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Counterfactual thinking in everyday life situations: Temporal order effects and social norms

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Counterfactual thinking is the comparison of a factual situation to a simulated alternative one. When people think about how things could have been different, they tend to mentally undo the last occurrence in an independent sequence of antecedents to an outcome. We report two experiments that examined this phenomenon that has been called the temporal order effect. The first experiment, with 132 participants, examined the effect of varying the number of everyday life events on the temporal order effect. The results show that, in mundane situations, the effect occurs only when the outcome is preceded by a sufficient number of events. The second experiment, with 177 participants, examined a possible interaction of the temporal order effect with a different mutability effect - the tendency to change controllable events that are exceptional with regards to interpersonal norms for behaviour. The results show that the mutability of these exceptional events is influenced by their position in an independent temporal sequence. We discuss the results in terms of social norms.

Counterfactual “if only” thoughts about what might have been involve the mental comparison of an actual situation with a simulated alternative. They have been studied both by philosophers (e.g., Lewis, 1973; Stalnaker, 1968) and psychologists (e.g., Byrne, 1997; Kahneman & Tversky, 1982; Kahneman & Miller, 1986). Counterfactual thinking has been shown to play

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a role in many cognitive processes such as causal judgements (e.g., Roese & Olson, 1997), deductive reasoning (e.g., Johnson-Laird & Byrne, 1991) and creativity (e.g., Hofstadter, 1985). Counterfactual thinking has also been shown to have a range of affective consequences. It has, for example, been shown to influence feelings of regret and elation (e.g., Gilovich & Medvec, 1994; Landman, 1987). Negative emotions, such as regret, can be spawned by upward counterfactual thoughts, where people compare the factual situation to a better alternative (e.g., Roese, 1994; Roese & Olson, 1995). Infrequently, positive emotions may instead result from downward counterfactual thinking, where people compare reality to a worse alternative. Both kinds of counterfactual thinking may have both functional and dysfunctional consequences (e.g., Roese, 1994; Sherman & McConnell, 1996).

When people imagine how things would or might have been different, they tend to focus on particular sorts of events to mentally undo in their construction of alternatives. They tend to focus on actions rather than failures to act (Kahneman & Tversky, 1982), at least in a short-term (Byrne & McEleney, 1997; Gilovich & Medvec, 1994). They focus on exceptional rather than routine events (Kahneman & Miller, 1986), dynamic rather than static events (Kahneman and Varey, 1990), and controllable rather than uncontrollable events (Giroto, Legrenzi & Rizzo, 1991). The focus of people's counterfactual thoughts also tends to be influenced by the order in which the information is presented to them. On the one hand, people tend to undo the first even of a causal chain and this tendency has been called the *causal primacy effect* (Wells, Taylor and Turtle, 1987). On the other hand, they tend to undo the last event of a independent temporal sequence, and this tendency has been called the *temporal order effect* (Miller & Gunasegaram, 1990). The main aim of this paper is to examine the temporal order effect more closely. The other aim was to examine how some of these different factors interact in determining the mutability of an event.

TEMPORAL ORDER EFFECT IN COUNTERFACTUAL THINKING

The temporal order effect was first explored by Kahneman and Miller (1986) who gave their participants a sequence of two letters: xf. When they asked people to quickly change one letter, their participants tended to change the second letter in the sequence rather than the first. That implies that they found the second letter easier to undo. Similarly, Miller & Gunasegaram (1990) offered their participants the following scenario:

Imagine two individuals (Jones and Cooper) who are offered the following very attractive proposition. Each individual is asked to toss

a coin. If the two coins come up the same (both heads and both tails) each individual wins £1,000. However, if the two coins do not come up the same, neither individual wins anything. Jones goes first and tosses a head; Cooper goes next and tosses a tail. Thus, the outcome is that neither individual wins anything.

Most people judged that the outcome could most readily have been different if Cooper (who acted second) had tossed a head, rather than if Jones (who acted first) had tossed a tail. They also tended to judge that Cooper would experience more guilt, and would be blamed more by Jones (e.g., Byrne, Segura, Culhane, Tasso & Berrocal, 2000; Miller & Gunasegaram, 1990;).

Byrne et al. (2000) have examined this phenomenon in a series of studies. Their experiments showed that the temporal order effect arises independently of strong preconceptions about normal descriptive order (e.g. heads and tails on a coin). When Byrne et al. changed game show scenarios like that used by Miller and Gunasegaram (1990), to use choices with no strong linguistic preconceptions (e.g., the participants in a game show must pick the same coloured card - red or black - from two separate decks in order to win), they continued to find a temporal order effect. In their experiments, they also showed that the temporal order effect depends on the order of events in the world, regardless of the order of events in the description occurs. When participants are offered scenarios like the one described above but in which the second individual is mentioned first (e.g. second individual picks a red card, before him the first individual gets a black card), people still tend to undo the actions of the person who acted second.

The cognitive mechanisms than underlie the temporal order effect can be explained in terms of the construction of counterfactual alternatives by revising mental models of the factual situation (Byrne, 1997; Johnson-Laird & Byrne, 1991). For example, people construct the following sort of representation of the coin-toss scenario:

jones -heads cooper -tails

where 'jones-heads' represents that Jones tossed a head, and 'cooper-tails' represents that Cooper tossed a tail (Byrne et al., 2000). When they must think of ways in which the outcome could have been different they may flesh out the counterfactual possibilities to be fully explicit:

factual: jones -heads cooper -tails
lose

counterfactual:	jones -heads	cooper -heads	<i>win</i>
	jones-tails	cooper-tails	<i>win</i>
	jones -tails	cooper -heads	<i>lose</i>

Different possibilities are represented on different lines, and the models are tagged to keep track of their epistemic status. As for other domains, due to the constraints of working memory, people fail to find counterexamples to the conclusions that they derive from their initial models (Johnson-Laird, Byrne, 1991). Likewise, the temporal order effect indicates that people only flesh-out their counterfactual models to contain one other possibility:

factual:	jones -heads	cooper -tails	
	<i>lose</i>		
counterfactual:	jones -heads	cooper -heads	<i>win</i>

The nature of counterfactual representations that people construct is defined by the fact that people make minimal changes to the factual events (Lewis, 1973; Pollock, 1986; Stalnaker, 1968), and that they are also more likely to delete an event than to add one (Kahneman & Miller, 1986; Kahneman & Tversky, 1982; Roese, 1994). On the other hand, counterfactual thinking is a goal-driven process, and therefore, in failure situations such as the one described in this scenario, people tend to represent how things might have been better (Roese & Olson, 1997). Consequently, the first model they flesh out is one in which both individuals win. But, why do people change the second event? The earlier event is presupposed because it *contextualises* the model, providing a cornerstone or anchor for the subsequent construction of models (Byrne et al., 2000; Segura, Fernandez-Berrocal & Byrne, 1998, 2000).

The anchoring process is evident in the “anchoring heuristic” (Tversky & Kahneman, 1982). People sometimes reduce ambiguity by starting with a beginning reference point or anchor and then they adjust the rest of information they receive in the light of it. For example, when people who are asked to play the role of a judge are given instructions about giving the harshest verdict first, they render significantly harsher verdicts than those ones who were instructed to consider lenient verdicts first (Greenberg, Williams & O’Brien, 1986). Similarly, the mentioned results (Byrne et al., 2000) suggest that the temporal order effect can arise because people

presuppose the first event and, therefore, they tend to mentally undo the second one.

This tendency has been suggested to play a role in everyday judgements such as the tendency for blackjack players to be averse to playing on the last box, for teams to put their faster runner last in a relay race, and for people to bet more on their predictions and their postdictions (Miller and Gunasegaram, 1990; Kahneman and Miller, 1986). Our aim in these experiments is to examine the temporal order effect more closely in everyday life situations in order to explore some of the cognitive mechanisms underlying counterfactual thinking.

EXPERIMENT 1

THE TEMPORALITY EFFECT IN EVERYDAY LIFE

The temporal order effect has been demonstrated mostly for sequences of two non-everyday life events as the ones described above about games (e.g., Byrne et al., 2000; Miller & Gunasegaram, 1990; Spellman, 1997). However, most of research on causal primacy effect using mundane scenarios has been carried out using sequences that were longer than two events such as four events (e.g. Segura, Fernandez-Berrocal and Byrne, 2002; Wells et al, 1987). Probably, these sequences are closer to the everyday life situations where people usually take in account more than two antecedents to an outcome.

On the other hand, the number of events has been examined to be an important factor showed across studies focus on other domains like causal reasoning (e.g. as the number of pieces of information increases, beliefs are less sensitive to the impact of new information; Hogarth & Einhorn, 1992).

Hence, does the number of mundane antecedents affect perceived mutability in temporal sequences? Our first aim was to establish whether there is a temporal order effect in mundane situations that vary in the number of events occurring before an outcome.

METHOD

Materials and design. We presented three versions of a scenario in which a woman called Maria carried out some tasks before leaving the house and being involved in an accident. One of the versions of the scenario is presented here:

Maria is a housewife. One morning, before going out, she put on the washing machine. Then, she drank a cup of coffee. Later, she ironed

the clothes. Then, she read the newspaper. Following that, she made a phone call. Then, she made the beds. After that, she did the dishes. Later, she cleaned the fridge. Then, she made some sandwiches. When she left, she had an accident in the car.

Maria thinks that she could have avoided the accident if she had not carried out some of the previous tasks, for example, if...

There were three versions of this scenario in which the outcome was preceded by a different number of events: three (*three-events* condition), six (*six-events* condition) and nine (*nine-events* condition). The nine antecedents were counterbalanced in the three cases. In all versions of the story, participants were asked to imagine how the situation could have been different. Hence, the dependent variable was the antecedent that participants chose to undo.

Participants and Procedure. The 132 participants were undergraduate students from different departments in the University of Malaga, who took part in the experiment voluntarily. They had not participated in such a study previously and they were tested in several groups. They were assigned randomly to the *three-events* condition (n= 42), the *six-events* condition (n=51), and the *nine-events* condition (n= 39). Participants were given a booklet with the instructions (thanking them for taking part in the experiment and explaining to them that they had to answer one simple question after reading a situation), as well as the story with the open question and a place to give the answer in separate pages. On completion of the experiment participants were verbally debriefed.

RESULTS AND DISCUSSION

We coded participants' first responses by serial position (i.e., the position in the scenario held by that event). First responses that did not concern one of the nine target events were coded as others, and could not be scored for serial position. Results are presented in Table 1.

Table 1: Percentage of participants first responses mentioning events in each position in Experiment 1.

	<i>nine-events</i>	<i>six-events</i>	<i>three- events</i>
n	39	51	42

Position			
<i>1st</i>	8	6	19
<i>2nd</i>	8	9	17
<i>3rd</i>	10	17	29
<i>4th</i>	3	6	
<i>5th</i>	3	9	
<i>6th</i>	5	18	
<i>7th</i>	5		
<i>8th</i>	8		
<i>9th</i>	26		
<i>Others</i>	24	35	35

Data were analysed by the hypothesis test for two proportions. Results showed a temporal order effect for the *nine-events* condition ($n = 39$). Participants' counterfactual thoughts focused on the last event (26%) more than on any of the other events [fourth and fifth events: 3% each; binomial, $z = 3.01$, $p < 0.001$; sixth and seventh events: 5% each; binomial, $z = 2.543$, $p < 0.001$; first, second and eighth event: 8% each; binomial, $z = 2.83$, $p < 0.01$; and the third event: 10%; binomial, $z = 1.738$, $p < 0.05$].

For *six-events* condition, the highest percentage of counterfactual thoughts was found again for the last event (18%). Although this percentage was only significantly higher than the percentage of participants who mentioned the first and the fourth events (6% each; binomial, $n = 51$, $z = 1.785$, $p < 0.05$).

Finally, for the *three-events* condition, participants' counterfactual thoughts focused mostly on the last event (29%). Although this percentage did not differ significantly from the percentage of participants that mentioned the second and first events (17% and 19%, respectively).

The results indicate that, in mundane situations, there is a tendency to undo the last event in a temporal sequence. But this effect depends upon the number of antecedents events to an outcome: while there is not a temporal order effect for the *three-events* and the *six-events* conditions, the tendency is strong in the *nine-events* condition.

Why is the case that for more mundane scenarios the temporal order effect needs a long sequence to occur and that is not necessary for the previous explored situations? We suggest that, probably, real life situations (e.g. different activities which are neither related to each other nor related to a final result) are not always defined in terms of goals (e.g. winning a game

which is defined by the result of each player). Hence, events are perceived as being independent, but do not seem to be in a sequence unless there are a sufficient amount of them (more than six events). The higher the number of events, the more likely people are to consider those events as part of such a sequence. Then, due to the limits of working memory, people do not represent all the different counterfactual possibilities of the scenario. Instead, they only construct a model of the situation where the first part of the information *contextualises* the model that they represent of the scenario, and that is the reason for them to undo the second part of such information.

EXPERIMENT 2

TEMPORAL ORDER EFFECT AND SOCIAL NORMS IN COUNTERFACTUAL THINKING

While there have been many efforts to elucidate the kinds of factors that can affect the mutability of events, there has to date been little systematic study of how the various factors interact (Gleicher, Kost, Baker, Strathman, Richman & Sherman, 1990; Vinokur & Ajzen, 1982). This current lack of understanding of how the myriad different factors that contribute to counterfactual mutability can be extended to those works that have looked for evidence for mutability effects in people's real-life (e.g., Davis & Lehman, 1995), and that may be why they find mixed results.

A few studies have considered interactions between some of the mutability factors mentioned above, and have shown that the controllability effect is stronger than the temporal order effect (e.g. Giroto et al., 1991). We suggest that the temporal order effect may interact with factors that are related to social norms, and these norms play an important role in many real life situations.

McCloy and Byrne (2000) showed that people are more likely to change inappropriate controllable events, which are exceptional with regards to interpersonal norms for behaviour, than to change appropriate controllable events, which are normal. They suggest that events can deviate from interpersonal norms along a number of different dimensions (e.g., perceived necessity, legality, selfishness).

The first aim of this study was to establish the effects of varying interpersonal normality on a unexplored dimension: selfishness. We predicted that controllable events which were *selfish* (i.e., done purely for the self) would be more mutable than controllable events which were *selfless* (i.e., done for more than just the self), because selfish events are exceptional with respect to interpersonal norms and selfless events are normal.

The second aim of this study was to explore the interaction between interpersonal normality and the temporal order effect. We predicted that the selfishness of an event would interact with its position in a temporal sequence, in that selfish events which occur last in an independent temporal sequence should be changed more often than selfish events which occur earlier.

METHOD

Materials and design. We use the same constructed scenario for the previous experiment describing a morning in the life of a woman (Maria). On this day, Maria carried out nine tasks before leaving the house. Of these, eight were everyday household tasks (e.g., dusting, ironing, washing clothes, sweeping, cleaning the fridge, making the beds, doing the dishes, making sandwiches) while one was an event carried out purely for Maria herself (reading a magazine). Within the group of eight, we did not include any of the other tasks from the previous study that could be considered to be done only for the self (e.g., making a phone call; drinking a cup of coffee). Moreover, the task consisting on reading the newspaper was changed by reading a magazine, in order to make it very clear that it was something that Maria did for herself, because a person might read the newspaper for a number of non selfish reasons (for example: looking for a job or searching for emergency telephone numbers). The outcome of this scenario was again that on leaving the house Maria had a car accident. Participants were asked to imagine how the outcome might have been different if she had not done one of the tasks.

The within-subjects variable was the nature of the tasks (*selfish* vs. *selfless*). The between-subjects variable was the position in which the selfish event appeared in the scenario. For one group the selfish event (reading a magazine) appeared in the first position in the scenario (the *start* condition). For a second group it appeared in the fifth position in the scenario (the *middle* condition) and for a third group it appeared in the ninth position in the scenario (the *end* condition). The position of the eight selfless events in the scenario was varied to control for event effects, so that each event appeared equally as often in each of the remaining eight positions in the scenario. Again, in all versions of the story, participants were asked to imagine a situation in which things had been different. Hence, the dependent variable was the antecedent that participants chose to undo.

Participants and Procedure. The participants were 117 undergraduates from the University of Malaga, Spain. They had not

participated in such a study previously and they were tested in several groups. Participants were assigned at random to one of the three experimental conditions regarding the position of the *selfish* event (first, $n = 35$; middle, $n = 42$; last, $n = 40$). They received a booklet with the instructions, the task and the open question as in experiment 1. On completion of the experiment, participants were also verbally debriefed.

RESULTS AND DISCUSSION

In this experiment, we additionally analysed the nature of the events that participants chose to undo (*selfish* or *selfless*). We therefore coded which of the nine events participants first responses to the mutation question focused on. First responses that did not concern one of the nine target events were again coded as others, and could not be scored. Results are presented in Table 2.

Table 2: Percentage of participants first responses mentioning each of the target events in the scenario in Experiment 2.

	<i>Start</i>	<i>Middle</i>	<i>End</i>	Overall	
n	35	42	40	117	
Events					
<i>Read magazine</i>	31	19	40	30	
<i>Clean fridge</i>	11	14	3	9	
<i>Make beds</i>	3	7	3	4	
<i>Sweeping floor</i>	0	5	5	3	
<i>Make sandwiches</i>		3	5	3	3
<i>Do ironing</i>	0	7	3	3	
<i>Do dusting</i>	3	0	5	3	
<i>Wash dishes</i>	3	0	3	2	
<i>Washing machine</i>	3	2	0	2	
<i>Others</i>	43	41	35	41	

Overall, participants first responses focused significantly more often on the *selfish* event (reading a magazine; 30%) than on any of the *selfless* events ($n = 117$; see fourth column, Table 2). They undid it significantly more often than cleaning the fridge (9%; binomial, $z = 3.54$, $p < 0.001$), making the beds (4%; binomial, $z = 4.74$, $p < 0.001$), ironing, sweeping the

floor, making sandwiches, dusting (3% each; binomial, $z = 4.96$, $p < 0.001$) washing the dishes and putting on the washing machine (2%, binomial, $z = 5.43$, $p < 0.001$).

This pattern holds in the condition where the *selfish* event occurred at the *start* ($n = 35$) of the scenario (see first column, Table 2). Participants first responses undid the *selfish* event, reading a magazine (31%), significantly more often than any of the *selfless* events in the scenario: cleaning the fridge (11%; binomial, $z = 1.81$, $p < 0.05$), making the beds, washing the dishes, putting on the washing machine, dusting, and making sandwiches (3% each; binomial, $z = 2.89$, $p < 0.001$), ironing, and sweeping the floor (0% each; binomial, $z = 3.32$, $p < 0.001$).

It also holds in the condition where the *selfish* event occurred at the *end* ($n = 40$) of the scenario (see third column, Table 2). Participants first responses focused more often on reading a magazine (40%) than on any of the other events: dusting, and sweeping the floor (5% each; binomial, $z = 3.30$, $p < 0.001$), cleaning the fridge, making the beds, washing the dishes, ironing, and making sandwiches (3% each; binomial, $z = 3.64$, $p < 0.001$), and putting on the washing machine (0%; binomial, $n = 16$, $z = 4.00$, $p < 0.0001$).

However, the pattern is not the same for the condition where the *selfish* event is located in the *middle* (the fifth position) of the scenario ($n = 42$; see second column, Table 2). Reading a magazine was once again the most common first response (19%). It was mentioned significantly more often than sweeping the floor and making sandwiches (5% each; binomial, $z = 1.90$, $p < 0.03$), putting on the washing machine (2%; binomial, $z = 2.33$, $p < 0.01$), washing the dishes, and dusting (0% each; binomial, $z = 2.83$, $p < 0.003$). Although it was not mentioned significantly more often than cleaning the fridge (14%), making the beds or ironing (7% each).

As predicted first, the *selfish* controllable event is more mutable than events than are *selfless*. We suggest that these results provide a replication of the effects of *interpersonal* exceptionality, and that they extend this effect to events that deviate from prevailing interpersonal norms along an unexplored dimension, that of selfishness.

Like in the previous experiment, we coded participants' first responses by serial position. First responses that did not concern one of the nine target events were again coded as others, and could not be scored. Results are presented in Table 3.

The effects of selfishness are strongest in the *end* condition where the *selfish* event appears in the last position in the scenario. Participants focussed significantly more often on this event when it was located at the *end* of the sequence (40%, $n = 40$) than when it was located at the *middle*

(19%, $n = 42$, $z = 2.090$, $p < 0.025$), but not when the event was located at the *start* (31%). In any case, the effects are considerably weaker in the *middle* condition (19%), where participants did not mention significantly the target event more often than in the *start* condition (31%). This suggests that the effects of selfishness and position in a temporal sequence interact in determining counterfactual mutability.

As predicted, the results of the experiment also showed that the mutability of selfish events varies with their position in the scenario. Selfish events that occur last in an independent temporally ordered sequence are more mutable than those which occur in the middle of the sequence. However, the *first* event in this temporal sequence is also highly mutable. Why might this be the case? One suggestion is that this may be the result of two different tendencies - the tendency to undo the last event in a temporal sequence (e.g., Miller & Gunasegaram, 1990), and the tendency to undo the first event in a causal sequence (e.g., Wells et al., 1987). It is possible that some of our participants may have inferred that the events in the scenario formed a dependent causal sequence, rather than an independent temporal sequence, and that this may have resulted in them focusing on the first event in the sequence, rather than on the last. However, the results of the first experiment do not support this idea, because participants do not tend to undo the first event. A second possibility is that the results may reflect the relative availability of the events in memory (in terms of primacy and recency effects). Nevertheless, our interpretation of the results to the first experiment as well as that by Byrne and her colleagues (Byrne et al., 2000) leads us to rule out an explanation of the temporal order effect in terms of recency effects, and hence they may not be enough to account for all of our results.

Table 3: Percentage of participants first responses mentioning events in each position in the scenario in Experiment 2.

	<i>Start</i>	<i>Middle</i>	<i>End</i>
n	35	42	40
Position			
<i>1st</i>	31	5	8
<i>2nd</i>	0	5	5
<i>3rd</i>	0	2	0
<i>4th</i>	0	2	3
<i>5th</i>	9	19	0
<i>6th</i>	0	5	5
<i>7th</i>	3	2	0

<i>8th</i>	11	7	3
<i>9th</i>	3	12	40
<i>Others</i>	43	41	36

We suggest an explanation of the present results in terms of social norms for behaviour that also affect the particular order in which these events should take place. The occurrence of the selfish event early in the scenario may violate people's assumptions about when people normally carry out such actions. A selfish action carried out when there are selfless tasks waiting to be done may be seen as more exceptional than one carried out after the completion of such tasks.

GENERAL DISCUSSION

Our first finding is that the temporal order effect, the tendency to undo the last event in a sequence of independent antecedents to an outcome, seems to depend on the number of antecedent events in everyday situations. We argue that, in real life, for temporal sequences, people often deal with chains of events that are much longer than just two events and usually goals are not so well defined. Therefore, the information that provides the cornerstone or anchor for the mental model's foundation of the situation need to be composed by a sufficient amount of events for people to perceive the group of them as a sequence that affect an outcome.

Our second finding is that the temporal order effect interacts with social norms. In everyday life, we face social situations that are defined by norms. These norms are not always explicit and they indicate to people about the behaviour they must follow if they want to belong to the group. These norms rule the everyday social world and they determine what is appropriate and what is not appropriate. Events can deviate from what is acceptable or appropriate in a dimension such as selfishness. People tend to mentally undo those events that are exceptional with respect to these norms, as when events are inappropriate (McCloy and Byrne, 2000) or they are selfish, as we have shown.

People's counterfactual thoughts following negative outcomes tend to be geared toward helping them avoid such outcomes in the future, so they tend to imagine how things could have been better (Roese & Olson, 1997) and those events which are more exceptional are more probable to be selected. The exceptional events are more deviated from the norms as commissions do not maintains the status quo compared to omissions in the action effect (Byrne & McEleney, 1997; Kahneman & Tversky, 1982) and

they are more probable to be selected. A selfish event would be exceptional with respect to the social norm or what is appropriate. In addition, when this event happens in a temporal sequence is more mutable if it located in the last place.

However, we found that people also tend to undo those selfish events that are located in first place. We suggest that rather than being a causal primacy effect (which does not happen in Experiment 1) it is another consequence of violating social norms for behaviour. There may be norms not only about which events deviate from the established codes of behaviour, but also the order in which those events should occur. Hence, a selfish event may be seen as more exceptional when it happens first in a sequence. In other words, there are social rules about the order of events that affect people's thoughts when they imagine how things could have been different.

In addition, these assumptions about norms have affective consequences like guilt which is probably the most representative counterfactual emotion and clearly happens from violating social norms. Guilt is the result of a process that starts with an event that has negative consequences and involves judgements about blame and responsibility (Shaver, 1985). We suggest that the order in which this event happens also affect people's attributions. We think that, for example, a person would feel guilty not only because she has carry out an action but also because this action was carried out first. In our scenario, Maria would regret and feel guilty not only for reading a magazine but also because she did it in first place before doing all her household chores and there are some implicit social norms about doing chores first.

Conclusions.

The temporal order effect has been demonstrated mainly for sequences of two events and using non-mundane scenarios. We found no effect in everyday life scenarios with less than six events, but we did find a clear temporal order effect for sequences of nine events. The explanation can be described, mostly, in terms of the amount of information that people need to consider when they are thinking about these everyday situations and the constraints of working memory. Future research should address the question of how many alternatives people naturally consider in counterfactual thinking. The concept of working memory may well play a central role in the future development of this area of cognitive psychology (Richardson, Engle, Hasher, Logie, Stoltzfus, & Zacks, 1996), and the effects of mental load in general on counterfactual thinking may be a promising future area of research (Kahneman, 1995).

We have also showed that there is an interaction between this temporal order effect and other factors, such as interpersonal norms. These norms form the basis of everyday social situations and they can also act to constrain counterfactual thinking. Specifically, events that are selfish, are considered to be more mutable than those ones which are selfless and particularly when they are located in the last position in a nine event sequence. Selfishness is maybe related to emotions like guilt. Future research should consider the interaction of factors that determine thinking about what might have been in everyday circumstances considering social norms of behaviour, including studies across cultures. The understanding of the role of social norms would help to explore the consequences that counterfactual thinking has on attributions of causality, and emotions such as guilt, blame, and regret.

RESUMEN

Razonamiento contrafáctico en situaciones de la vida diaria: Efectos de orden temporales y normas sociales. El razonamiento contrafáctico es la comparación de una situación fáctica con una alternativa simulada. Cuando las personas imaginan cómo las cosas podrían haber sido diferentes, tienden a deshacer mentalmente el último suceso de una secuencia de acontecimientos independientes previos a un resultado. Se presentan dos experimentos que examinan este fenómeno que ha sido denominado el efecto de orden temporal. El primer experimento, con 132 participantes, examinó el efecto de variar el número de eventos de la vida diaria en el efecto de orden temporal. Los resultados muestran que en situaciones cotidianas, es necesario un número suficiente de sucesos para que efecto se produzca. El segundo experimento, con 177 participantes, examinó una posible relación entre el efecto de orden temporal con un efecto diferente: la tendencia a cambiar eventos controlables que son excepcionales respecto a las normas interpersonales de conducta. Los resultados muestran que la posición en una secuencia temporal de sucesos independientes afecta a la facilidad para cambiar esos eventos excepcionales. Los resultados se discuten en términos de normas sociales.

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