Expectancy-confirmation in spite of disconfirming evidence: The case of price increases due to the introduction of the Euro

Eva Traut-Mattausch *, Stefan Schulz-Hardt **, Tobias Greitemeyer *, & Dieter Frey *

* Ludwig-Maximilians-University Munich
** Technical University Dresden

Abstract
People in Germany believe that the Euro introduction caused an overall price increase, but that increase is not reflected by reality. To investigate whether this gap could be based on biased perceptions of the average price trend, five studies were conducted. Participants received two menus from a restaurant (one ‘old’ menu with DM prices and one ‘new’ menu with Euro prices) and were asked to estimate the price trend (in percent). In all of these studies, price trend judgements were biased towards rising prices. If the prices had in fact been raised, the magnitude of this price increase was overestimated. If the prices had remained stable, significant price increases were perceived. And if the prices had fallen, they were perceived as having remained stable. The bias was systematically related to participants’ expectations concerning price increases. A “selective error correction” hypothesis proved to best fit the data: Calculation errors that are in line with one’s expectation are overlooked, whereas inconsistent errors are detected and corrected. The results imply that expectations can influence judgements even if clear disconfirming evidence is at hand that can be compared with an objective standard and, thus, leaves no room for interpretation.

Keywords: Euro – psychology of money – price estimation – expectancy confirmation – prior belief effect

Introduction
In this paper, we want to address two related questions. One of them is a fundamental theoretical question, namely whether or not expectations can continue to influence judgments even if unequivocal contradictory evidence is at hand. As we will outline, this question has not been conclusively addressed before. The second question is a more practical one, namely whether or not people in Germany have a biased perception of price increases due to the introduction of the Euro. Obviously, the connection between the two is whether, given that the latter is the case, the former process underlies this misperception.

Already during the first weeks following the introduction of the Euro money in cash a controversial discussion had been started about whether the Euro conversion was leading retail to rise their prices (SZ, 01.02.2002). Particularly economists and economic researchers feared that these price increases would have led to a higher inflation rate. In the media, the Euro was considered as a price booster and was made responsible for the unreasonable price increases (TZ, 25./26.05.2002). Also, from the beginning of 2002 on, most people in Germany had the impression that dramatic price increases had taken place (FT, 30.05.2002), leading to a flood of complaints addressed to German consumer centres.

In contrast to these perceptions and this debate, the Federal Statistical Office in Germany reported a consumer price index for the beginning of 2002 that was almost equal to that of the same time period of the previous year; and inflation rate also proved to be stable compared to previous years. Thus, obviously there is a gap between the inflation “felt” by the German people and the official “hard data” (FT, 30.05.2002). This gap has never been that large before (SZ, 29.05.2002) and it has already led to economic consequences: The European Central Bank claims that peoples uncertainty of prices has led to an unjustifiable reluctant inclination to buy (SZ, 12.07.2002) which, in turn, caused dropping sales in retail and gastronomy (SZ, 10./11.08.2002). Thus, not only from a psychological point of view, but also from the view of an economist the important question arises of how the gap between peoples perception and measurable facts can be explained.

From a social psychological point of view, a promising starting point for such an analysis is the fact that even before the new Euro currency was introduced in the beginning of 2002, people held rather firm expectations that the Euro would bring about price increases (Greitemeyer, Jonas & Frey, 2001). It falls outside the scope of our paper to explain what factors may have caused this expectation, but to give just one example, in the second half of 2001, there was an extensive discussion in the German media about how retail sellers, restaurants etc. might use the Euro introduction to realize covered price increases. These media
reports finally could have led people to form expectations of future price increases (Olson, Roese, & Zanna, 1996).

Given that these expectations played a major role in bringing about an overestimation of actual price increases due to the Euro, the question is how these expectations are transformed into judgements und why they are not corrected by reality. A very simple explanation for this could be that information that would be needed to correct incorrect expectancies concerning price increases is often not available to people. When buying certain goods, people might simply not know what the product might have cost before because they never bought that particular good before. In all of these cases they might use their expectation as a “default value” to estimate the real price trend. In addition, people might not remember the exact former prices but rather have a range within the former price is located. In this case, anchoring effects of the new Euro prices (cf. also Jonas, Greitemeyer, Frey & Schulz-Hardt, 2002) as well as all kinds of reconstructive memory biases might come in.

However, although processes like these might play a role, it is interesting to note that people show evidence of large perceived price increases particularly in areas where direct comparisons between old and new prices can easily be performed. An analysis of complaints addressed to the German consumer centres indicated that about 20% of the total number of complaints concern gastronomy and 15% grocery retailing and shopping centre (SZ, 10/11.08.2002). People should be able to accurately recall the DM prices of their favoured dish in a often visited restaurant, allowing a comparison between the old DM price and the new Euro price. In addition, people usually know the prices of the groceries they buy regularly. However, the large gap between perceived and real price increases was also observed for these sectors (FT, 30.05.2002). Thus, do people ignore the evidence that is available to them in this case? Or is it possible that their expectations survive the confrontation with the contradictory evidence?

Several lines of research show that people are somehow reluctant to revise initial expectations. For example, beginning with the seminal study by Asch (1946), the literature on primacy effects how initial information (leading to an expectation) has a large impact on the evaluation of subsequently received information. In a similar vein, Darley and Gross (1983) found that ambiguous information about a target person is interpreted in a way that is consistent with their initial expectations about that target person. Further evidence for such a tendency towards expectancy-confirmation comes from the literature on the so-called “prior belief effect”. In their classical study, Lord, Ross, and Lepper (1979) demonstrated that both supporters and opponents of the death penalty judged evidence supporting their opinion as being more conclusive, important and credible than evidence contradicting their opinion. As a consequence, both groups were more convinced of their opinion after having been confronted with the two-sided evidence than they had been before. This asymmetric evaluation of information in favor of one’s initial beliefs has been shown to be a robust phenomenon (e.g., Edwards & Smith, 1996) and a barrier against the revision of incorrect initial judgments (e.g., Greitemeyer & Schulz-Hardt, 2003).

Furthermore, studies on belief perseverance in the so-called “debriefing paradigm“ (e.g., Lepper, Ross, & Lau, 1986; Ross, Lepper, & Hubbard, 1975) revealed that feedback can continue to influence peoples’ judgements even after having been disclosed as false. In this paradigm, after completing a task participants receive a fictitious performance-feedback for this task. After the session the participants are informed that the feedback and their performance were not related (“debriefing”). Subsequently the participants are asked to assess their real performance on this specific task, their performance according to similar tasks, and their ability to solve such tasks. Although the participants have been debriefed, their self-assessments usually are still influenced by the fictitious performance-feedback.

As a final example, research on the so-called “self-fulfilling prophecy” indicates that expectations influence not only the perception and the behaviour of the person who holds the expectation, but rather also makes the target of the expectation behave in a manner that is consistent with this expectation and thereby influences also the targets self-evaluation (cf. Darley & Fazio, 1980; Jussim, 1986, 1991; Neuberg, 1994; Snyder, 1992). For example, the negative stereotype of non-with applicants lead the interviewer to act more aloof and unfriendly (e.g., more distant seating position, more stopover of the applicant). Indeed the non-with applicants present themselves worse during the job interview (Word, Zanner, & Cooper, 1974). Similar processes were demonstrated by Rosenthal and Jacobson (1968). They told teachers that some of their students had been identified by an IQ test as being particularly clever. In fact, the students so identified were determined randomly by the researchers. Tests at the beginning and at the end of the school year showed that the “clever” students manifested a significantly greater increase in IQ than did the students who were not so labelled, and these differences were due to different behaviour of the teachers towards these students compared to the other students.
In summary, these results show that expectancies can prevail against contrary evidence. Thus, at first glance it appears highly plausible that people might misperceive price increases due to their expectation even though they are confronted with contradicting evidence. However, at second glance it is far less clear whether the same mechanisms of expectancy-confirmation that we know from the previously mentioned literatures can be applied to explain this phenomenon. In all of the prior studies, evidence has been used that contained at least a certain degree of ambiguity. For example, the evidence for and against the deteriorating effect of death penalty presented in the study by Lord et al. (1979) both had its strengths and weaknesses. The behaviour of applicants in an employment interview (Word et al., 1974) is open to different interpretations. Even if performance data are used as, for example, in the studies by Darley and Gross (1983) as well as Rosenthal and Jacobsen (1968), considerations about the difficulty of the questions are needed in order to evaluate the performance. A similar situation arises in studies on the impact of expectancies on the perception of contingencies (Billman, Bornstein & Richards, 1992): Even though “hard” data are available, most people lack the formal knowledge about how to transform these data into a valid measure indicating the strength of this contingency. Thus, in none of these cases people had an objective standard against which the evidence could be compared.\textsuperscript{1}

Furthermore, given the current state of theoretical explanations for expectancy-confirmation, it seems to be exactly this ambiguity and this lack of an objective standard that is crucial for the possibility of expectancy-confirmation to occur. Many authors explicitly refer to this as a necessary precondition. For example, Anderson and Kellam (1992, p. 557) state that, “A fair test requires new data that clearly support one side or the other of an issue but also must be ambiguous enough to allow biased assimilation”. This claim for partially ambiguous evidence is reflected in the theoretical mechanisms presumed to underlie expectancy-confirmation in spite of disconfirming evidence. For example, in the literature on the prior belief effect, asymmetric processing of consistent vs. inconsistent information is claimed responsible for the effect: Whereas people tend to accept consistent information at face value, they deeply scrutinize inconsistent information, thereby enhancing the possibility to detect possible weaknesses in the arguments (Edwards & Smith, 1996). However, if the arguments contain no weaknesses, they are accepted (Ditto et al., 1998). Thus, no prior belief effect should occur if the information contains no ambiguity and can be compared to an objective standard. Although using somewhat different formulations, the literature on the confirmation of stereotypic expectancies highlights very similar processes: Stereotypic expectations frame the way how new evidence is interpreted by the perceiver (Darley & Gross, 1983). Thus, if the evidence contains no ambiguity, no room for stereotype-consistent processing should be left. Hence, no expectancy-confirmation should occur.

It would lead too far at this point to outline this principle for each of the different literatures mentioned above. However, in our opinion each of them is based on this principle, and each of them leads to the conclusion that the influence of expectations on judgements should disappear if unequivocal evidence is available that can be compared against an objective standard. Thus, if it can be shown that people’s expectations of price rises due to the introduction of the Euro bias their actual judgement of the price trend although direct comparisons between old and new prices are possible, this would, in our opinion, constitute theoretical as well as practical progress. The following five studies will address this question.

Study 1

The first experiment was designed to examine whether price trend estimations (with regard to the change from DM to Euro prices) are biased even when participants are able to perform a direct price comparison between ‘old’ DM prices and ‘new’ Euro prices. Therefore, two menus from an Italian restaurant were given to the participants, the ‘old’ menu with DM prices and the ‘new’ menu with Euro prices. We already pointed out that, at least in Germany, price trends are also overestimated in areas where a price comparison is nearly always possible (e.g., in a restaurant one often visits). Here it is important to distinguish between two situations: In the first situation a price comparison is possible, but it is necessary to recall the former DM prices from memory. This is the situation for most people in most restaurants (or stores) they have been in before: They have seen the DM prices in the past, but these prices are no longer available now and have to be

\textsuperscript{1} At first glance, the above mentioned studies of belief perseverance in the debriefing paradigm seem to be an exception to this rule. If people are debriefed about the fictitious nature of the previous feedback, shouldn’t this be unequivocal disconfirming evidence without any room for interpretation? However, the problem here is that the participants lack any objective criteria telling them why the debriefing should be more accurate than the previous feedback. Although people might hold a subjective theory of being deceived in the beginning and being debriefed in the end of a psychological experiment, they can never be sure that the second feedback (debriefing) is not still part of the experimental manipulations. Hence, even in these studies no objective standard exists that allows unequivocal identification of the evidence.
remembered. In this case memory-biases can occur that lead the perceiver to overestimate the price trend (e.g., “intrusion errors”, Snyder & Uranowitz, 1978; Bower, Black, & Turner, 1979). In the second situation, both prices (DM and Euro) are available during the price comparison. This is the situation of a restaurant (or a store, or whatever) that makes “double-pricing” or that the perceiver has visited so often that she exactly remembers the old DM prices. If even in this situation an overestimation of the actual price trend occurs, no memory bias can be responsible for that. Thus, we varied the availability of the DM prices in the first experiment: Whereas one half of the participants could use the DM menu during the whole experiment, the other half had to return their DM menu before receiving the Euro menu.

Furthermore, any overestimations of the actual price trend would not be surprising if people did not pay attention to the old and new prices and, instead of doing so and calculating the real price trend, only blindly followed their expectation of price increases. To test this possibility, we manipulated the real price trend given in the two menus (falling prices, stable prices, rising prices). When in fact participants do not use the price information given in the menus, their judgments of the real price trend should be insensitive of this manipulation.

**Method**

**Participants.** One hundred and twenty-three adults (42 male and 81 female) with ages ranging from 18 to 76 ($M = 50.62$, $SD = 12.83$) participated in this study. The participants were recruited at a workshop about health prevention and were asked to participate in a brief experiment on “consumer behaviour”.

**Design.** The experiment is based on a 2 (DM prices: available vs. not available) x 3 (real price trend: plus 15% vs. 0% vs. minus 15%) factorial between subjects design. Participants were randomly assigned to one of the six experimental conditions.

**Procedure.** The study was conducted during the breaks of the health prevention workshop. As a cover story, the participants were told that the aim of the study was to investigate whether Germans changed their consumer behaviour after the introduction of the new currency. At the moment, these possible changes were being examined in several areas like, for example, purchasing household articles and jewellery, buying and selling stocks, and going out for a dinner in a restaurant. For this purpose, we had asked several restaurants in Munich for their old menu with DM prices and the new menu after the introduction of the Euro currency in January 2002.

The participants then received the DM menu. In addition, they were handed out a short questionnaire on which they were asked to write down what dishes they would like to order in this restaurant. Next, the participants received the now valid Euro menu from the same restaurant and a second questionnaire on which they were asked to write down what dishes they would like to order now. Both menus contained the same 21 different dishes (Table 1). Furthermore, the participants had to estimate the price trend (in percent) in this restaurant after the introduction of the Euro. For this purpose, the participants were asked “About how much percent had the prices changed by the conversion of the DM menu into the Euro menu?” To explain the judgement scale in more detail, the participants were informed that, if they indicated “+50%”, this would mean that the prices on average had increased by half of the old price; if they indicated “0%” this would mean that the average price did not change; and if they indicated “−50%” this would mean that the average price had decreased by half of the price before. In the “DM-prices available” conditions, the participants were allowed to keep the DM menu during the price trend estimation, whereas in the “DM-prices not available” conditions the experimenter collected the DM menus before handing out the new Euro menus.
Table 1: Calculation of the Euro prices in the five Studies

<table>
<thead>
<tr>
<th>21 dishes</th>
<th>DM price</th>
<th>variation of the overall price trend</th>
<th>Within- menu variation of price trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Euro price(^0%)</td>
<td>Euro price plus 15%</td>
</tr>
<tr>
<td>Pizza</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Margherita</td>
<td>8.90</td>
<td>4.55</td>
<td>5.23</td>
</tr>
<tr>
<td>Funghi</td>
<td>10.15</td>
<td>5.19</td>
<td>5.97</td>
</tr>
<tr>
<td>Prosciutto</td>
<td>11.45</td>
<td>5.85</td>
<td>6.73</td>
</tr>
<tr>
<td>Hawaii</td>
<td>12.60</td>
<td>6.44</td>
<td>7.41</td>
</tr>
<tr>
<td>Regina</td>
<td>12.60</td>
<td>6.44</td>
<td>7.41</td>
</tr>
<tr>
<td>Shrimps</td>
<td>14.45</td>
<td>7.39</td>
<td>8.50</td>
</tr>
<tr>
<td>Calzone</td>
<td>18.50</td>
<td>9.46</td>
<td>10.88</td>
</tr>
<tr>
<td>Salad</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salad Italy</td>
<td>10.15</td>
<td>5.19</td>
<td>5.97</td>
</tr>
<tr>
<td>Salad du Chef</td>
<td>12.65</td>
<td>6.47</td>
<td>7.44</td>
</tr>
<tr>
<td>Soup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomato soup</td>
<td>6.80</td>
<td>3.48</td>
<td>4.00</td>
</tr>
<tr>
<td>Onion soup</td>
<td>7.50</td>
<td>3.83</td>
<td>4.41</td>
</tr>
<tr>
<td>Minestrone</td>
<td>10.65</td>
<td>5.45</td>
<td>6.26</td>
</tr>
<tr>
<td>Pasta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tortellini</td>
<td>14.45</td>
<td>7.39</td>
<td>8.50</td>
</tr>
<tr>
<td>Pasta Bolognese</td>
<td>11.45</td>
<td>5.85</td>
<td>6.73</td>
</tr>
<tr>
<td>Pasta Carbonara</td>
<td>12.65</td>
<td>6.47</td>
<td>7.44</td>
</tr>
<tr>
<td>Rigatoni</td>
<td>18.50</td>
<td>9.46</td>
<td>10.88</td>
</tr>
<tr>
<td>Dessert</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tiramisu</td>
<td>7.50</td>
<td>3.83</td>
<td>4.41</td>
</tr>
<tr>
<td>Sundae</td>
<td>8.90</td>
<td>4.55</td>
<td>5.23</td>
</tr>
<tr>
<td>Spaghetti ice</td>
<td>8.20</td>
<td>4.19</td>
<td>4.82</td>
</tr>
<tr>
<td>Sum</td>
<td>251.75</td>
<td>128.72</td>
<td>148.03</td>
</tr>
<tr>
<td>Studies</td>
<td>1-5</td>
<td>2</td>
<td>2, 4</td>
</tr>
</tbody>
</table>

Note: \(^a\) The DM prices were converted into Euro prices using the exact exchange rate of 1.96 DM to 1 Euro; \(^b\) For Study 3 this Table includes only the prices for the “1.96 DM to 1 Euro” condition, but not for the “2 DM to 1 Euro” condition.
The calculation of the Euro prices is displayed in Table 1. In Study 1, three versions of the Euro menu existed that differed with regard to the average price trend. For all three versions, first the DM prices were converted into Euro prices using the exact exchange rate of 1.96 DM to 1 Euro. In the next step, some variability was introduced in order to make the situation more realistic: Whereas some dishes became more expensive (e.g., ice cream plus 20%), other dishes which had the same former DM price became cheaper (e.g., pizza Margherita minus 20%). These modifications were balanced, that is, the average overall price of the dishes was not affected by this modification. Whereas the Euro menu resulting from these two steps was the experimental menu used in the “price trend: 0%” condition (i.e., the condition where the average price remained stable after the introduction of the Euro), two other menus were created by either subtracting or adding 15% to each price (conditions “price trend: +15%” and “price trend: -15%”). Thus, whereas some of the participants received a menu where in fact the prices had been raised after the introduction of the Euro, other participants were confronted with a menu that clearly indicated declining prices after the Euro introduction.

Results and Discussion

The means of the participants’ price trend estimations (in percent) as well as the means of the differences (in percent) between estimated and real price trend for each condition are displayed in Table 2. With regard to the estimated price trend, the ANOVA revealed a significant main effect for the real price trend on price trend estimation, $F(2, 113) = 26.33, p < .001, \eta^2 = .33$. Post-hoc tests (LSD method) showed that a significantly higher price trend was assessed in the “+15%” condition ($M = 21.94\%$, $SD = 12.85$) compared to the “0%” condition ($M = 8.18\%$, $SD = 12.49$), $p < .001$; and the “-15%” condition ($M = -0.07\%$, $SD = 14.51$), $p < .001$. In addition, price trend estimations were also higher in the “0%” condition compared to the “-15%” condition, $p < .01$. This result indicates that the participants were in fact sensitive to the manipulation of the overall price trend.

Table 2: Means for price trend estimations (in percent) and for the difference between estimated and real price trends (in percent) in Study 1

<table>
<thead>
<tr>
<th>Real price trend</th>
<th>DM prices</th>
<th>price trend estimation</th>
<th>difference*</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>plus 15%</td>
<td>available</td>
<td>23.25</td>
<td>8.25</td>
<td>13.31</td>
<td>13.31</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>not available</td>
<td>20.63</td>
<td>5.63</td>
<td>12.59</td>
<td>12.59</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0%</td>
<td>available</td>
<td>9.63</td>
<td>9.63</td>
<td>8.80</td>
<td>8.80</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>not available</td>
<td>6.73</td>
<td>6.73</td>
<td>14.44</td>
<td>15.44</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>minus 15%</td>
<td>available</td>
<td>-0.76</td>
<td>14.24</td>
<td>12.92</td>
<td>12.92</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>not available</td>
<td>0.55</td>
<td>15.55</td>
<td>16.12</td>
<td>16.12</td>
<td>17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * Difference between estimated and real price trends.

However, at the same time it becomes obvious that the participants were biased in their price trend estimations. For all three levels of the price trend factor, the average estimated price trend was significantly higher than the real price trend: $M = 21.94\%$ in the “15%” condition, $t(39) = 3.41, p < .01$; $M = 8.18\%$ in the “0%” condition, $t(39) = 4.14, p < .001$; $M = -0.07\%$ in the “-15%” condition, $t(35) = 6.18, p < .001$. In other words, if the real price level had not changed, the participants perceived a significant price increase. If the real prices had in fact increased on average, the participants overestimated the extent of this increase. And if the real prices had in fact declined after the Euro introduction, the participants perceived them as having remained stable. This overestimation is illustrated in Figure 1.

In addition, we created a second, parallel version where the same dishes that had become more expensive in the first version were now becoming cheaper and vice versa. We did this in order to test whether the position of the dish in the menu has an influence on the price trend estimations. The result showed no significance differences between the two parallel versions of the menu ($p > .30$). We also created parallel versions of the Euro menu in Studies 3 and 4. In both studies the difference between the two parallel versions did not reach significance (Study 3, $p > .08$; Study 4, $p > .67$). Due to these results we did not create parallel versions for Study 5.
As a 2 × 3 ANOVA of the experimental design for the differences between estimated and real price trends shows, the magnitude of this bias differed dependent on the real price trend: In this analysis, the main effect of the price trend factor becomes significant, $F(2, 113) = 3.81$, $p < .05$, $\eta^2 = .07$. Post hoc comparisons between the three conditions (LSD method) revealed that the overestimation was significantly higher in the “-15%” condition ($M = +14.93\%$, $SD = 14.51$ for the difference between estimated and real price trend) compared to the two other conditions (“+15%” condition, $M = +6.94\%$, $SD = 12.85$; “0%” condition, $M = +8.18\%$, $SD = 12.49$), both $p < .05$; with the latter two conditions not differing significantly from each other ($p > .68$). In other words, the average overestimation was particularly large if the real price trend was opposed to the expectation of a general price increase after the introduction of the Euro.

In contrast to that, the extent of these overestimations did not depend on whether or not the original DM menu was available at the time when the participants evaluated the new Euro menu: Neither in the analysis of the price trend estimations nor in the analysis of the differences between estimated and real price trend did the “Availability of DM prices” factor have an effect, both $F$s $< 1$ (difference between estimated and real price trend in the DM price “available” condition, $M = +10.70$, $SD = 1.78$; and the DM price “not available” condition, $M = +9.30$, $SD = 1.74$). The interaction between the “real price trend” factor and the “Availability of DM prices” factor did not reach significance ($F(2, 113) = 0.29$, $p > .75$, $\eta^2 = .01$). We can thus exclude the possibility that the bias in price trend estimation is simply due to a misrepresentation of the original DM prices.

The result of the different overestimations in the three “price trend” conditions is in line with the hypothesis that the price trend estimations are biased by expectations of price increases. The bias was especially strong when the real price trend was in the opposite direction, which would mean a price decrease in reality instead of the estimated fixed price. The fact that the price trend estimations made by the participants differ according to the manipulated real price trends indicates that the participants did not ignore the price information within the Euro menu to make their decision blindly according to their initial expectation of rising prices. Because this effect did not vary depending on the availability of the DM prices, we can preclude that the effect is based on incorrect or lack of remembering of the original prices or on any type of memory-bias.

However, for two reasons the results need not necessarily reflect a previously unknown phenomenon, as we claimed in the case of expectancy-confirmation in spite of unequivocal disconfirming evidence that can be compared to an objective standard. On the one hand, although we know from all the media reported in the beginning that most people suspect nearly all restaurants of having risen their prices after the Euro introduction, we did not measure the participants’ expectations in this study. We will come back to this point in Studies 3 to 5. On the other hand, a well-known mechanism from the social hypothesis testing literature (for an overview see Trope & Liberman, 1996) may be responsible for the findings, namely the use of a positive testing strategy. The participants may have searched for evidence supporting their hypothesis, that is, for prices that have been increased. Since each of the Euro menus contained such instances, it is possible
that participants focused their attention on these instances and largely neglected those prices that had remained stable or that had fallen.

To check for this possibility, we replicated Study 1 with one important modification, namely that the Euro menu no longer contained any variability with regard to the price trend of the single dishes. In this situation, neither the “-15%” menu nor the “0%” menu do contain any hypothesis-confirming instances any longer. In addition, in order to check for the generalizability of our findings, we used a younger sample this time.

### Study 2

The goal of Study 2 was to examine whether the price trend estimations are also significantly biased when the real price trend is stable for all dishes in the menu. Thus, the Euro menus from Study 1 were replaced by menus where the overall price trend was identical with the specific price trend for each of the dishes (Table 1). In other words, the Euro menus were created by converting each DM price with the correct exchange rate of 1.96 DM to 1 Euro, and afterwards adding 15% to each price (“+15%” conditions), leaving the price as it is (“0%” conditions), or subtracting 15% from each price (“-15%” conditions). Apart from this, Study 2 is a full replication of Study 1.

#### Method

**Participants.** Ninety-three students of an introductory psychology class (66 male and 27 female) participated in this study. The ages ranged between 18 and 35 years ($M = 22.47$, $SD = 2.73$).

**Design.** The experiment is based on a $2 \times 3$ factorial between subjects design. Participants were randomly assigned to one of the six experimental conditions.

**Procedure.** The study was conducted during one of the lectures. The procedure was identical to Study 1.

#### Results and Discussion

Table 3 shows the means of the participants’ price trend estimations (in percent) as well as the means of the differences (in percent) between estimated and real price trends for each condition. With regard to the estimated price trend, the ANOVA revealed a significant main effect for the real price trend on price trend estimation, $F(2, 89) = 19.95$, $p < .001$, $\eta^2 = .32$. Post-hoc tests (LSD method) showed that a significantly higher price trend was assessed in the “+15%” condition ($M = 15.43$, $SD = 10.61$) compared to the “0%” ($M = 3.80$, $SD = 6.52$), $p < .001$; and the “-15%” condition ($M = -3.19$, $SD = 17.01$), $p < .001$. In addition, price trend estimations were also higher in the “0%” condition compared to the “-15%” condition, $p < .01$. This result shows that the participants were in fact sensitive to the manipulation of the overall price trend.

<table>
<thead>
<tr>
<th>Real price trend</th>
<th>DM prices</th>
<th>price trend estimation</th>
<th>difference$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td>$SD$</td>
</tr>
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<td>17.01</td>
</tr>
<tr>
<td></td>
<td>not available</td>
<td>-1.10</td>
<td>12.61</td>
</tr>
</tbody>
</table>

Note: $^a$ Difference between estimated and real price trends.

As in Study 1, the participants overestimated the real price trend. For two levels of the price trend factor, the average estimated price trend was significantly higher than the real price trend: $M = 6.73\%$ in the “0%” condition, $t(32) = 4.39$, $p < .001$; and $M = -2.14\%$ in the “-15%” condition, $t(31) = 4.92$, $p < .001$. The comparison between estimated and real price trend in the “+15%” condition ($M = 17.56$) did not reach significance ($p > .26$). In other words, if the real prices had in fact increased, the participants exhibited only a slight and nonsignificant overestimation of the real price trend. In contrast, if all prices remained stable, the participants nevertheless perceived a significant price increase. And if the real prices had in fact declined
after the Euro introduction, the participants perceived them as having remained almost stable. All estimations for each condition are displayed in Figure 2.

Figure 2: Real price trend and price trend estimation in the three conditions (“+15%”, “0%”, “-15%”) in Experiment 2

As a 2 x 3 ANOVA of the experimental design for the differences between estimated and real price trend shows, the magnitude of this bias differed dependent on the real price trend: In this analysis, the main effect of the price trend factor becomes significant, $F(2, 89) = 5.53, p < .01, \eta^2 = .11$. Post hoc comparisons between the three conditions (LSD method) revealed that the overestimation was significantly higher in the “-15%” condition ($M = 12.86\%$, $SD = 14.77$ for the difference between estimated and real price trend) compared to the two other conditions (the “+15%” condition, $M = +2.56\%$, $SD = 11.62$, $p < .001$; and the “0%” condition, $M = +6.73\%$, $SD = 8.80$, $p < .05$), with the latter two conditions not differing significantly from each other ($p > .18$). In other words, as in Study 1, the average overestimation was particularly large if the real price trend was opposed to the expectation of a general price increase after the introduction of the Euro.

In contrast to that, the extent of these overestimations again did not depend on whether or not the original DM menu was available at the time when the participants evaluated the new Euro menu: Neither in the analysis of the price trend estimations nor in the analysis of the differences between estimated and real price trend did the “availability of DM prices” factor have an effect, both $F$s $< 1$ (difference between estimated and real price trend in the DM price “available” condition, $M = +5.35$, $SD = 1.79$; and the DM price “not available” condition, $M = +9.30$, $SD = 1.76$). The interaction between the “real price trend” factor and the “availability of DM prices” factor again did not reach significance, $F(2, 89) = 0.16, p > .85, \eta^2 = .01$. Thus, we can again exclude the possibility that the bias in price trend estimation is due to any misrepresentation of the original DM prices.

In sum, the results of Study 1 were replicated, with the slight exception that this time no significant bias was observed in the “+15%” condition and that the overall level of bias was slightly lower than in Study 1. Both findings can easily be explained by assuming that the task was easier this time, since no varying price developments had to be taken into account. More importantly, again we found a general bias towards overestimating the actual price trend, although this time all prices in the menu showed the same real price trend. Therefore, a positive test strategy can not explain the results since both in the “0%” condition and in the “-15%” condition no hypothesis-consistent evidence is available. At the same time, again we have to note that people did not ignore the data since price trend estimations systematically varied in accordance with the real price trend. However, is it possible that about one half of the participants paid attention to the data, whereas the other half ignored them? This would lead to the same pattern of results, but a closer inspection of the data shows that we can almost surely exclude this possibility. Instead of showing a bimodal distribution, the data both in Study 1 and Study 2 did not substantially deviate from a normal distribution – which, of course, also implies that only very few participants came up with correct price trend estimations. We already argued that expectancies could be the basis for the biased price trend estimations. The fact that in Studies 1 and 2 the bias is even stronger when the information contradicts an expectation of rising prices is consistent with that assumption. However, more convincing evidence for this assumption would come from
actually measuring participants’ expectations and relating them to their price trend estimations. This was done in Study 3. In addition, we also measured participants’ attitudes towards the Euro, since these attitudes could be a common third variable underlying a correlation between expectations and price trend estimations – with negative attitudes towards the Euro, which are frequent in Germany (Greitemeyer et al., 2001), leading to negative expectations with regard to price rises and at the same time giving rise to judgment biases in favour of these price increases.

Furthermore, Study 3 was also intended to test whether the biased price perceptions found in Studies 1 and 2 are simply a product of cognitive simplification: Since it is difficult to calculate price comparisons with the exact exchange rate of 1.96 DM to 1 Euro, most people in Germany use an exchange rate of 2 to 1 for the sake of simplification. However, doing so automatically implies an illusionary price increase of about 2.5% if the real prices remained stable and if the simplified exchange rate is not corrected for. Although the magnitude of this error clearly lies below the illusionary price increases perceived in the “0%” conditions in Studies 1 and 2, people might have difficulties calculating these exact percentages. Thus, all they might notice is that there seems to be some price increase, and the magnitude of this price increase might be overestimated. To examine this alternative explanation we varied the exchange rate (DM to Euro) in Study 3.

**Study 3**

In Study 3, two different Euro menus were used. In one condition the Euro prices where calculated with the exact correct exchange rate of 1.96 DM to 1 Euro, and in the other condition an exchange rate of 2 DM to 1 Euro was used. As in the first Study, the prices within each Euro menu were variable (the prices of some dishes became more expensive and the prices of dishes with the same DM price became cheaper), but were stable on average (Table 1, “0%” condition from the first two studies). In addition to the measures in the first two studies, the participants’ specific expectations with regard to the price trend in this particular restaurant as well as their general attitude towards the Euro were also measured.

**Method**

**Participants.** Thirty-three adults (20 male and 13 female) with ages ranging from 15 to 71 (M = 39.33, SD = 17.10) participated in this study. The participants were recruited in a public building in Munich and were asked to participate in a brief experiment on “consumer behaviour”.

**Design.** The experiment is based on a one factorial between-subjects design with two experimental conditions (exchange rate: 2 DM to 1 Euro vs. 1.96 DM to 1 Euro). Participants were randomly assigned to one of the two experimental conditions.

**Procedure.** The procedure was similar to Study 1 and 2, with the following exceptions: Prior to being handed out the first menu, the participants gave ratings of their attitude towards the Euro. For this purpose, the scale created by Greitemeyer et al. (2001) was used. We asked the participants about the subjective attractiveness, stability, valence, and likeability of the new currency with 4 items (on a scale between –5 = negative attitude and +5 = positive attitude). These measures showed high reliability (α = .80) and were, thus, collapsed to an overall attitude rating. After that, the participants received the DM menu and a short questionnaire on which they were asked to write down their anticipation of the price trend in this Italian restaurant after the currency reform. For this purpose, the participants were asked “What do you think, about how much percent have the prices changed by the conversion of the menu towards the euro currency in this Italian restaurant?” To give an example, the participants were informed that if they indicated “+50%” this would mean, that the prices have increased by a half of the old price, if they indicated “0%” this would mean, that the prices did not change, and if they indicated “–50%” this would mean, that the prices have decreased by a half of the old price before.

Next, the participants were handed out the Euro menu and were asked to estimate the price trend. Two versions of the Euro menu were used. In one condition, the exact exchange rate of 1.96 DM for 1 Euro was used, similar to Studies 1 and 2. In the other condition, a rate of 2 DM for 1 Euro was used (i.e. the average nominal price of the dishes in Euro was exactly half of the average nominal price in DM). In both conditions, the price trends within each menu were variable (i.e., some dishes became more expensive, whereas other dishes became cheaper); however, overall the prices remained stable given the above-mentioned exchange rates. In other words: In the condition with the 2 DM to 1 Euro exchange rate the average price trend was in fact –2%; however, for someone who calculates with an exchange rate of 2 to 1 the price trend is 0%. All participants were allowed to keep the DM menu during the judgment of the price trend.
Results and Discussion

As in Study 1 and 2, the participants were systematically biased in their perception of the price trend. In the 1.96 DM to 1 Euro condition, the average estimated price trend was $\bar{M} = 12.81\% \text{ (SD} = 17.51)$, which is significantly different from zero, $t(15) = 2.93$, $p < .01$. The corresponding average price trend estimation in the 2 DM to 1 Euro condition was $\bar{M} = 11.03\% \text{ (SD} = 14.52)$, which also significantly differs from zero, $t(15) = 3.04$, $p < .01$. The magnitude of this bias did not significantly differ between the two conditions, ($F(1, 30) = 0.20$, $p > .66$, $\eta^2 = .01$).

This results shows that the price trend misperceptions found in Studies 1 and 2 were replicated in this study. Since the magnitude of this bias was not substantially lowered by using a simplified exchange rate of 2 to 1, biased price trend estimations can not be explained by the fact that people might round up the exchange rate and then misjudge the extent to that the real Euro prices lie above the so-created reference prices. Of course, there might be an effect of the exchange rate factor that was not detected in this experiment due to insufficient statistical power. However, based on the results of this experiment the best guess is that this effect – given that it exists – might account for an overestimation of the price trend of roughly about 2%.

This could by no means explain the large overestimations observed in our studies.

To test whether negative attitudes towards the Euro or price trend expectancies are predictors for the biased price trend estimation, a multiple regression was computed ($R^2 = .56$, $F[1, 28] = 17.44$, $p < .001$). The Beta-value reached significance for the expectation about the price trend ($\beta = .60$, $p < .001$), but not for the negative attitude towards the Euro ($\beta = -.21$, $p > .17$).

Thus, the participants’ biased price trend estimations are systematically related to their initial expectations, but not to the participants’ attitude towards the Euro. The correlation between the price trend expectancies and the attitude towards the Euro was $r = -.58$ ($p < .01$).

Thus, the more negative one’s attitude towards the Euro is, the more one expects rising prices due to the Euro, and vice versa, the more one expects rising prices, the more negative one’s attitude towards the Euro is. However, as the regression analysis shows, if the common variable is controlled for, only expectations are systematically related to price trend estimations. This gives us reason to believe that indeed the biased price trend judgements found in our studies are the result of faulty expectancy-confirmation.

However, this still leaves open the question of how these expectations are confirmed even though clear contradictory evidence is available that is not open to any interpretation and that can be compared with an objective standard. Since there is no room for interpretation and differential weighting, the process of asymmetric information evaluation which is assumed to underlie many belief confirmation phenomena (cf. Edwards & Smith, 1996; Greitemeyer & Schulz-Hardt, 2003) does not seem applicable. The most detailed analysis of this process has been done in research on the prior belief effect, and it has been demonstrated that differential allocation of cognitive resources is responsible for the effect: Whereas people tend to accept expectancy-confirming evidence at face value, expectancy-disconfirming evidence is subjected to a more detailed analysis. Since this deeper elaboration and intensified processing heightens the probability of detecting weaknesses in the evidence, disconfirming evidence is – on average – judged to be less credible and less important than confirming evidence (Edwards & Smith, 1996). But – what potential weaknesses should be found in the result of a price comparison?

We believe that, although the “classic” version of this mechanism does not apply here, a variant of this expectancy-confirmation principle does still apply here. We call this variant the “selective error correction” process (Schulz-Hardt, Traut-Mattausch, Greitemeyer & Frey, 2003). Selective error correction appears when specified expectancies towards the result of a numerical calculation exist. These expectancies affect the perceived accuracy of one’s calculation results. More specifically, if the calculated result is more or less consistent with the expectation, the result is accepted, and no additional check for errors occurs. As a consequence, the result will be accepted independent of whether it is correct or false. If, in contrast, the result contradicts the expectancy, an error checking is initiated. Hence, the result will only accepted if it proves correct. In sum, miscalculations that are consistent with the initial expectation will overlooked more often than miscalculations that are inconsistent with this expectation.

This mechanism is directly applicable to the results found in Studies 1 to 3. The average price trend is not directly obvious from the two menus, but rather has to be calculated by performing a three-stage process, namely a) generating a reference price for the new Euro price by dividing the old DM price by roughly 2, b) comparing the new Euro price with this reference price and c) averaging the results of the single price comparisons. Within this process, errors can and do occur. For the sake of simplicity, let us assume that a person calculates with an exchange rate of 2 to 1 (most people in Germany do this, and as the results of Study 3 show, this does not affect the results). The person is confronted with the price of a dish which now costs 8.75 Euro, whereas the former price was 17.50 DM. Thus, given this simplified exchange rate, the

\[ 8.75 \text{ Euro} = \frac{17.50 \text{ DM}}{2} = 8.75 \text{ Euro} \]
price has remained stable. Now, if this person makes an error in recalculating how the new Euro price would have to be given that no price change had occurred (that is, in dividing the old DM price by two), the detection of this error depends on what kind of error the person makes. If the person erroneously calculates a reference price of 8.25 Euro, this reference price lets her conclude that the dish has become more expensive. This result confirms the initial expectation – the Euro has led to price increases – and is thereby accepted. In contrast, if the person erroneously calculates a reference price of 9.25 Euro, this price implies that the dish has become cheaper. This violates the initial expectation. As a consequence, the person checks her calculation and probably detects and corrects the error. In the end, almost only expectancy-consistent error remain. Thereby, the calculation of the average price trend is systematically biased by these errors, leading to a result in favour of the initial expectation.

In Study 4, we will test one very straightforward implication of this explanation: If it were true, more errors consistent than inconsistent with the initial expectation should be found for our participants, and the magnitude of this asymmetry should be systematically related to the magnitude of the price trend bias. Therefore, in one of two conditions in Study 4 the participants are enforced to give separate judgements for the price change of every single dish instead of only judging the average price trend.

This manipulation also allows us to check for an additional alternative explanation: Although no systematic observational measures were taken, the participants’ behaviour as well as their reports during the experimental debriefing indicated that most of them did not systematically make price comparisons for all dishes on the menu. Instead, most of them seemed to rely on a strategy of drawing a sample and calculating the comparison for the dishes in this sample. Thus, it is possible that the participants found no evidence for price increases in their sample, but that they, based on their expectation, inferred that the rest of the dishes would contain the expected price increases. Since the overall judgement then contains the information from the sample as well as the expectation, the same pattern as in the first studies should occur: Judgements are sensitive to the real price trend, but are systematically biased towards price increases. If this were true, the bias should disappear in the condition where participants are enforced to make separate comparison for all dishes.

Study 4

As outlined above, in Study 4 half of the participants underwent the procedure from the control condition of Study 3, whereas the other half had to make separate price comparison for all dishes before judging the overall price trend. If the bias disappears in the latter condition, this would support the hypothesis of judgments being a composite of an unbiased sample estimate and the participants’ expectations. If, in contrast, the bias is not reduced by this manipulation, and if, in addition, we find more errors consistent than inconsistent with the participants’ expectations in these separate comparisons, this supports our “selective error correction” hypothesis.

As an additional feature, Study 4 allows for a direct test of the effect of price trend variability on biased price trend estimations. In Studies 1 and 3 the price trend of the separate dishes varied within the menu, whereas in Study 2 this price trend was identical for all dishes. Overall, the bias in price trend estimations was somewhat lower in Study 2 compared to the other two studies; however, other features (e.g., differences between the samples) may also be responsible for this. To systematically check for the effect of price trend variability, in Study 4 half of the participants received stable price trends and half of the participants received variable price trends within the menu.

Method

Participants. Seventy adults (23 male and 47 female) with ages ranging from 19 to 76 (M = 27.77, SD = 9.83) participated in this study. The participants were recruited in a public building in Munich and were asked whether they would like to participate in a brief experiment on “consumer behaviour”.

Design. The experiment is based on a 2 (price comparison: single vs. overall) x 2 (price trend variability: variable vs. stable) factorial between-subjects design. Participants were randomly assigned to one of the four experimental conditions.

Procedure. For participants in the “overall” price comparison condition, the procedure were similar to Study 1 and 2. After receiving the DM and the Euro menu the participants had to estimate the price trend. All of the participants were allowed to keep the DM menu during the price trend estimation. Two versions of the Euro menu were used. In one condition, the price trends within the Euro menu were variable after converting the DM prices with the correct exchange rate of 1.96 DM to 1 Euro. That means some dishes became more expensive, whereas other dishes became cheaper. However, the average price remained stable in this
condition (average real price trend 0%, Table 1). In the other condition, the Euro menues were created by converting each DM price with the correct exchange rate and leaving the price as it is.

For participants assigned to the “single” price comparison condition, the procedure was identical except the following: “Single” price comparison participants were instructed to calculate and write down the price trend (in percent) for each of the 21 dishes within the menu. After having made these calculations for all dishes, the participants were asked to estimate the overall price trend in this restaurant.

Results and Discussion

The means of the participants’ price trend estimation (in percent) for each condition are displayed in Table 4. With regard to the estimated price trend, the ANOVA revealed no significant main effect for the price comparison factor (estimated price trend in the “single price comparison” condition, $M = 9.24$, $SD = 8.47$ and in the “overall price comparison” condition, $M = 6.76$, $SD = 12.39$) as well as for the price trend variability factor (estimated price trend in the “variable” condition, $M = 8.98$, $SD = 13.47$ and in the “stable” condition, $M = 7.06$, $SD = 7.43$), both $F$s < 1.

Table 4: Means for price trend estimations (in percent) in Study 4

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<td></td>
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<td>6.83</td>
</tr>
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</table>

As in first three studies, the participants were systematically biased in their perception of the price trend. In the “single price comparison” condition, the average estimated price trend was $M = 9.24\% \ (SD = 8.47)$, which is significantly different from zero, $t(32) = 6.27, p < .001$. The corresponding average price trend estimation in the “overall price comparison” condition was $M = 6.76\% \ (SD = 12.39)$, which also significantly differs from zero, $t(34) = 3.23, p < .01$.

The results show that the price trend misperception found in the first three studies was replicated again. Forcing the participants to make separate calculations for all dishes did not diminish this bias. Thus, the hypothesis of participants judgements being an aggregation of an unbiased sample estimate and their expectation was not supported. In addition, price trend variability within the menu also had no systematic effect on participants’ bias. In other words, even if all prices are exactly converted from DM to Euro and even if they are enforced to check this for each single dish on the menu, the participants have the impression of a price increase in this particular restaurant. This underlines the high robustness of the effect.

As an explanation for this robust effect, we have suggested the “selective error correction” hypothesis: Participants make unsystematic errors when calculating the price trends for the separate dishes, but they systematically check only those results that are inconsistent with their expectation (stable or even falling prices). As a consequence, more errors that are consistent with the initial expectation should be found than errors that are inconsistent with this expectation. We will now turn to the data that speak to this question. The average quantity of miscalculations that were consistent with the expectancy of rising prices were significant higher ($M = 3.66, SD = 4.37$) compared to the average quantity of miscalculations that were inconsistent with the expectancy of rising prices ($M = 1.29, SD = 1.81$), $t(34) = 4.42, p < .001, \eta^2 = .37$. The average miscalculation (difference between the average of the separately calculated price trends and the real price trend, with the latter being zero in this study) was $M = 3.46, SD = 4.10$, which is significantly different from zero, $t(31) = 4.78, p < .001$. The magnitude of this miscalculation was systematically related to the participants’ final judgements about the overall price trend; the correlation between these two measures was $r = .41, p < .05$. In other words, the more asymmetric the participants’ errors were towards price increases, the larger the perceived general price increase in this restaurant was. These results are entirely consistent with our selective error correction hypothesis.

Apart from the latter correlation, it has to be noted that the overall magnitude of the separate errors is lower than the final bias in the participants’ price trend judgements. That is, on the basis of their separate price trend estimations the participants should estimate the price trend to be $+3.46\%$ on average (the mean of the average error), not the observed $+9.24\%$. However, averaging the separate price trend estimations into the overall price trend judgement is a new calculation that again allows for selective error correction. Thus, no additional assumptions are needed to explain the discrepancy between these two measures.
However, the evidence obtained for our selective error correction in Study 4 is rather indirect. A more direct test for our explanation would be to block this process and see whether this manipulation eliminates or, at least, substantially reduces the bias in price trend estimation. This will be done in Study 5.

Study 5

Selective error correction is based on the differential allocation of cognitive resources: Whereas calculation results that are inconsistent with one's expectation are checked systematically, results consistent with this expectation are accepted at face value. A method commonly used to block such differential allocation is cognitive load (cf. Gilbert, 1989): The general idea behind this method is that if the causal chain leading to an effect requires cognitive processing, then this effect should not occur among persons who can not engage in this processing due to cognitive load. Ditto, Scepanisky, Munro, Apanovitch, and Lockhardt (1998) showed that by using a cognitive load task, the differential testing of consistent and inconsistent information was eliminated. By blocking cognitive resources, both sorts of evidence (consistent and inconsistent) obtain the same lower level of processing capacity. In our paradigm this means that independent of whether or not the calculation result confirms or disconfirms the participant’s expectation, no systematic error checking or error correction should occur. As a consequence, consistent and inconsistent errors should both be left undetected and, in turn, the overall judgement should be less biased (i.e., the average perceived price trend should be closer to zero). Thus, we transferred the method used by Ditto et al. (1998) to our paradigm.

Note that, at least to our knowledge, almost all possible other explanations for the price trend misperception would make the opposite prediction. All other models of the influence of expectancies on judgements would make a contrary prediction. For example, if some sort of category-based processing (Fiske & Neuberg, 1990) lies at the heart of the effect (with the expectation of “inflation” or something like that being a category), the influence of the category (the expectation) should be larger if processing concrete, individuating information is more difficult. And if any type of more or less intentional derogation of the Euro were responsible for the effect, again this general negative attitude should have more instead of less impact if cognitive resources are constrained.

Method

Participants. Forty-two students (24 male and 18 female) participated in this study, with ages ranging between 19 and 49 years (M = 27.29, SD = 6.48). Participants were recruited in the cafeteria of the University Munich with fliers asking them to participate in a brief experiment on “consumer behaviour”. For their participation, they received free coffee and a chocolate bar.

Design. The experiment is based on a one factorial between-subjects design with two experimental conditions (cognitive load: load vs. no load). Participants were randomly assigned to one of the two experimental conditions.

Procedure. For participants in the “no load” condition, the procedure was similar to Study 3. Upon arrival in the lab, the participants were given the DM menu and a short questionnaire on which they were asked to give ratings on their attitudes towards the Euro (Greitemeyer et al., 2001) and to write down their anticipation of the price trend in this Italian restaurant. Next, the participants received the Euro menu and had to estimate the price trend. All of the participants were allowed to keep the DM menu during the price trend estimation. In both conditions the Euro prices were calculated with the exact exchange rate of 1.96 DM to 1 Euro; and in both conditions the Euro menus contained a within-menu variation of the price trend for single dishes, with the average price remaining stable.

For participants assigned to the “cognitive load” condition, the procedure was identical except for the following: “Cognitive load” participants were given the written explanation that normally in a real life situation in a restaurant, people do not exclusively concentrate on the prices or the price trends; they also have conversations, order dishes and drinks etc. We were interested in trying to re-create that kind of busy cognitive environment in this study. The participants were told that their task was to estimate the price trend while at the same time attending to a separate letter counting test (Ditto et al., 1998). During the price trend estimation the participants listened simultaneously over a head phone to a tape recording of individual reading strings of letters (one letter every 3 seconds). The participants were asked to estimate the price trend and try to count the number of vowels in the letter strings at the same time. After the price trend estimation, all participants were asked the following two items as a manipulation check: “To what extend did you feel distracted during the processing of the task” and “How strenuous did you find this experiment?” Both answers were given on a scale between 0 (= hardly distracting / hardly strenuous) and 10 (= very distracting / very strenuous).
Results and Discussion

The intercorrelation of the two manipulation check items was high enough to allow for an aggregation of both items an overall measure ($r = .53$, $p < .01$). The mean for this measure was significantly higher in the “cognitive load” condition ($M = 5.21$, $SD = 2.07$) compared to the “no load” condition ($M = 1.79$, $SD = 1.50$), $F(1, 40) = 37.96$, $p < .001$, $\eta^2 = .49$. This result indicates that the manipulation of the cognitive load task was successful.

The ANOVA revealed a significant effect of the cognitive load factor on price trend estimation, $F(1, 40) = 6.80$, $p < .05$, $\eta^2 = .15$. Significantly higher price trends were assessed in the “no load” condition ($M = 10.67\%$, $SD = 9.62$) compared to the “cognitive load” condition ($M = 3.81\%$, $SD = 7.25$). Thus, in line with our “selective error correction” hypothesis, reducing the cognitive resources that the participants could allocate to the task significantly reduced the price estimation bias.

The difference between the estimated and the real price trend (in both conditions 0%) was significant in the “no load” condition ($t(20) = 5.08$, $p < .001$, and also in the “load” condition $t(20) = 2.41$, $p < .05$. Thus, although cognitive load significantly reduced the price trend estimation bias, it did not completely eliminate this bias. The smaller, but still existent bias in the “load” condition could be explained with the assumption that the cognitive resources for the selective error correction process were not completely blocked by the used load task.

On a descriptive level, the data also indicate that the correlation between the price trend estimation and the price trend expectation is lower in the “cognitive load” condition ($r = .10$, $p < .05$) compared to the “no load” condition ($r = .50$, $p < .05$). This would be consistent with our assumption since cognitive load should block the connection between expectations and price trend judgements. However, if one tests for a moderator effect according to Baron and Kenny (1986) in a linear regression analysis ($R^2 = .28$, $F(2, 38) = 4.96$, $p < .01$), the interaction between the load factor and the price trend expectations ($\beta = .37$, $p > .21$) is not significant.

General Discussion

The aim of the research reported here was to answer two related questions, namely whether expectations can be confirmed although unequivocal disconfirming evidence is available that can be compared with an objective standard, and whether this process underlies the gap between perceptions of the Euro forcing up the prices and the official statistics showing no increased inflation rate. To answer these questions, we constructed a paradigm where people can directly compare the old DM prices and the new Euro prices from the menu of an (in fact fictitious) restaurant.

In all of our five studies we found that the price trend estimations were significantly biased towards price increases. When the average price had in fact been raised, the magnitude of this price increase was overestimated. When the average price had remained stable, a significant price increase was perceived that, over the course of the five studies, had an average magnitude of about 10%. And if the average price had even fallen, stable prices were perceived. Thus, overall we found clear evidence of illusionary price increases due to the Euro introduction, in spite of the fact that clear disconfirming evidence was available.

As we demonstrated in the first two studies, this bias is not due to misrepresentations of the original DM prices or any kinds of memory biases, since the bias was not systematically affected by the availability vs. non-availability of the original DM menu during the price comparison. In addition, we have seen that the participants did not blindly judge any price increases they were expecting, but instead were sensitive for the manipulation of the average price trend. Furthermore, a positive testing strategy can not explain the results, since the bias also occurred if the price trend was identical for all dishes and, thus, no confirming evidence was available in two of the three levels of the price trend factor. Finally, neither a simplification in the exchange rate used (2 to 1 instead of 1.96 to 1) nor a matching of an unbiased price trend estimation from a sample of prices with one’s prior expectation can explain the results, because none of the corresponding manipulations in Studies 3 and 4 affected the bias.

In our opinion, the findings can be best explained using our “selective error correction” hypothesis (Schulz-Hardt et al., 2003). We assume that if numerical calculations are made and strong expectations concerning the result of this calculation exist, calculation results that are consistent with this expectation will be accepted at face value, whereas calculation results that are inconsistent with regard to this expectation will be systematically checked. Therefore, erroneous confirmations of the expectations will be more frequently overlooked than erroneous disconfirmations. In sum, this mechanism is a transfer of the differential processing principle from “prior belief effect” research (Edwards & Smith, 1996) onto the field of numerical calculations and numerical judgements.
Several of our findings support this hypothesis. First of all, Study 3 showed that the participants’ expectations with regard to the price trend in this restaurant were systematically related to the magnitude of the perceived price increase; that is, the more price increase was expected, the more price increase was perceived. This relation held even if the participants’ attitudes towards the Euro were controlled for. Thus, the bias is not due to an attitudinally based derogation of the Euro and its consequences.

Further on, Study 4 revealed that if the participants are enforced to make separate price comparisons for all dishes, this ameliorates the bias by no means. Even more relevant for our hypothesis, the final calculations contained more errors that were consistent than inconsistent with the expectation of rising prices, and the magnitude of this asymmetry was systematically related to the magnitude of the price trend bias. Finally, in Study 5 we directly blocked the selective error correction mechanism by introducing cognitive load (Ditto et al., 1998, Exp. 3; Gilbert, 1989). As we had expected and, at least as far as we can see, as only our selective error correction hypothesis would predict, price trend estimations were more accurate under cognitive load; that is, a lower price increase was perceived in this condition.

Implications and Directions for Further Research

In showing that people perceive illusionary price increases due to the Euro introduction if they expect these price increases to occur, our findings on the one hand add to the existing literature on expectancy-confirmation (e.g., Darley & Gross, 1983; Lord et al., 1979) and highlight the generalizability of these findings. On the other hand, they extend the existing literature with regard to an important point. In our view, our findings are the first consistent and methodologically sound demonstration that expectations can influence judgements even if clear disconfirming evidence is available that can be judged against an objective standard and that, thus, leaves no room for any interpretation or weighting. To put it more simple, hard facts do not automatically correct expectations, even if the implications of the hard facts are unequivocal. Thus, the boundaries within that expectancy-confirmation can occur are wider than many authors have formerly suggested (e.g., ).

In suggesting that selective error correction underlies this kind of expectancy-confirmation, we also extend the theoretical processes that are known to operate in this field. However, we have to admit that even more direct tests of this mechanism are needed in the future. To highlight just a few possibilities, one way to do this could be the use of “think aloud” protocols during the price trend estimation. In the qualitative analyses of the recorded price trend estimations, participants should detect and correct more preference-inconsistent miscalculation than preference-consistent calculation errors. A further possibility could be to give the participants price trend estimations that supposedly have been made by other participants. Thus, their task would be to check for possible errors. Again, more inconsistent than consistent errors should be detected.

A second implication for further research regards the extent to that our findings can be generalized. Although we only investigated effects of expectations on the perception of price trends during the introduction of the Euro, this does not mean that the results necessarily can only be applied to the context of a new currency. In all contexts where expectancies exist and numerical calculations are needed to test this expectation, the same kind of selective error correction should occur and, thus, the same judgemental bias should occur. To give just one example, private investors often hold expectations about the future performance of particular companies. When these companies publish their quarterly or annual reports, calculations may be needed to judge, for example, the development of sales over several business sectors. Thus, selective error correction might lead people to misperceive the hard economic facts of this company. Obviously, promising areas for the further test of processes like these exist.

Finally, a third implication for research in the future is that interventions are needed that can correct for such expectancy-based biases in numerical judgements. Previous research on the prior belief effect and other related expectancy-confirmation processes have shown that “consider the opposite” (Lord, Lepper & Preston, 1984) is a useful strategy for debiasing. However, whereas the strategy has proven useful in situations where the evidence can be differentially interpreted and weighted, this does not automatically mean that it must also be successful if no such interpretation can occur. This question of possible interventions leads to the last point we want to consider here, namely the question of practical implications.

Practical Implications

Obviously, our findings also have practical implications. As we outlined in the beginning, in Germany the “felt” inflation has reduced people’s consumption and buying behaviour, and this trend (among other factors) directly leads to reduced economic growth or even economic stagnation (SZ, 12.07.2002). Thus, it is important to counteract this tendency. As our results show, even a double pricing system can not be expected
to eliminate the illusory price increase perceptions, since having the DM menu available during price trend estimation did not substantially reduce the bias. Thus, the most promising target for any type of practical intervention are people’s expectations.

However, changing expectations is not an easy thing to do if they are held with strong confidence, as it is the case here. One way to deal with this problem could be to lower prices by a certain amount, given that the margin is high enough to allow for this possibility. As the results of the first two studies indicate, a real price change of minus 15% is perceived as an almost stable price level. Hence, people should not perceive price increases any more if the real price trend is brought in that direction. Although in this case these judgments would still be biased, they should be the basis for new expectations concerning the future price trend. And with these expectations being more close to zero and possibly being held with less confidence than before, less systematic bias should occur in the future.

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References


