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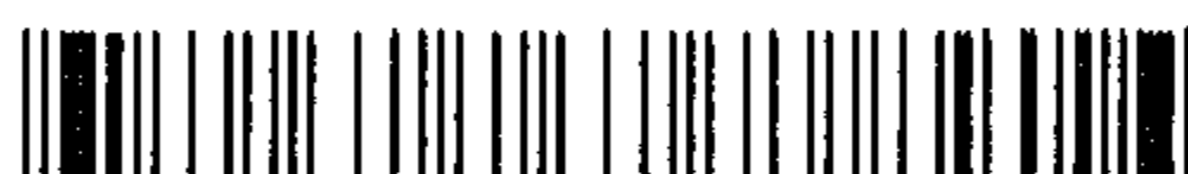
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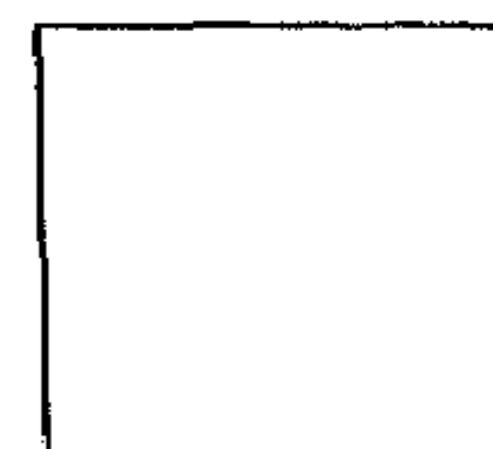
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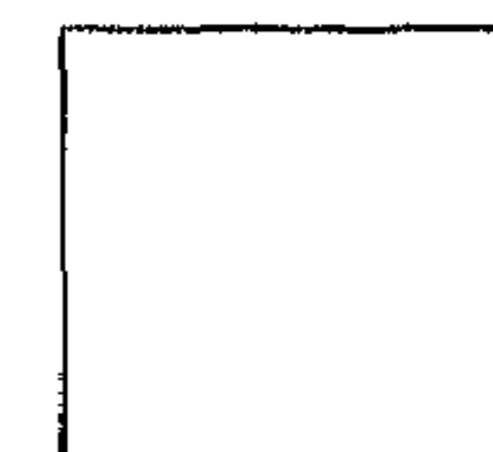
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Counterfactual processing and the correspondence between events and outcomes: Normality versus value

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Abstract

Kahneman and Tversky (1982) have proposed a simulation heuristic such that perceivers tend to substitute 'normal' antecedent events for exceptional ones in psychologically 'undoing' a given outcome. Recently Gavanski and Wells (1989) have demonstrated that exceptional outcomes tend to be perceived as caused by exceptional events and normal outcomes by normal events, a finding more in line with the representativeness heuristic than this 'normalization' principle. We argue that representativeness may be determined by the evaluative tone of events as well as by probability—namely that positive events are assumed to underlie positive outcomes and negative events, negative outcomes. Both normality and value were independently manipulated in order to test the relative effects of each of these factors. In contrast to Gavanski and Wells our data indicate that preference was given to the similarity of value between events and outcome for undoing both positive and negative and normal and exceptional outcomes. Some implications of these findings for counterfactual processing are discussed.

INTRODUCTION

The present study examines certain principles which govern *counterfactual processing* or the tendency to imagine how things may have turned out otherwise in a particular situation (*cf.* Miller, Turnbull and McFarland, 1990). A number of researchers have pointed to the pervasiveness and importance of counterfactual thinking in a range of contexts, especially in terms of how people account for unexpected or undesirable outcomes (e.g. Bulman and Wortman, 1977; Gavanski and Wells, 1989; Kahneman

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and Tversky, 1982). Speculating about possible alternatives ('if only...') can form a psychological way of trying to 'overcome' or cope with adverse consequences, as well as dwelling on 'what might have been'. Such processes are closely linked to how people feel and orient themselves to the future (e.g. Johnson, 1986; Landman, 1987). For these reasons it is important to be aware of those psychological principles which may structure counterfactual thinking.

In exploring such principles we attempt to extend a line of reasoning developed by Gavanski and Wells (1989). These authors suggest that the preference for 'undoing' events may depend on their correspondence with the subsequent outcome in terms of whether the outcome to be undone is 'exceptional' or 'normal'. Their study was important because it challenged the previously accepted explanation of Kahneman and Tversky (1982).

Kahneman and Tversky (1982) described a cognitive heuristic — the *simulation heuristic* — in order to help account for how people reconstruct a dramatic outcome, such as a fatal accident. According to these authors the simulation heuristic amounts to people having a preference for replacing exceptional or extraordinary events in a scenario with normal or common ones, in attempting to generate an alternative outcome. This *normalization tendency* is endorsed by Kahneman and Miller (1986) in their *norm theory*. Support for this line of reasoning has also been forthcoming in a number of subsequent studies (e.g. Miller and McFarland, 1986; Wells, Taylor and Turtle, 1987).

However Gavanski and Wells (1989) noticed that this empirical evidence focused exclusively on scenarios with exceptional outcomes. When a *normal* outcome had to be undone (that is, made exceptional), subjects in their study tended to make a preceding normal event more exceptional rather than *vice versa*. For example, a good student who passes an examination (normal outcome) would perhaps likely not have passed (normal outcome made exceptional) if she was forced the evening before the exam to do chores in place of her usual revision (normal event made exceptional) (Gavanski and Wells, 1989). This finding suggested the operation of a more general heuristic reflecting a corresponding between cause (antecedent event) and effect (conclusion or outcome). This *normality-correspondence hypothesis* (p. 316), referring to the perceived resemblance between cause and effect, has a long history dating at least to the empiricist philosophy of Mill (1872/1973). More recently, within cognitive psychology, this principle has been captured in the *representativeness heuristic* of Kahneman and Tversky (1972). Thus, exceptional causes may be more representative of exceptional outcomes, and similarly, normal causes more representative of normal outcomes. Gavanski and Wells (1989) argue that: 'Although Kahneman and Tversky's notion of representativeness usually refers to *content* similarities between features of events, whereas normality is more of a *general property* or abstraction, we see no reason why general properties could not be a dimension along which judgments of representativeness and similarity are made' (pp. 316-317).

It follows then that the representativeness principle may apply to dimensions other than probability/normality in the undoing paradigm. We explore this question in terms of another pervasive and important dimension of events and outcomes in this context, namely their value, or 'valence'.

The evaluative dimension has already received some attention in the undoing paradigm. For example Kahneman and Miller (1986) have argued that it is more difficult to imagine a positive outcome to be less positive, than to imagine a negative outcome

to be less negative, and this idea finds support in some research by Landman (1987). In their study Gavanski and Wells (1989) consider whether 'positively valenced outcomes follow the same rules of mutation as negatively valenced outcomes' (p. 317) but their study was designed to test for normality-correspondence rather than value-correspondence.

In the present study, rather than simply looking at whether the pattern of undoing in terms of normality/exceptionality varies as a function of outcome valence, we consider whether valence *itself* can form a basis for counterfactual thinking in the undoing paradigm. If undoing of events and subsequent outcomes follows a pattern of correspondence in terms of normality/exceptionality as Gavanski and Wells's (1982) data indicate, it is possible that other dimensions such as value can also form the basis of representativeness. As suggested above, valence, and particularly the negativity of outcomes, is an important feature of counterfactual thinking. Although Gavanski and Wells did manipulate outcome valence, they did so to specify the normality of the outcome (p. 318). Normality of outcome in their study was varied by independently manipulating a starting condition (an excellent or poor student) and the outcome valence (the student failed or passed an exam). Thus a good student who passed or a poor student who failed were normal outcomes, whereas a good student who failed or a poor student who passed were exceptional outcomes. In this respect normality and valence were to some extent confounded (a good student who passed is never exceptional). Moreover, although two of the preceding events could be construed as positive in possibly contributing to a positive outcome (exam success), and *vice versa* for a negative outcome, the evaluative tone of these events was not directly stated or manipulated as an independent variable as such. More importantly for our purposes however, in Gavanski and Wells's study there was always one normal and one exceptional event which could be seen as facilitating (or inhibiting) the outcome, so that correspondence in terms of normality and value could be satisfied simultaneously making it impossible to assess the relative strengths of either as alternative bases of undoing.

In the present study the aim is to manipulate normality and value independently and set them in opposition to each other. The question then is whether people undo events along the lines of normality or along the lines of value when these strategies conflict. If value is an important dimension of undoing, a related question concerns the valence of the outcome and whether 'value-correspondence' is more pronounced for negative outcomes as could be inferred from the literature cited above.

METHOD

Subjects

Sixty male and female first year psychology students at the University of Amsterdam participated in the experiment. They were allocated at random to four conditions (15 subjects per cell).

Design and stimuli

The aim was to construct stimulus scenarios in order to manipulate independently the normality (normal versus exceptional) and the valence (positive versus negative)

of two contributory events and an ensuing outcome in order to determine which dimension (if any) was dominant in determining the undoing of outcomes. To this end we composed four different stories of 'The Tennis Match' (see Table 1). These stories were piloted beforehand with another comparable group of subjects to test for their comprehensibility and sense especially in the context of the undoing task.

Normality was manipulated via a personal norm by linking the event to custom or habit (*cf.* Gavanski and Wells, 1989; Kahneman and Tversky, 1982; Miller *et al.*, 1990; Wells *et al.*, 1987). The value of the events was always determined from the actor's point of view for purposes of consistency (i.e. 'liking' or 'disliking'). Regarding the value of the outcome of each story, we supposed winning to be more agreeable than losing so that evaluation is again determined from the actor's perspective.

To summarize then, both the normality (normal versus exceptional) and valence (positive versus negative) of events and outcomes were manipulated independently in a complete between-subjects design. Each subject was assigned to one variant of the scenarios at random. The specific scenarios are described below and their relation to the design is summarized in Table 1.

Table 1. The structure of the four scenarios

Event 1	Event 2	Outcome
Girlfriend present (N+)	Drinks coke (E-)	Winning (E+)
Girlfriend present (N+)	Drinks coke (E-)	Losing (N-)
Girlfriend present (N-)	Drinks coke (E+)	Winning (N+)
Girlfriend present (N-)	Drinks coke (E+)	Losing (E-)

N = normal; E = exceptional; + = evaluatively positive; - = evaluatively negative.

The tennis match:

'It is Wimbledon, and it is the quarter-finals of the men's singles. The sun is shining and a packed centre-court audience filled with celebrities looks on. Player A, who has already participated five times in the championships, has never (always) beaten his present opponent in their previous encounters. His girlfriend is, as always, in the stadium. He likes (dislikes) her being present when he's playing an important match such as this. His opponent plays a serve and volley game as is his style. During the breaks, player A normally drinks mineral water. Today, however, for no apparent reason, there is no mineral water available on court and he is obliged to drink coke. He dislikes this because he doesn't drink coke (quite likes this because he actually prefers coke). It is an interesting game. As usual, player A loses (wins) the game [unusually, player A wins (loses) the game this time].'

In this story, the normal event (girlfriend watching)¹ was either positively or negatively framed, as was the exceptional event (coke in place of mineral water) and both could result in positive or negative outcomes which were either exceptional or the norm. Thus each event pits normality-correspondence against value-correspon-

¹ Although technically this might not be termed an intrapersonal norm because it implicates the behaviour of another person, it is still a norm for the central character, and it is not clear that it should be treated as qualitatively different from the other norms as used in this paradigm.

dence in each scenario and the two events equally often are associated with normality-correspondence and value-correspondence across scenarios.

Procedure

The procedure and measures closely follow those previously used in this paradigm (Gavanski and Wells, 1989; Kahneman and Miller, 1986; Kahneman and Tversky, 1982; Wells and Gavanski, 1989; Wells *et al.*, 1987). Each subject was given a booklet containing an instruction page followed by the story followed by an open-ended response measure. Subjects were allowed to consult the story while answering the question (*cf.* Gavanski and Wells, 1989). Upon completion subjects were probed for suspicion and knowledge of the design, thanked and debriefed.

Dependent measure

After having read the scenario, the subjects were asked to write down a possible event or events which would have resulted in a different outcome (winning instead of losing or *vice versa*). For example subjects were asked: 'Suppose player A had won. Write down one (or more) events by which this could have happened'.

Coding

The answers to the open questions were coded by two independent judges blind to the design and manipulations. The judges disagreed on only one of the 60 subjects (an interrater agreement of 98 per cent) and a third judge arbitrated in this case. The first mentioned answer to this open question was taken as the indicator of undoing consistent with previous studies in this paradigm (e.g. Gavanski and Wells, 1989). All first answers were classified according to the normality and value dimensions in line with the design (see Table 1). In fact one of the two manipulated events was always nominated by subjects as their first answer; other events or circumstances were only raised as subsequent choices. In coding all first answers it was specifically determined whether each subject was guided by a similarity between events and outcome in terms of normality (normal [exceptional] events causing normal [exceptional] outcomes) or value (positive [negative] events causing positive [negative] outcomes).

Consider for example the case where player A likes the presence of his girlfriend, dislikes coke and wins exceptionally (see also Table 1). Altering this outcome (player A loses as usual) is possible by changing (among other alternatives) one of the two preceding events. Suppose a subject answers player A would have lost if his girlfriend had not been present that day. In this case the subject would have changed the normal positive antecedent to an exceptional and negative one. Thus an exceptional and negative event results in a normal but negative outcome reflecting a value-based correspondence between cause and consequence. In the case where the subject changes the second event from an exceptional and negative one towards a normal and positive one ('player A would have lost if he was not obliged to drink coke') he would have created a normality-based correspondence where a normal event (albeit positive) would result in a normal (albeit negative) outcome.

RESULTS

The basic question underlying our design concerns subjects' preference for undoing outcomes in terms corresponding with either the normality or the evaluative sign of the 'undone' or alternative outcome. Reversing each outcome necessarily involves a reversal of both normality and valence simultaneously, implying a choice between the corresponding dimension of undoing as illustrated above. The question is whether subjects are more likely to change (first) the event that is 'normatively' congruent or the event that is 'evaluatively' congruent with the old outcome to produce the new one. These frequency data broken down by condition are presented in Table 2.

Table 2. Response frequencies of (first) nominated event in terms of norm- or value-correspondence with outcome

Condition (outcomes to be undone)	Correspondence between (undone) event and outcome		
	Normality	Value	<i>n</i>
<i>Positive outcomes</i>			
Exceptional (E+)	4	11	15
Normal (N+)	5	10	15
Subtotals	9	21	30
<i>Negative outcomes</i>			
Exceptional (E-)	2	13	15
Normal (N-)	2	13	15
Subtotals	4	26	30
Total <i>ns</i>	13	47	60

Inspection of Table 2 reveals there are more subjects who change outcomes along the lines of value than normality: 13 subjects exhibited a normality correspondence and 47 subjects a value-correspondence (2-tailed *binomial-test*, $p < 0.00001$). This effect appears to be stronger for the undoing of negative outcomes. Collapsing the results across scenarios shows that for the positive outcomes nine and 21 subjects undid outcomes in terms of normality and value respectively whereas four and 26 subjects did so for the negative outcomes. This difference did not attain significance however. A *Catmod analysis of variance* (SAS, 1985) with correspondence (in terms of normality or value) between the undone event and the outcome as the dependent variable revealed no main effects for outcome value ($\chi^2 [1, N = 60] = 2.57$; $p = 0.11$), outcome normality ($\chi^2 [1, N = 60] = 0.10$; $p = 0.75$) nor an interaction effect between the two ($\chi^2 [1, N = 60] = 0.10$; $p = 0.75$). In sum, subjects consistently opted for value-correspondence irrespective of outcome normality or valence.

Manipulation check of perceived normality

Despite the clear-cut nature of this result, the possibility remains open that the value-correspondence effect occurred because subjects were not sufficiently aware of the information relating to normality. In other words, although the valence of the outcome is obvious in these scenarios, one might question whether the normality

of winning or losing was really recognized. If not, our results would say little about the relative effects of normality versus value and would only really represent a test of the effect of value-correspondence *per se*. To address this objection we conducted a post-experimental check on our manipulation. Twenty subjects read one of the four scenarios and were asked to estimate player A's probability of winning the tennis game in question. The results revealed that subjects gave much higher winning probabilities in the two scenarios in which player A had always won before (0.73) compared to the two scenarios in which he had never won before (0.15). Moreover, there were no differences depending on the actual scenario outcome (whether player A actually wins or loses). A 2×2 analysis of variance with outcome normality and value as between-subjects variables yielded a highly significant interaction effect: $F(1, 19) = 420.5$; $p < 0.00001$ (an interaction effect is predicted given that the scenarios in which player A has always won before is associated with either a normal positive outcome (N+) or an exceptional but negative outcome (E-)). In sum we may assume that the outcome of the stories appears to convey normality information as well as value.

DISCUSSION

In this study we attempted to build on the development by Gavanski and Wells (1989) of the undoing paradigm pioneered by Kahneman and Tversky (1982). Noting an imbalance towards the undoing of exceptional outcomes in this earlier work Gavanski and Wells offered an elegant demonstration that the normalization tendency was contingent on such outcomes, and could be reversed when undoing had to proceed from a normal to an exceptional outcome. A more parsimonious explanation for this finding seems to be available in the earlier work of Kahneman and Tversky on the representativeness heuristic (1972) — namely that there is some relationship of correspondence or similarity between the undone outcome and the undone event which presages it. We attempted to take this argument one step further and show that the undoing of normal or exceptional outcomes might also be vulnerable to another pervasive dimension of representativeness, namely evaluative tone.

Our results lend clear support to this idea. It is also worth remarking that undoing on the basis of corresponding normality received little support in our data, in contrast to the findings of Gavanski and Wells (1989). Subjects were on average almost four times more likely to undo outcomes on the basis of value than normality. Moreover this tendency did not significantly differ across normal and exceptional or positive and negative outcomes (and as the check on the normality manipulation reveals, subjects were able to discriminate this information quite easily, suggesting the preference for value-correspondence was not an artefact). Given that our design set normality and value in opposition to each other, this result can be taken as direct evidence for the power of value-correspondence which would seem at the very least to put it on a par with the normality-correspondence rule of Gavanski and Wells (1989).

With regard to the ascendancy of value over normality generally, some further corroborative evidence for this tendency is provided in a study by Abele (1985), albeit not in the undoing paradigm. In her study an introspective analysis revealed that valence weighed more heavily than expectations in determining perceived cause. In this and our study, the reason why the evaluative dimension seems to dominate

other cognitive factors may be related to the fact that the evaluative aspects of information are generally consequential, involving and salient and thus draw more attention and weight in causal judgment (*cf.* MacArthur, 1981; Weiner, 1985). The evaluative elements of a scenario may thus seem the most important elements to bring into alignment during undoing. Nevertheless, we should also sound a note of caution in generalizing our results. The present study (like Gavanski and Wells, 1989) is based on one particular story-line, so there remains a chance that our findings were influenced to some extent by features specific to the 'tennis player' scenario. In future research it may thus be important to replicate these findings for other story domains to ensure the generality of this pattern².

It is important at this point to remark on another more general difference between our study and that of Gavanski and Wells (1989) and others. Because our study was designed to test for the relative effects of value versus normality, we were careful to accord neither of the two factors used to manipulate these variables any logical *a priori* causal status in determining the outcomes, which might then be confounded with value or normality and perhaps differentially weight one or the other of these variables. This contrasts with those studies which have deliberately manipulated the facilitative or inhibitory relation of prior events to subsequent outcomes (e.g. Gavanski and Wells, 1989). We reasoned that the presence of the girlfriend, or the new drink, could equally be seen as inhibiting or facilitating the outcome. In short, we attempted to examine the effects of pure resemblance between event and outcome. Indeed, the evidence of a consistent pattern based on value-correspondence, independent of any overtly causal or facilitative mechanism, tends to underline rather than undermine the significance of this finding.

Although it was not the purpose of our design to test the effects of value or normality in competition with more clearly facilitative or inhibitory factors, it does seem likely that events that can be seen as having a more direct causal influence on outcomes will be the prime candidates for undoing in scenarios where these are present, salient and comprehended. In this regard we propose an hierarchical model in which causality ranks above representativeness in the undoing of outcomes. Based on our results, we further propose that different dimensions of representativeness may themselves be ordered hierarchically in terms of impact such that, other things being equal, value-correspondence will tend to rank above normality-correspondence.

The question then arises as to whether the general hierarchy described here is invariant or is sensitive to stimulus or task characteristics which affect the salience of different aspects of information and/or the quality of information processing. It seems quite possible that if certain elements receive enough attention, they may usurp factors higher in the hierarchy in determining perceived causality. For example, although more logically relevant information concerning contingency should generally supersede evaluative correspondence, it is possible that where the evaluative

² It is also worth pointing out that in our design value was manipulated within each event while normality was manipulated between the events in the scenario. However, this does not undermine the present findings. The *a priori* chance that subjects should undo an event on the basis of normality or valence is still the same for any one condition, and is in principle unaffected by the relation between conditions, which in any case would not be apparent to participants in such a between-subjects design. Moreover, for either a consistent value-correspondence rule or a consistent normality-correspondence rule to obtain, both girlfriend and drink aspects have to be mutated across conditions (as occurred), counterbalancing for any idiosyncratic effect of these elements.

tone of events and outcomes is especially salient, and/or where the processing demands on causal inference are great, value may even compete with more logically facilitative or inhibitory factors in guiding counterfactual thinking. A related point is that the levels of the hierarchical model outlined here are unlikely to be distinct in many real world situations. Although causal factors may usually outweigh the impact of events which only have their valence in common with outcomes, the fact is that many causally relevant events will also be evaluatively toned themselves, so that evaluative sign may then determine which among competing facilitatory events is preferred in undoing evaluative outcomes. After all, it is often the evaluative and usually undesirable nature of outcomes which motivates their undoing in the first place (see e.g. Miller *et al.*, 1990).

To summarize, it is useful to contrast our findings with the approach of Kahneman and colleagues who argue that '... an event is more likely to be undone by altering exceptional than routine aspects of the causal chain that led to it' (Kahneman and Miller, 1986). In the present study, correspondence based on valence rather than exceptionality was more predictive of undoing. It is also important to contrast these findings with those of Gavanski and Wells (1989). In showing that exceptional events are evoked to explain exceptional outcomes these authors suggest that the representativeness heuristic could be a more parsimonious basis of the simulation heuristic in this paradigm (Kahneman and Tversky, 1972). Our results qualify the findings of Gavanski and Wells insofar as they show that correspondences based on normality do not always obtain in this paradigm. However, because our findings can also be conceptualized in terms of another correspondence, specifically a value-based correspondence, they provide support for Gavanski and Wells's general interpretation in terms of representativeness.

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