculated the mean for every participant based on the *absolute* change values. Change of abstraction level was lower in the in-group audience-condition ($M = 0.369$, $SD = 0.438$) than in the out-group audience-condition ($M = 0.658$, $SD = 0.754$) on a marginally significant level, $t(44) = 1.593$, $p = .059$ [one-tailed], $d = 0.470$.

Effects of Audience's Group Membership and Behavior Valence. We also explored whether linguistic abstraction differed depending on the audience's group membership and the valence of the observed behaviors. A 2(audience's group membership: in-group vs. out-group) X 2(behavior valence: positive vs. negative) mixed analysis of variance (ANOVA) with level of abstraction as dependent variable (DV) revealed a significant main effect of valence. Positive actions were described in a more abstract way ($M = 1.630$, $SD = 0.390$) than negative actions ($M = 1.478$, $SD = 0.550$), $F(1, 44) = 6.916$, $p = .012$, $\eta_p^2 = .136$. We also found a significant interaction, $F(1, 44) = 5.081$, $p = .029$, $\eta_p^2 = .104$. Pairwise comparisons showed this significant effect of valence in the out-group audience condition only, $F(1, 44) = 11.929$, $p = .001$, $\eta_p^2 = .213$, but not for the in-group audience, $F < 1$, *ns* (see Table 1, left panel). There was no significant main effect on the between subject factor.

Two coders also rated the level of abstraction for each free recall based on the LCM (Semin & Fiedler, 1988), blind to the respective audience condition. The interrater-correlation was high, $r(268) = .964$, $p < .001$, so the mean of the ratings was used for the subsequent analyses. We analyzed the recall of the events using a mixed ANOVA. Overall, positive actions were remembered in more abstract terms ($M = 1.778$, $SD = 0.699$) than negative actions ($M = 1.436$, $SD = 0.657$), $F(1, 43) = 31.253$, $p < .001$, $\eta_p^2 = .421$. There was neither a significant effect involving audience's group membership nor an interaction effect, $F_s < 1$ (see Table 1, right panel).

Table 1. Linguistic Abstraction in Description and Recall as Function of the Audience's Group Membership

Audience Group Membership	description				recall			
	positive		negative		positive		negative	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
in-group	1.59	0.35	1.57	0.52	1.78	0.68	1.45	0.59
out-group	1.67	0.43	1.39	0.57	1.77	0.73	1.43	0.73

Interdependent and Independent Self-Construal. On the level of interdependence, participants who chose descriptions for the out-group audience indicated to be more interdependent ($M = 4.471$, $SD = 0.475$) than participants who selected descriptions for the in-group audience ($M = 4.196$, $SD = 0.593$), $t(44) = 1.737$, $p = .045$ [one-tailed], $d = 0.512$. There was no difference on the level of independent self-construal, $t < 1$, *ns*.

Perceived Similarity. Participants perceived the in-group audience ($M = 4.044$, $SD = 1.224$) as more similar to themselves than the out-group audience ($M = 2.913$, $SD = 1.379$), $t(44) = 2.940$, $p = .005$, $d = 0.867$.

Intention to Adapt. Participants intended to adapt their descriptions towards the in-group audience ($M = 4.717$, $SD = 0.939$) to a greater extent than towards the out-group audience ($M = 3.935$, $SD = 1.667$), $t(44) = 1.961$, $p = .028$ [one-tailed], $d = 0.578$.

Recall Performance. A mixed ANOVA with group membership as between-participants variable and valence of events as within-participants variable on amount of recalled events as DV did not reveal any significant effects, all F s < 1 , *ns*. Thus, there was no evidence that participants in one of the conditions remembered more aspects than those in the other condition.

Discussion

With the present experiment, we could demonstrate for the first time that individuals may use the level of language abstraction from descriptions of events to construct mental representations of these events, that is, we found an 'abstracting-is-believing effect'. Moreover, the effect only appeared when the audience was from the in-group: Thus, participants relied on the abstraction level from the descriptions they chose in the formation of their mental representations of the events only when their communication partner was perceived as sufficiently appropriate for the construction of a shared view (see Echterhoff et al., 2009). In the out-group audience condition, participants altered the level of linguistic abstraction in their descriptions depending on valence, without remembering the scenes accordingly. These results suggest, that participants in the out-group audience condition intentionally applied linguistic abstraction levels to the descriptions, thus, displayed the presence of non-shared-reality goals in this condition.

By presenting a distinct feature of the out-group member (i.e., membership in a student fraternity) but nothing alike about the target persons, participants in the out-group audience condition may have inferred that the target persons were part of the in-group. They were presumably more sensitive to an unfair or dispositionally negative depiction of the targets when they communicated with the fraternity audience. Participants may thus have been motivated to shield the target persons engaged in negative actions against the out-group audience in their descriptions and therefore described negative actions in a more concrete way than positive actions. In the in-group audience condition participants might not have thought about the target persons' specific group membership. Apparently, without deliberately considering the abstraction levels in the descriptions, these participants also wanted to facilitate the task for their (in-group) audience and did not switch between abstraction levels in the descriptions.

Overall, participants recalled negative events in more concrete terms than positive events. Memorizing negative events in relatively more concrete terms may well account for the expectation of negative events occurring less frequently than positive ones. In line with this reasoning about the recall result pattern it is known that individuals usually expect positive behaviors of other people or, in other words, people expect other people to be good. The person-positivity bias (Sears, 1983) refers to the tendency of individuals holding mainly positive evaluations of other persons by default. Additionally, negative actions stand out to a greater extent than positive actions and negative stimuli are generally construed in a more differentiated way (see Rozin & Royzman, 2001).

More concrete descriptions are associated with behavior that occurs in specific events rather than generally and frequently due to human nature (see Wigboldus & Douglas, 2007). Remembering negative actions in relatively more concrete terms can also serve self-protective motives as individuals might come to the conclusion that negative actions do not occur very often. Because we did not specify the target persons by, for example, letting participants think of them as their best friends or worst enemies (see Douglas & Sutton, 2003) it could be that participants in the present experiment did not attribute the depicted behaviors to a single person. To protect themselves from thinking of negative actions occurring frequently, their mental representations of negative events presumably became more concrete.

Participants who described behavioral events for an out-group audience reported to be more interdependent than those who worked with an in-group audience. People who score high on the interdependent self-construal scale perceive themselves as more dependent on other people and depend more on contextual factors for the regulation of behavior (Singelis, 1994; also see Kühnen & Oyserman, 2002). Thus, participants in our experiment have perceived a stronger dependence on contextual factors when dealing with an out-group (*vs.*



in-group) audience which was reflected in their apparently strategic use of abstraction level in the descriptions and underscored by the absence of the abstracting-is-believing effect in this condition. In sum, these considerations suggest that linguistic abstraction in the out-group audience condition was driven to a greater extent by non-shared reality goals than by shared-reality goals.

Outlook and Conclusion

Our similarity measure and the measure regarding participants' intention to adapt support the view that the out-group audience has been evaluated in a relatively unfavorable way. However, it is yet unclear, how exactly the audiences were evaluated – especially in their relationship to the target persons. Future research should also address the question how the relationship between the target person and the audience influences communicators' use of linguistic abstraction.

Appendix

Examples of Stimuli Presented to Participants

Positive Example	Negative Example
	
(a) A is writing notes	(a) A is dropping rubbish on the ground
(b) A is studying	(b) A is littering
(c) A enjoys the studies	(c) A disrespects the environment
(d) A is motivated	(d) A is dirty

Footnote

¹ If the out-group member had a different cultural background (including mother tongue) than the participants' one, participants would likely adjust their communication because of the audience's linguistic background. We also did not want to introduce a White supremacist as out-group member as in Douglas and McGarthy (2001). In Germany, white supremacists are often associated with low intelligence which could in turn affect participants' choice of linguistic abstraction.

Chapter 4

*Centrality of Recalled Information and Judgments of Memory Certainty*³

³ A version of this chapter has been submitted as Hellmann, J. H., Rees, J. H., Kopietz, R., & Echterhoff, G. (2011). *The role of centrality of recalled information in eyewitnesses' judgments of memory certainty*. Manuscript submitted for publication to *Applied Cognitive Psychology*.

Abstract

Two experiments examined the influence of centrality of recalled information on eyewitnesses' memory certainty. When asked to recall many (vs. few) aspects about a video-filmed event, participants judged the task as more difficult and reported less certainty regarding their event memory (Experiment 1). Critically, in the many-aspects condition details became less central for the event when they were recalled later in the task. In Experiment 2, we manipulated the centrality of to-be-recalled information. Participants indicated lower memory certainty after answering questions about 4 peripheral (vs. 4 central) aspects. Participants answering all peripheral plus central questions (many aspects) reported higher certainty than those who responded to 4 peripheral questions (few aspects) only – although the experience of recall difficulty did not differ between these two groups. Overall, the findings suggest that centrality of recalled information is a critical, but often overlooked, factor in memory judgments. Implications for interrogation procedures are discussed.

Retrieval Ease and Judgments of Memory Certainty

Judgments of memory quality are important. When people feel that their memories are accurate and reliable, they will be more willing to draw conclusions from the remembered experiences and act accordingly (Koriat & Goldsmith, 1996). In contrast, when people suspect that their recall is not accurate or reliable, they are more susceptible to social influence (e.g., Bless, Strack, & Walther, 2001). A continuing challenge for research is to identify the mechanisms that allow people to arrive at such judgments, that is, how well they remember a target event. Building on work on the availability heuristic (Tversky & Kahneman, 1973), researchers have argued that rememberers use the experienced ease with which relevant information can be recalled (Belli, Winkielman, Read, Schwarz, & Lynn, 1998; Benjamin, Bjork, & Schwartz, 1998; Echterhoff & Hirst, 2006; Kelley & Lindsay, 1993; Winkielman, Schwarz, & Belli, 1998). In pioneering studies Winkielman et al. (1998) and Belli et al. (1998) indeed found evidence that people use the experienced ease of retrieving specific events for judgments of memory for one's childhood. In these studies, participants rated their childhood memory as worse when they had retrieved many (e.g., 12 or 8) childhood events prior to their memory judgment than when they had recalled only few (i.e., 4) events (for similar findings in other judgment domains see, e.g., Rothman & Schwarz, 1998; Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka, & Simons, 1991; Wänke, Bohner, & Jurkowitsch, 1997; for a review see Schwarz & Vaughn, 2002).

Studies examining the role of ease-of-retrieval in memory judgments, as the ones described above, commonly manipulate subjective retrieval ease by asking participants to recall many or few exemplars of a particular category. The predominantly proposed underlying mechanism of such a numbers-of-instances manipulation is that people required to recall many instances experience this task as difficult and rate their ability related to the dimension in question as worse compared to those who recall few instances (e.g., Schwarz et

al., 1991). However, other mechanisms not considered in these explanations might also contribute to the effect. For example, it may be that individuals are not able to generate the requested amount of exemplars, and therefore, provide exemplars that are not of central importance for the event in question.

The possibility that the effect of retrieval ease on memory judgments may also result from the declining centrality of recalled aspects has been widely neglected. In one rare exception, Echterhoff and Hirst (2006) classified responses according to their level of specificity as acceptable or unacceptable. All data that were excluded came from participants in conditions in which they had to recall *many* exemplars of the category in question. It is therefore possible that low memory certainty in many-detail conditions result not only from experienced difficulty, but also from the reduced quality, specifically the degrading centrality, of information recalled toward the end of the task. On this basis, they might then have inferred that their ability related to the dimension in question was low. Based on research conducted so far, we cannot be certain if and how these two processes (ease and centrality of recall) interact and how they contribute to the routinely observed ease-of-retrieval effects.

Amount of Recalled Information and Experienced Retrieval Ease

Typically, the amount of recalled information and ease of recall have been confounded in the vast majority of previous research on the ease-of-retrieval effect. Participants might have provided less objectively correct information the more information they were required to recall. Thus, because the exemplars participants provided in previous research were not yet coded for centrality, it cannot be ruled out that participants in the conditions in which they had to recall many instances provided exemplars they *knew* were not central to the phenomenon in question. Findings by Tormala, Falces, Briñol, and Petty (2007) on the effect of number-of-instances manipulations in a domain outside of memory judgments, attitudinal

judgments, are consistent with this reasoning. These authors demonstrated that individuals asked to generate relatively many (vs. few) cognitions also generated more cognitions opposite to those details originally requested. In the present paper, we focus on effects of event centrality of recalled information on holistic mnemonic judgments such as eyewitness memory certainty.¹

Context and Content of Questions

Previous research on the potential impact of retrieval ease on eyewitnesses' memory has been conducted in the context of ease of retrieval for recall items which affected participants' certainty in a subsequent lineup identification task (see Eisenstadt & Leippe, 2009), but not for the memory for complete events. In extending retrieval ease research from isolated incidents to holistic memory judgments in the applied field of eyewitness memory research, we intended to also create a condition that would include a difficult task without compromising memory certainty in eyewitnesses.

Legal cases vividly illustrate that individuals' evaluative interpretations of perceived events, including those of another person's behaviors, can become crucial for police investigations (e.g., Memon & Wright, 1999). An obvious person to evaluate in legal contexts is the witness: police officers as well as judges and jurors will commonly gauge credibility of witnesses based on their behaviors. However, eyewitnesses can suffer from negative emotions such as confusion or fear when witnessing a crime and thereafter (see Marsh & Greenberg, 2006), and such stress can substantially decrease the accuracy of eyewitness memory (see Deffenbacher, Bornstein, Penrod, & McGorty, 2004). Additionally, witnesses' memory is highly susceptible to different kinds of information they might come across after perceiving the forensically relevant event (for reviews, see Loftus, 2005; Wells, Memon, & Penrod, 2006) including misinformation the witnesses receive from other people (e.g., Gabbert, Memon, & Allan, 2003) or other sources such as wall posters (see Loftus,

2003). Not only is eyewitnesses' memory highly malleable but also the certainty in their own memory accuracy has been found to be susceptible to information such as confirming feedback (e.g., Wells & Bradfield, 1998) or biased instructions (Leippe, Eisenstadt, & Rauch, 2009).

Many studies show that third parties such as police officers or lay judges frequently evaluate the credibility of eyewitnesses based on the witnesses' own apparent certainty in the accuracy of their memory (e.g., Bradfield & Wells, 2000; Wells & Leippe, 1981; also see Wells et al., 2006). Although, clearly, for most legal cases central aspects are more important than peripheral ones, it can be necessary to ask questions about peripheral aspects during a legal investigation in order to reconstruct the forensically relevant scene as accurately as possible. One source of witnesses' mnemonic uncertainty can be the perceived question difficulty resulting from the questions' content that might have been peripheral to the event in question. This will especially be the case when there are only few witnesses that encoded the event under suboptimal conditions (e.g., because factors such as poor lighting conditions, the speed of the event, or far distance from the scene; see Fisher, 1995). We therefore hypothesized that the centrality of information about the event in question can profoundly affect eyewitnesses' mnemonic certainty.

As Eisenstadt and Leippe (2009) point out, the level of retrieval ease can be an internal cue for eyewitnesses, but it seems to be affected by external factors, such as the phrasing of questions in interrogations or the content to which these questions relate. Using questions of varying difficulty with regard to general knowledge, Kelley and Lindsay (1993) have demonstrated that people are less certain in their answers to relatively more difficult questions.

Determinants of Memory Certainty and the Present Research

Previous research on the impact of different question forms on subsequent memory has focused mainly on formal aspects, including different formats of questions (Ibabe & Sporer, 2004; Shapiro, 2006), different phrasing (e.g., Lenzner, Kaczmarek, & Lenzner, 2010), or presuppositions in questions (Loftus & Zanni, 1975). It was shown that, for example, misleading questions result in higher error rates than unbiased questions (Smith & Ellsworth, 1987). Other research has demonstrated how confusing questions can decrease witness accuracy (Kebbell & Johnson, 2000). Clifford and Scott (1978) found that nearly 96% of their participants were misled with at least one leading question.

By applying the ease-of-retrieval paradigm with a video as target material to the important field of eyewitness memory judgments in Experiment 1, we wanted to test the hypothesis that, on average, participants would generate more peripheral (*vs.* central) details when asked to retrieve relatively many (*vs.* few) details. Additionally, we predicted that centrality of aspects would decline when participants are required to recall many details.

Experiment 1

Using video material in the ease-of-retrieval paradigm has multiple advantages: First, an extension of previous findings in this paradigm to the applied field of eyewitness memory regarding complete events would highlight the importance of subjective experiences for the formation of eyewitness memory judgments. Second, by dint of using a video, we were able to code the details participants provided with regard to their centrality (*vs.* periphery) for the respective event. Regarding studies on participants' susceptibility to misinformation, typically the misinformation deals with peripheral aspects of the target material (e.g., Lindsay & Johnson, 1989). Additionally, it has been found that individuals are more prone to

be affected by misinformation to peripheral details as compared to misinformation regarding central aspects of an event (Dalton & Daneman, 2006).

Method and Procedure

Participants. A total of 35 participants took part in this experiment (26 female, 9 male). Their mean age was 23.09 years ($SD = 4.20$).

Material and Design. The experiment was administered using an online survey platform. Participants saw a video of a person falling on the tracks of a subway station with a train approaching and stopping directly in front of the person. The video lasted 55 seconds. After watching the video, participants were involved in an unrelated filler task to approximate a time lag between witnessing the event and being questioned usually occurring in realistic contexts (see Wells et al., 2006). This filler task lasted for about five minutes. Participants were then divided into two experimental groups: One half was asked to list 4 details ('few details condition') while the other half was asked to list 12 details ('many details condition'). Participants then indicated the perceived difficulty of the task as a whole ("How difficult was it for you to answer the questions about the video?") on a 9-point Likert scale (1 = *not at all difficult*; 9 = *very difficult*). They also judged their memory certainty ("How certain are you about your memory regarding the incident?"), again on a 9-point Likert scale (1 = *not at all certain*; 9 = *very certain*).

Finally, participants were fully debriefed and could enter a code to receive partial course credit in exchange. They also had the chance to comment on the experiment and were provided with an e-mail address in case they had any further questions about the experiment.

Results

Participants asked to recall many (i.e., 12) details from the video rated the task as more difficult ($M = 5.294$, $SD = 2.801$) than those who recalled only few (i.e., 4) details ($M = 2.500$, $SD = 2.093$), $t(33) = 3.356$, $p = .002$, $d = 1.128$. Those who had to recall few (vs.

many) details were also relatively more certain about their memory regarding the incident, $t(33) = 2.933$, $p = .006$, $d = 0.985$. Experienced difficulty and memory certainty were negatively correlated, $r(33) = -.649$, $p < .001$.

Additionally, two coders who were familiar with the video but blind to experimental conditions rated each detail provided by participants regarding its centrality for the scene in the video on a 9-point scale (1 = *not at all central*; 9 = *very central*). Centrality was defined as importance for the course of the event. An example for a very central detail was “A person was falling on the tracks.” A detail that was not at all central was for example “One of the helpers was wearing a jumper.” The intercoder-correlation was high, $r = .854$, $p < .001$, so the mean of the two coders’ ratings was used for the subsequent analyses. On average, the aspects produced in the few details condition ($M = 6.798$, $SD = 1.300$) were more central than the aspects in the many details condition ($M = 5.622$, $SD = 0.749$), $t(33) = 3.252$, $p = .003$, $d = 1.108$. A non-parametric rank correlation indicated that the centrality of aspects provided declined with progress in the aspect generation in the many details condition, $\rho(202) = -.315$, $p < .001$, but not in the few details condition, $\rho(70) = -.172$, $p = .149$. The first four generated aspects in the many details condition did not show a significant decline in centrality, $\rho(66) = -.117$, $p = .343$, and their mean did not differ in centrality from the mean of the four details generated in the few details condition, $t < -1$, *ns*. As already indicated by the significant negative correlation, within the many details condition, the first four details participants retrieved on average ($M = 7.000$, $SD = 1.192$) were more central than the four details retrieved the latest ($M = 4.941$, $SD = 1.313$), $t(16) = 5.189$, $p < .001$, $d_{\text{within}} = 1.644$.

We also calculated the correlation between mean centrality and memory certainty. This relationship was significant, $r(33) = .341$, $p = .045$.

Discussion

As predicted, participants required to recall few details of a witnessed incident judged this task as easier and their memory certainty as higher compared to participants who had to recall many details of the same incident. Additionally, items that were recalled in the many details condition were on average less central to the event and became more peripheral the later they were retrieved. These results suggest that the quality of the recalled information was adapted to the increasing mnemonic challenge.

The findings are consistent with our notion that effects of number-of-memories manipulations cannot only be explained by ease of recall but also by the centrality of recalled information. Memory for peripheral details of an event is often not as clear and compelling as memory for central aspects of the event. Indeed, in a study by Ibabe and Sporer (2004) peripheral action details were remembered worse than central action details (also see Wright & Stroud, 1998).

Experiment 1 showed that a common number-of-instances manipulation affected the proposed centrality of recalled information, the proposed mediator of effects on memory judgments, in predicted ways. In addition to measuring the proposed mediator, we also wanted to manipulate the mediator to examine the effects on the main outcome (memory judgments). Finding an effect of the independent variable on the proposed mediator in one experiment, and finding an effect of the proposed mediator on the main dependent variable in another experiment provides persuasive evidence for mediation (Spencer, Zanna, & Fong, 2005).

Hence, we manipulated the centrality of aspects probed in recall questions in Experiment 2. The effect of this manipulation on experienced ease of recall was also assessed. We predicted that recalling central (*vs.* peripheral) aspects would boost judgments of memory quality (*i.e.*, mnemonic certainty). Critically, memory certainty should be higher

when a recall task comprises a mix of both central and peripheral aspects than when the task comprises only peripheral aspects, even when the former (vs. latter) task requires the recall of twice as many aspects. In other words, given that the recalled instances include central aspects, memory is judged as relatively good even when the amount of recalled information is relatively high. We also explored whether differences in memory judgments could be accounted for by reported ease.

In Experiment 2, we employed closed questions about the event instead of asking participants to generate a certain amount of only vaguely defined exemplars. This procedure, which has not been used in pertinent research, has the following advantages: Participants' objective accuracy can be validated post-hoc. Furthermore, concrete questions are highly ecologically valid, and thus, of substantial applied relevance for eyewitness interrogation procedures.

Experiment 2

We generated eight questions about aspects featured in the video that was also used in Experiment 1. Four of these questions addressed details that were central to the event; the other four questions addressed peripheral details (for the questions, see Appendix). Because the wording of questions can have an impact on self-reported memory judgments (see Schwarz, 1999), we have taken great care to phrase the questions in an easily understandable manner. We have avoided unfamiliar and ambiguous terms in the wording of the questions to rule out the possibility that the choice of words would affect difficulty. Difficulty arising from questions' wording and the particular impact on individuals' certainty has been investigated by other researchers (e.g., Kebbell & Giles, 2000; Kebbell & Johnson, 2000).

Different levels of centrality of aspects in questions and their potential effects on eyewitness memory performance and judgments have received surprisingly little attention

(for an exception, see Kebbell, Wagstaff, & Covey, 1996). Questions about peripheral details may not always be avoidable during an interrogation. Interrogations are likely to elicit discomfort, stress, and uncertainty in eyewitnesses (see Deffenbacher et al., 2004). In Experiment 2, we combined the questions we generated into three sets of aspect focus in the questions (i.e., central, peripheral, and both, central and peripheral). The main goal of Experiment 2 was to investigate the impact of aspect centrality in questions on participants' judgments of memory certainty.

Method

Participants and Design. Participants were 106 students (56 female, 50 male; mean age = 24.52, $SD = 5.16$) at a larger German university. None of these participants had taken part in Experiment 1. However, in a post-experimental check, three participants indicated that they had seen the video before. Their data were not included in the analyses, resulting in the sample described above. The experiment was based on a single-factor between-subjects design with three conditions: Four questions about central aspects *versus* four questions about peripheral aspects *versus* all of these questions as a mix of the central and peripheral aspects. We will refer to these conditions as the central, peripheral, and central-plus-peripheral groups. Participants' judgments of task difficulty and certainty in their memory regarding the incident served as main DVs.

Materials and Procedure. Experiment 2 was conducted in the lab at computers using the software MediaLab (Jarvis, 2005).

At the beginning of the experiment, participants saw the video. As in Experiment 1, to approximate the time lag between witnessing the event and interrogation usually occurring in real world contexts, an unrelated filler task that lasted about five minutes was added to the experimental procedure.

Participants were then randomly assigned to one of the three experimental groups (central, peripheral, or central-plus-peripheral) and answered the questions to the event to their best knowledge. Participants then rated the perceived difficulty of the task as a whole (“How difficult was it for you to answer the questions about the video?”) on a 9-point Likert scale (1 = *not at all difficult*; 9 = *very difficult*). They also judged their memory certainty (“How certain are you about your memory regarding the incident?”), again on a 9-point Likert scale (1 = *not at all certain*; 9 = *very certain*).

Results

Experienced difficulty of the task. Participants’ perceptions regarding the difficulty of the recall task differed by experimental condition, $F(2, 103) = 36.758, p < .001, \eta_p^2 = .416$ (see Table 1). Pairwise comparisons revealed that participants in the central condition perceived the task as less difficult than participants in the peripheral condition, $t(104) = 7.376, p < .001$, and participants who answered both the central and peripheral questions, $t(104) = 7.437, p < .001$. Participants in the central-plus-peripheral group did not rate the task as easier than those participants who answered the questions about peripheral aspects only, $t < 1, ns$.

Memory certainty. Participants’ judgments of certainty about their memory regarding the video’s content differed significantly by condition, $F(2, 103) = 15.433, p < .001, \eta_p^2 = .231$. Participants in the central condition reported higher memory certainty than those in the peripheral and those in the central-plus-peripheral conditions, $t(104) = 5.470, p < .001$, and $t(104) = 3.555, p = .001$, respectively (see Table 2). Importantly, participants in the central-plus-peripheral condition indicated a higher memory certainty than those who answered the questions about peripheral aspects only, $t(104) = 2.023, p = .046$.

Table 1. Experiment 2: Experienced Task Difficulty

Requested Aspects	Difficulty	
	<i>M</i>	<i>SD</i>
4 central	4.14 _a	2.03
4 central plus 4 peripheral	7.27 _b	1.66
4 peripheral	7.33 _b	1.67

Note: Means (*M*) and standard deviations (*SD*) for the experienced difficulty of the task for the groups with central aspect questions ($n = 36$), central-plus-peripheral aspect questions ($n = 37$), and peripheral aspect questions ($n = 33$). Different subscripts indicate statistically significant mean differences ($p < .001$).

Table 2. Experiment 2: Memory Certainty

Requested Aspects	Memory Certainty	
	<i>M</i>	<i>SD</i>
4 central	5.36 _a	2.00
4 central plus 4 peripheral	3.68 _b	2.14
4 peripheral	2.70 _c	1.91

Note: Means (*M*) and standard deviations (*SD*) for the memory certainty for the groups with central aspect questions ($n = 36$), central-plus-peripheral aspect questions ($n = 37$), and peripheral aspect questions ($n = 33$). Different subscripts indicate statistically significant mean differences ($p < .05$).

Experienced difficulty and participants' subjective certainty about their memory for the incident were significantly correlated, $r(104) = -.625, p < .001$. However, a closer look at

the differential correlations between memory certainty and experienced difficulty per experimental group revealed that there were only significant correlations for the group with exclusively central questions, $r(34) = -.79, p < .001$, and for the group that answered the mix of both, central and peripheral, questions, $r(35) = -.48, p = .002$. No significant correlation was found in the peripheral group, $r(31) = -.12, p = .492$. These correlations differed significantly between central and peripheral groups, $z = 3.79, p < .001$, and between central and central-plus-peripheral groups, $z = 2.26, p = .024$. The comparison of difficulty-certainty correlations between central-plus-peripheral and peripheral groups was marginally significant, $z = 1.61, p = .054$ [one-tailed].

Relative objective accuracy. We calculated an ANOVA for the relative objective accuracy, that is, the accuracy per item, by dividing the accuracy scores for the central and peripheral groups by 4 and for the central-plus-peripheral group by 8. Overall, scores in the three groups differed significantly, $F(2, 103) = 24.085, p < .001, \eta_p^2 = .319$. Recall in the central group ($M = .583, SD = .216$) was more accurate than it was in the central-plus-peripheral group ($M = .385, SD = .148$) and in the peripheral group ($M = .250, SD = .234$), $t(104) = 4.213, p < .001$, and $t(104) = 6.938, p < .001$, respectively. Participants in the central-plus-peripheral condition were more accurate than were participants in the peripheral condition, $t(104) = 2.813, p = .006$.

Correlations between certainty and accuracy. The overall correlation between memory certainty and relative accuracy was significant, $r(104) = .392, p < .001$. The correlations within the experimental groups were not statistically different from each other, $z_s < 1$.

Discussion

As predicted, centrality in the questions affected not only perceived task difficulty but also holistic memory certainty for the complete incident. Not surprisingly, participants' answers

to questions about central aspects were more likely to be correct than the answers to questions about peripheral aspects (also see Parker & Carranza, 1989) and participants' reported memory certainty was lower in the latter group. Crucially, however, even though central-plus-peripheral group participants answered the same peripheral questions, their memory certainty was higher than for those participants confronted exclusively with peripheral questions. Experienced ease could not fully explain the pattern of results found on memory certainty.

The differential correlations between experienced difficulty and memory certainty by experimental condition may depend on depth of processing (Craik & Lockhart, 1972): When finding answers to central aspects was easy, participants could presumably also more easily determine whether their answers were correct or not. When the questions focused on peripheral aspects and participants might have had to guess the answer, their indication of memory certainty might also have become more random.

General Discussion

With the present research, we demonstrated that centrality of recalled information can affect eyewitnesses' memory certainty regarding the witnessed event: Participants judged their memory certainty about an event as a whole as worse after answering questions to relatively peripheral (*vs.* central) aspects. Importantly, participants facing a mix of questions about central and peripheral aspects judged their memory certainty as better than those who answered the questions about peripheral aspects exclusively.

The finding that those who answered the central plus peripheral questions did not experience the task as easier than those who were facing only questions about peripheral aspects underlines the importance of a largely neglected aspect in event memory research: The holistic experience of task difficulty regarding a list of questions is different from the

aggregated difficulty judgments about each of the questions included in this list. It is more than the sum of its partial difficulty ratings.

In Experiment 2, when specific definitive questions were asked, we also found an effect on memory judgments when we asked questions about peripheral aspects exclusively. Importantly, we found higher memory certainty when adding questions regarding central aspects to the list of questions about peripheral aspects as compared to the condition with questions about peripheral aspects only.

Consistent with meta-analytical findings in the field of eyewitness identification studies (see Sporer, Penrod, Read, & Cutler, 1995) and despite the significant correlation we found, the association between memory certainty and accuracy in the present research was not perfect. Memory certainty therefore does not necessarily always serve as a reliable criterion to distinguish between true and false memories in eyewitnesses which we have shown here for a complete event. It is important to investigate the relationship between the objective instance of memory accuracy and the subjective judgment of memory certainty on a *holistic* level, for example, for the judgment regarding one's own memory certainty about an entire event. The distinction between true and false memories is vital for multiple reasons and in many different settings: In court, the ability to separate statements derived from false memories from those that contain the truth is of major importance, be it for the conviction of the right suspect or for setting an appropriate penalty. However, average human perception regarding this distinction is deceivable (see Wells & Olson, 2003). Science is still in the process of developing reliable ways of distinguishing between true and false memories as well as truth and deceit (see Levine, Serota, & Shulman, 2010). In future studies, centrality of information to be recalled should be taken into account as an important variable with potential impact on indicators for the distinction between true and false memories by parties involved in solving crimes.

The present results also have implications for basic research on retrieval ease: They demonstrate that mnemonic judgments do not only depend on the mere amount of information that is obtained. The results reported in this paper strongly support the view that memory judgments can as well be modified by the centrality of recalled information while obtaining these pieces of facts.

One limitation of the present research is that, at this stage, we cannot definitely determine whether the increase of memory certainty in the central-plus-peripheral group participants is due to an accumulation of memory certainty arising from both central and peripheral information or if the effect is due to a relative increase of memory certainty per item. Keeping in mind that the central-plus-peripheral group showed medium memory certainty as compared to the central and peripheral groups, we argue that the observed differential effects of memory accuracy support the latter explanation. Additionally, if we assume that the task difficulty for the central-plus-peripheral group is a result of the *relatively* decreased difficulty derived from all questions, we can conclude that the correlations between perceived difficulty and memory certainty decrease with increasing difficulty of the task due to smaller centrality of recalled information.

Outlook and Conclusion

We have demonstrated in this paper that individuals asked to retrieve many details of a witnessed event tend to generate more details that are peripheral to the encountered incident. Questions about peripheral details could simply be perceived as more difficult than questions about frequency estimates. Future research should focus on issues of applied and theoretical relevance: What are the particular features a question addresses that make the question easy or difficult to answer? How might such factors relate to eyewitness memory judgments? Additionally, it could be investigated whether the effects are still present when ease (*vs.* difficulty) of the task is made salient (see Winkielman et al., 1998).

The present findings have important practical implications for interrogation procedures: If legal practitioners intend to reduce mnemonic uncertainty in the eyewitnesses they interrogate, whenever questions about peripheral aspects make up a large part of the interrogation, they should add questions about central details. Even if the answers to these latter questions are not of interest, mnemonic uncertainty in eyewitnesses can then be reduced in an already uncomfortable situation.

Footnote

¹ The terms eyewitness *certainty* and *confidence* regarding the accuracy of one's own memory have been used synonymously (see Eisenstadt & Leippe, 2009). For the present article, we predominantly make use of the term *certainty*.

Appendix: Questions about Central vs. Peripheral Aspects

Questions on Central Aspects

How many people got out of the driver's cabin of the train and stepped on the tracks?

How many people fell on the tracks?

How many people have visibly waved their hands until the train stopped?

How many people helped the woman to get back on the gate?

Questions on Peripheral Aspects

What was the color of the stripe on the floor?

How many people have worn a hat (cap, woollen hat, ...)?

What was the color of the lower half of the train?

What was the name of the station?

Concluding Remarks

Concluding Remarks

The overarching argument of the present thesis was that individuals may bias their own mental representations via the verbalization of certain aspects of or the communication about incidents. Using a multimethod approach, I investigated communication and verbalization effects on mental representations and judgments – namely with the saying-is-believing effect, the abstracting-is-believing effect, and retrieval ease effects. These effects have in common that they illustrate the impact of verbalizing or communicating about cognitive instances on subsequent mental representations of the events described.

All chapters address the overarching argument, yet the approaches are different and the methodology varies per chapter: The present research extended saying-is-believing and retrieval ease effects to the important applied field of eyewitness memory research. Moreover, the thesis provides a first-time integration of research on the importance of audience group membership for linguistic abstraction and how communicated events are subsequently mentally represented regarding the level of linguistic abstraction.

In sum, the present experiments further our understanding of how verbalization and communication influence mental representations and judgments. Still, much more research is needed to comprehend the underlying processes completely.

Concluding Remarks

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