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Not governed by chance:
Flipping a coin to make own decisions

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Declaration of scientific integrity

I hereby declare that I have single-handedly written this dissertation without the assistance of third parties and without any resources that are not indicated. The sources that were used are marked accordingly. The published manuscripts and the manuscripts submitted for publication were developed together with the co-authors and were not published, submitted for publication, or submitted to another examination board as qualification work by any of the involved parties. The dissertation is based on the following manuscripts:

- Douneva, M., Jaffé, M. E., & Greifeneder, R. (2019). Toss and turn or toss and stop? A coin flip reduces the need for information in decision-making. *Journal of Experimental Social Psychology*, *83*, 132–141. https://doi.org/10.1016/j.jesp.2019.04.003
- Jaffé, M. E., Douneva, M., & Greifeneder, R. (2020a). Solve the dilemma by spinning a penny? On using random decision-making aids. *Invited revision at Judgment and Decision Making.*
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Basel,

Maria Douneva

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~

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Not governed by chance: Flipping a coin to make own decisions

A Psychological Tip

Whenever you're called on to make up your mind,
and you're hampered by not having any,
the best way to solve the dilemma, you'll find,
is simply by spinning a penny.

No - not so that chance shall decide the affair
while you're passively standing there moping;
but the moment the penny is up in the air,
you suddenly know what you're hoping.

Piet Hein (1905 – 1996)

1: Introduction

Decision making is ubiquitous and has implications for every aspect of life. Making decisions is tied to humans' fundamental need for control, and it is therefore not only desirable to be able to make decisions, but in fact necessary (Leotti, Iyengar, & Ochsner, 2011). The plethora of research on the values and positive consequences of having choice (for an overview, see Botti & Iyengar, 2004, p. 312) conveys the impression that people always want to make decisions, and that whenever given the option between choosing and not choosing, they would prefer to choose.

What is far less studied are the numerous situations in which people do not want to make decisions. Besides personality factors (some people are chronically indecisive, Germeijs & De Boeck, 2002), arguably every person has encountered situations in which they found themselves preferring to not make a decision. The two main situational factors that can lead to choice avoidance are selection difficulty and anticipated regret/blame (Anderson, 2003). However, there is more between choosing and not choosing—for example, delegating decisions. Delegating a decision is an appealing strategy, because it allows one to cope with difficult choices while still retaining some of the benefits of choosing (that opting

out of the choice altogether would not offer; Steffel & Williams, 2017). If, however, no one else is available to whom a decision could be delegated, or no one else wants to take on the responsibility of deciding, delegating the decision to a chance device, such as a coin flip, can be an alternative. In some cases, people will let the coin randomly determine an outcome and will follow its suggestion. The coin then functions as a *decider*. In other cases, the coin might rather function as a *catalyst*, enabling people to make a decision themselves. While "simply spinning a penny" and "passively standing there", they might "suddenly know" what they are hoping for.

My research focuses on this peculiar phenomenon of flipping a coin to decide but then making a decision independent of the coin flip. This is a phenomenon many people have encountered in their life (Jaffé, Douneva, & Greifeneder, 2020a), but for which a thorough scientific explanation has been lacking so far. I introduce a model focusing on approach versus avoidance motivations for decision outcomes versus decision processes, resulting in four quadrants in which I locate previous findings and my own research on coin flips for decisions. I then discuss the reluctance to involve chance in decisions before closing with implications of my work and future directions.

2: When people prefer to make decisions and when they do not

I started my introduction by juxtaposing that although people value making decisions, they can also find themselves in situations in which they avoid making them and instead delegate (part of) the decision to, for example, a coin flip. I will now describe this juxtaposition in more detail to show when exactly a coin flip comes into play and how it bridges the valuation and avoidance of choice.

Valuing choice. People have a strong preference for choosing and making their own decisions. Being able to choose is tied to the fundamental need for control (Skinner, 1996) and to motivation (Ryan & Deci, 2000). The anticipation of choice is associated with increased activity in brain regions involved in affective and motivational processes, demonstrating the inherent value of having the opportunity to choose (Leotti & Delgado, 2011). Even when people are unaware of their preferences, choosing activates a psychological immune system that bolsters the value of a personally selected outcome (Gilbert, Pinel, Wilson, & Blumberg, 1998). People value decision rights beyond their instrumental benefit (Bartling, Fehr, & Herz, 2014), and their desire to make own decisions goes so far that they even want to decide when they would be better off delegating to others

(Bobadilla-Suarez, Sunstein, & Sharot, 2017; Botti & Iyengar, 2004; Botti & McGill, 2006; Botti, Orfali, & Iyengar, 2009).

Avoiding choice. While research has repeatedly shown how strong and sometimes detrimental the desire for choice is, this desire has boundaries. Based on previous literature, Anderson (2003) provides a comprehensive model of decision avoidance and shows that various forms of decision avoidance result from selection difficulty and anticipated regret/blame. For both of these antecedents of decision avoidance, he identifies further antecedents. For selection difficulty, these are preference uncertainty, reasons (how many exist for a particular decision), decision strategy (compensatory vs. non-compensatory), degree of structure of the decision, attractiveness of the option set, and cultural values (Figure 4, p. 157). For anticipated regret/blame, these are reversibility of the decision, expected outcome feedback (learning what would have happened if one had chosen differently), loss aversion, mutability (ease of generating counterfactuals), anticipated future opportunities, and perceived responsibility (Figure 3, p. 151). In sum: Many different factors can contribute to decision avoidance, some being more rational and others more emotional.

In contrast to making a decision, *avoiding a decision* does not describe a single action but can come in various forms (e.g., staying with the status quo or the default option, omission, deferral; Anderson, 2003). Consequently, not all antecedents listed above lead to the same forms of decision avoidance. As my research focuses on decision delegation, I will focus on responsibility aversion as the most relevant antecedent identified by the literature.

Avoiding responsibility as motivation to delegate to others. Delegating decisions is an appealing strategy, because it allows one to cope with difficult choices while still retaining some of the benefits of choosing (Steffel & Williams, 2017). There are different motivations to delegate decisions to others: First, choosing can be effortful as it takes up time and energy, and delegation reduces the effort of choosing (Steffel & Williams, 2017). Second, another person might be better suited to make the decision because they have more knowledge or special abilities (Hamman, Loewenstein, & Weber, 2010). Third, people can transfer some of the responsibility for a decision through delegation, and it appears that this motivation is a very strong one. Steffel and colleagues (2016) find that people only delegate to others who can assume responsibility regardless of the others' expertise, and that people delegate primarily to cede responsibility instead of putting choices in the hands of more capable others. Taken together, reducing responsibility is a strong motive to delegate a decision to someone else (Bartling & Fischbacher, 2012).

Avoiding (felt) responsibility as motivation to delegate to chance. In a situation in which people wish to delegate a decision to someone, it could happen that no one else is available to whom a decision could be delegated, or that no one else wants to take on the responsibility of deciding. Delegating the decision to chance can be an alternative then. While not the focus of their studies, Steffel and colleagues (2016) note that the desire to avoid feeling responsible or being blamed is "unique to delegation and does not extend to other methods of choice avoidance, like […] flipping a coin, that do not absolve decision makers of responsibility and blame" (p. 32). Leonhardt, Keller, and Pechmann (2011), however, claim that the presence of chance lessens feelings of responsibility (p. 405), and Beattie and colleagues (1994) find that participants prefer "chance mechanisms like a coin flip to remove choice (and thus blame and accountability) from themselves" (p. 134). The apparent contradiction between these findings might stem from not clearly distinguishing between *process* and *outcome* responsibility. When people flip a coin, they are responsible for the process of making a decision, namely using a coin flip (Keren & Teigen, 2010). It is an open question, however, as to who is responsible for the outcome of the coin flip. Normally, only persons are thought of as responsible agents, and are traditionally only made responsible for consequences they could have controlled (Fischer & Ravizza, 1998).

It appears that people strategically make use of the vagueness surrounding responsibility in the case of chance in the same way they more generally use "moral wiggle room" to feel better about making decisions that might negatively reflect upon them (Dana, Weber, & Kuang, 2007). For example, when asked whether they want to donate or not, people prefer a random option instead of making that decision, and choosing this random option decreases moral self-reproach (Lin & Reich, 2018). In general, people care more about *feeling* good than about *doing* good (for an overview, see Gino, Norton, & Weber, 2016). Feeling less responsible can therefore be a strong motivation to delegate to chance. This diffusion of responsibility not only affects perceptions of own behavior, but also how others judge this behavior: People are less willing to punish someone for delegating (than for taking actions directly), even when the result is the same (Bartling & Fischbacher, 2008). In sum: Randomness allows people to obtain a desired outcome in a way that lessens their perceived causal role in obtaining it.

3: Approach and avoidance motivations for decisions involving chance

In Chapter 2, I contrasted wanting and not wanting to choose, and showed that responsibility concerns for the decision process play an important role. In Chapter 3, I now

suggest viewing this juxtaposition through a motivational lens and describe it in terms of approach and avoidance tendencies—a distinction that is fundamental to studying human behavior (Elliot & Covington, 2001). Instead of attaching approach and avoidance motivations only to decision outcomes, I also attach them to the responsibility for the process to obtain these outcomes. This is in line with the call to move beyond the simple hedonic principle that people approach pleasure and avoid pain and to also address the means by which people obtain desired end states (Higgins, 1997). In addition to being motivated to avoid bad outcomes and to approach good outcomes, I suggest that people can be motivated to avoid and to approach responsibility for making decisions that lead to those outcomes.

Coins as deciders and catalysts in approach-avoidance situations. The focus of my research is to describe and explain what happens when a coin flip acts as a catalyst, and I do this on the level of feelings, thoughts, and information regarding the decision at hand in addition to individuals' adherence to the coin suggestion. Figure 1 shows a conceptual model of the four situations I will describe, including prototypical thoughts that decision makers might have and the function of the coin flip in these situations. I suggest that the coin can act as a catalyst and bring about change in three of the four situations, but will typically move the decision maker to an own decision in only one of the four situations. I therefore call the coin in that situation a *strong catalyst*, and a *weak catalyst* in the other two situations.

	Avoid process responsibility	**Approach process responsibility**
Avoid (bad) outcome	*"I want to avoid that something bad happens which I could be blamed for, so I want to distance myself from everything"* Coin = decider [3.1]	*"I want to avoid that something bad happens which I could regret, so I want to find a way to make a good decision myself"* Coin = weak catalyst [3.3]
Approach (good) outcome	*"I want the best outcome for me, but I could be blamed for choosing that way, so it would be better if I do not make the decision myself"* Coin = strong catalyst [3.2]	*"I know what the best outcome is for me and I want to make a decision myself"* Coin = weak catalyst [3.4]

Figure 1. Overview of the four situations resulting from avoiding versus approaching process responsibility and avoiding bad versus approaching good outcomes (chapter numbers are included in brackets).

It is important to note that my model is a simplification and that, in reality, a particular decision might quickly move from one quadrant to the other for various reasons,

but the model provides a useful framework for integrating previous research and my own findings on coin flips for decisions. To the best of my knowledge, I have included all research that examines coins as randomizers.

3.1: Avoiding a bad outcome and avoiding process responsibility

If people want to both avoid a bad outcome and responsibility for the decision process (e.g., because there are only unattractive options in the choice set and the decision impacts others as well), they are in an *avoidance-avoidance* situation. People would then prefer to not make a decision at all, but if they cannot opt out from making a decision, they might flip a coin to let it randomly determine an outcome and would follow its suggestion. The coin then acts as a *decider*. This is how coin flips have mostly been treated in the literature, leaving no room for the possibility that people might not adhere to the coin suggestion (and if so, then it was a sign of cheating, e.g., Batson, Kobrynowicz, Dinnerstein, Kampf, & Wilson, 1997; DeSteno, Duong, Lim, & Kates, 2019; Shalvi, Dana, Handgraaf, & De Dreu, 2011).

An exemplary avoidance-avoidance situation is the following (adapted from Beattie et al., 1994): “Your sister Mary passed away and you are the trustee of her estate. Mary had two children. All the money has been divided equally, and Mary's possessions must now be divided. Mary's only major possession was a priceless antique grand piano, which both children used to play on and which both children would now like to have”. Here, 62% of participants opted for a coin flip instead of deciding themselves. When asked why, they often mentioned fairness and blame avoidance (“The coin is arbitrary and impartial”, “It would not be fair to judge which child deserves or needs the piano more. Randomness is the only way”, “'This way it is totally random and I won't get blamed by the loser”, p. 140).

The situation is prototypical for using a coin as a decider: The coin’s main purpose is to make an unbiased and fair decision of which a person would not be capable in that situation. This feature is particularly important in situations involving two or more parties when there are no strong arguments favoring one of the options and in which both options entail negative consequences. This is, for instance, the case for difficult medical decisions (e.g., which one of two patients should receive an organ transplant; Keren & Teigen, 2010), when people are asked to implement inequity (e.g., there is only one award for two equally deserving individuals; Gordon-Hecker et al., 2017), or in moral decisions with unattractive options (e.g., the trolley dilemma; Gordon-Hecker & Olivola, 2019). In these cases, people prefer to flip a coin instead of making an own decision when they cannot exit the decision situation.

While previous research has examined antecedents of using a coin flip as a decider, it largely remains silent about the consequences of making a decision this way. One exception is Levitt's (2020) study, in which undecided individuals were invited to let a coin flip decide for them, mostly for decisions between keeping versus changing the status quo. Follow-up surveys examined whether the coin influenced behavior and whether there is a causal impact of making a change on happiness. People who were told by the coin to make a change (vs. to maintain the status quo) were more likely to have made a change, were happier, and were more likely to say they would make the same decision again (Levitt, 2020). Still, those results only show how people felt about the decision outcome, not how they felt about the decision process. How did participants feel about the suggestion by the coin flip? Did the coin reduce felt responsibility? Would participants flip a coin again? Although coin flips as deciders are not the focus of my research, some of my data can speak to these questions.

Own judgments about flipping a coin as a decider and catalyst. Jaffé and colleagues (2020a, Study 1) asked 461 participants about their past experiences with flipping coins to gauge what the respective consequences were. While 54% of participants indicated having never flipped a coin for a decision, 46% had done so. Most of the latter (82%) had also experienced a feeling (e.g., happiness, disappointment, relief) when looking at the outcome and 65% suddenly knew what they wanted. When asked about the last situation in which they had flipped a coin and the resulting decision, 55% decided in line with the coin suggestion, 24% did the opposite, and 21% still did not make a decision. In addition, those who had experienced a feeling (vs. not) more often indicated having done the opposite of what the coin suggested (28% vs. 8%), and less often indicated having made no decision (19% vs. 30%). Despite these experiences, only 48% of the "past coin flippers" would flip a coin again, and only a few participants (1%) would flip a coin when they had not done so in the past. These results show that flipping a coin is a strategy that some but not all people use, and which more often than not leads to emotional reactions and more clarity regarding the decision. Still, the willingness to flip a coin is relatively low among those who have already done so, and practically non-existent when never having flipped a coin before.

Others' judgments about flipping a coin as a decider. To examine ascribed responsibility as downstream consequence of using a coin as a decider, Douneva, Jaffé, and Greifeneder (2020a) conducted two studies (total $N = 268$) with a focus on observer judgments. Participants learned about Frank, who had received a voucher for a theater, and could not decide which play to watch. They read: "Frank decided to use a decision making aid and flipped a coin after assigning heads to one of the plays and tails to the other. The

result of the coin flip was heads and Frank went to the play associated with that outcome". The play then either turned out to be enjoyable or boring (positive vs. negative decision outcome).

In Study 1, participants first read that Frank makes an own decision, and then imagine the situation again but read that he flips a coin (see above). Outcome valence was kept constant across the own decision and the decision with a coin. Flipping a coin led to lower ascriptions of responsibility for both positive and negative outcomes than when making an own decision that resulted in the same outcome. This implies that compared to making an own decision, an individual using a coin as decider is seen as less responsible for the decision.

In Study 2, using a coin as a decider was not contrasted with making an own decision, but the outcome of the decision was again either positive or negative. This time, responsibility ascriptions were significantly higher when the outcome was negative compared to positive. Participants apparently "punished" the target person for making a decision with a coin flip by ascribing higher responsibility to him for a negative (vs. positive) outcome. In the absence of other information, participants apparently assume that the decision would have turned out better if Frank had decided himself.

Taken together, while people choosing to flip a coin might do so with the intention of being less responsible for a decision, others appear to punish them for negative outcomes that are the result of flipping a coin. This is in line with people's general preference for argument-based decisions (Elster, 1988) and with research on accountability showing that people suffer negative consequences when they cannot provide satisfactory justifications for their actions (Stenning, 1995). In that sense, Steffel and colleagues (2016) are right that flipping a coin cannot absolve people from responsibility and blame, at least not when the prevailing assumption is that making an own decision would have led to a different (and better) outcome.

3.2: Approaching a good outcome and avoiding process responsibility

When people want to obtain a good outcome but do not want to make a decision themselves, meaning when they avoid process responsibility, I suggest that the coin can act as a strong catalyst. An example for a strong catalyst situation comes from Anna, a friend of mine who works as a therapist. One of her patients had recently graduated from university and had two job offers. One was in the small city in northwest Germany that he was currently living in, a city he liked and knew well. The other one was in Berlin, several hours away and very different. He could not decide which job offer to take. Anna and her patient started

compiling lists of pros and cons and spent hours on that decision, without success. Finally, Anna tried something different and suggested flipping a coin for his decision. “But – I don’t need to do what it says, right?” – “Let’s see what happens”. She flipped the coin, which suggested to take the job in Berlin. In that moment, her patient said with a sigh of relief: “This was what I was hoping for”. After that, the decision was crystal-clear to him.

This situation can be seen as an approach-avoidance situation: Anna’s patient had two good job offers between which he could not decide and apparently had a preference (approach motivation for a good outcome), but was hesitant to act upon it and avoided making a decision (avoidance motivation for the process). It appears that the coin flip moved Anna’s patient from an approach-avoidance situation to an approach-approach situation, enabling him to make a decision himself. In this situation, the coin flip served as a *catalyst*—a condition or event that is the cause of important change (Cambridge Dictionary).

Support for the idea that a coin flip can trigger change comes from Levitt’s (2020) large-scale online study in which undecided individuals were invited to let a coin flip decide for them, mostly for decisions between keeping versus changing the status quo. More than 22,000 coins were flipped, signaling a high interest in resorting to chance. Follow-up surveys several months later showed that participants who were told to make a change (vs. told to maintain the status quo) were more likely to have made a change. Levitt (2020) concludes that “some part of the impact of the coin toss is to accelerate changes that would have happened anyway, but at a later date” (p. 9). Using the image of a person standing at a crossroad and deciding whether to turn left or right, Levitt’s conclusion suggests that the coin was not simply telling people where to turn because they had no idea where to go. Instead, it pushed people in the direction they would have gone anyway. However, Levitt’s (2020) results do not speak to any mechanism that might trigger this change. I suggest that feelings in response to the coin flip are a mechanism that can lead to a strong catalyst experience.

Feelings as information. Another example for a strong catalyst situation comes from one of our studies, in which a participant described that she was trying to decide whether or not to attend a party. She flipped a coin, and the coin suggested going to the party, but she strongly disliked this suggestion and suddenly knew that she did not want to attend the party (Jaffé, Douneva, Reutner, & Greifeneder, 2020). Both Anna’s patient and our participant found themselves in an approach-avoidance situation. It appears that the critical ingredient here to move them to an approach-approach situation was an emotional reaction—relief when the coin suggested the preferred option (Berlin), and dissatisfaction when the coin suggested

the non-preferred option (going to the party). Thus, it appears that emotional intensity is the driving force, and not so much valence (Jaffé, Reutner, & Greifeneder, 2019).

Traditionally, judgment and decision-making research has focused on factual information as the most important ingredient for (good) decisions (e.g., rational choice theory; von Neumann & Morgenstern, 1947). The scientific interest in feelings as influences on decisions emerged relatively late, but has in the meanwhile established them as "potent, pervasive, predictable, sometimes harmful and sometimes beneficial drivers of decision making" (Lerner, Li, Valdesolo, & Kassam, 2015, p.799). For example, the *feeling-as-information* account holds that feelings, just like factual information, can be used as information to guide decisions (e.g., Schwarz, 1990): People might ask themselves how they feel about the decision object and then rely on this feeling to make a decision. A coin flip might similarly trigger a reliance on feelings and thereby function as a catalyst.

Feelings evoked by a coin flip as information. To test this, Jaffé and colleagues (2020a) recruited 548 participants across two studies (2a and 2b) who indicated being undecided regarding an upcoming decision with two options and examined a) to which extent feelings towards a coin flip outcome arise in an experimental setting when people contemplate own decisions, and b) to which extent the coin and the feelings facilitate decision making (vs. a control group without a coin). In both studies, participants described decisions that were rather difficult and important, they indicated that they would rather regret making a wrong decision, and that it was rather likely they would make a decision within the next weeks. Content-wise, the decisions covered a broad range of topics and also varied in terms of whether participants categorized them as rather rational or emotional, as impacting only themselves or others as well, and whether they comprised "should I / should I not" decisions or decisions between two options. Coin participants were introduced to the coin flip as a decision aid and not as a decider (i.e., they were explicitly told that they would make the decision on their own and would not need to adhere to the suggestion).

Participants showed a relatively high degree of skepticism towards the coin flip: More than half of them (2a: 57%, 2b: 71%) did not want to flip a coin for their decision. Because of the experimental nature of the study, the coin was flipped nevertheless, and most participants (2a: 78%, 2b: 68%) had an immediate feeling when looking at the outcome (satisfaction: 39% / 18%, relief: 16% / 31%, disappointment: 23% / 20%; only 23% / 32% indicated being indifferent). The experienced feeling was moderately strong, and some participants (2a: 16%, 2b: 17%) wished to flip the coin again. Neither the experienced feelings nor their strength differed between participants unwilling and willing to flip a coin.

Despite participants' skepticism towards the coin, many of them experienced a certain feeling when the coin suggested what to do. However, follow-up surveys did not reveal any consequences of flipping a coin versus not on the decision (data available upon request), meaning that coin participants were neither more likely to make a decision nor did they make their decision earlier. This is in contrast to Levitt's (2020) conclusion that a coin accelerates changes that participants would have made anyway. A crucial difference is that Levitt's conclusion is based on a self-selected sample that knew there would be a coin flip involved before describing a decision, and there was no control group without a coin. It is therefore an open question under which circumstances feelings evoked by a coin flip translate into downstream consequences for actual decision making.

It is furthermore evident that it is challenging to rebuild the conditions necessary to evoke the strong catalyst experience under controlled conditions. Even when participants have chosen to flip a coin themselves in the past, they indicated quite often that they were still not able to make a decision (21%; Jaffé et al., 2020a). Experimentally confronting people with a coin flip without their explicit wish might lead to an even higher share of participants unable to make a decision, for example, because participants might actively resist the influence of the coin. Langer (1975) notes that people are often either unaware of the motivational factors that influence their behavior in chance situations, or they do not wish to appear "irrational" by admitting the influence of chance on them (p. 327). Another challenge is that we actually do not know in which approach-avoidance situation participants were. If participants in the two studies presented above were rather motivated to approach instead of avoid process responsibility, the coin could not satisfy this motivation and therefore did not help with making a decision. I next turn to exactly those situations.

3.3: Avoiding a bad outcome and approaching process responsibility

Why it is that even when people are undecided and voluntarily flip a coin, some still cannot make a decision? I suggest that when people want to avoid a bad outcome but want to have process responsibility, their main motivation is to find a good way to make a decision themselves. Imagine you are in a relationship and think about breaking up with your partner. The main factor for decision avoidance here is likely an emotional one, namely anticipated regret/blame (Anderson, 2003). As such, the reversibility of the decision is low, one will not know how the non-chosen option would have played out, but it is easy to generate counterfactuals once a decision is made (Figure 3, p. 151). To minimize actual regret and

blame, people should be rather motivated to say that no matter how the decision turned out, they did their best to make a good decision (and not that they delegated it).

With this motivation, people normally would not flip a coin. This might have been the case for the 57% and 71% of participants in the studies described above (2a and 2b; Jaffé et al., 2020a) who indicated that they did not want to make their decision with a coin. They experienced feelings, but those feelings might not have been strong enough to override the motivation to find a good solution in a different, more reason-based way—for example, by thinking about reasons that speak in favor of one option but not the other.

Coming up with reasons as an attempt to achieve process responsibility. When people are about to make a decision, they might start thinking about reasons that matter for this decision, because they anticipate being held accountable for their decision (Lerner & Tetlock, 1999). The reasons people then come up with, however, might not be the best reasons for making that particular choice. In fact, when people verbalize reasons for a decision before making it, they can end up being diverged from what is really important to them (Wilson et al., 1993). Coming up with many reasons for a decision might therefore not only be unnecessary, but even detrimental. The decision process takes longer, and the option people ultimately choose might not be the one leading to long-term satisfaction (Wilson et al., 1993). Especially for complex decisions, focusing on feelings instead of details results in subjectively and objectively better decisions (Mikels, Maglio, Reed, & Kaplowitz, 2011).

A coin flip that evokes feelings might in theory be a good guide for making complex decisions. Focusing on feelings (vs. deliberation) in choice causes people to see their true selves reflected in those choices (Maglio & Reich, 2019), and people are more satisfied with decisions when they perceive them as guided by their "true self" (Kim, Christy, Rivera, Hicks, & Schlegel, 2020). Yet, people are reluctant to make decisions without basing them on rational arguments, as is the case when flipping a coin, especially when the decision is important (Keren & Teigen, 2010). People use decision importance as a cue for deferring decisions in the sense that more important decisions should take time and effort (Krijnen, Zeelenberg, & Breugelmans, 2015). Accordingly, people should come up with rather more than fewer reasons when they are about to make an important (vs. less important) decision, such as whether to break up with their partner or not. When people desire to take time for a decision, confronting them with a coin flip might counter this desire, because flipping a coin is normally a method of ending the decision-making process (e.g., people indicate it is a strategy they would use rather late after trying other strategies; Jaffé et al., 2020a, Study 2).

In that case, the coin contradicts the usual way of making an important decision and might thereby trigger the generation of even more reasons.

Reasons for important decisions with and without a coin. To examine how a coin flip influences the number of reasons deemed relevant for important decisions, Douneva, Jaffé, and Greifeneder (2020b) conducted three studies (total $N = 854$) with participants in romantic relationships who were currently thinking about breaking up with their partner. In the first study, half of the participants were presented with a coin flip as a decision aid. Participants were then shown a list with the ten most common reasons for staying in and the ten most common reasons for leaving a relationship (order counterbalanced; adapted from Joel, MacDonald, & Page-Gould, 2017). Compared to control participants who did not see a coin flip, coin participants indicated that more of those reasons played a role. Coin participants' tendency whether to stay or to leave the relationship was not influenced by the coin suggestion and did not differ from the control group's tendency.

This pattern held in the next study with two between-subjects factors as well. There, coin and control conditions were crossed with participants in relationships who were thinking about breaking up and with participants in relationships who were *not* thinking about breaking up. The 20 reasons for staying and leaving in that study additionally varied in how common they were (again adapted from Joel et al., 2017). Still, coin participants in both samples indicated that more of those reasons play or would theoretically play a role in that decision. Coin and control participants did not differ in terms of whether the decision seemed clearer to them, whether they felt closer to making a decision, or how well they could imagine making a decision. Importantly, coin participants felt a lower need to justify their decision, which suggests that deeming more reasons to be relevant was not an expression of reactance. Again, participants' tendency (whether to stay or to leave the relationship for those who were thinking about it) was not influenced by the coin suggestion and did not differ from the control group's tendency.

In the third study, coin and control conditions were crossed with participants in relationships who were thinking about breaking up and with participants who were single. This time, participants did not see a list of reasons but wrote down own reasons. Although the differences were smaller than in the two previous studies, the pattern still held: Coin participants, regardless of their relationship status, wrote down more reasons that play or should play a role in the decision. Again, coin versus control participants did not differ regarding other variables (clarity, nearness, control over the decision, imagination, justification, decision tendency).

Across three studies, participants who saw a coin flip suggesting how to make an important decision came up with more reasons that they deemed relevant than control participants. However, the coin did not influence decision tendencies and therefore did not act as a strong catalyst for participants contemplating a decision. Besides a motivational explanation (that participants wanted to find a good solution themselves), there might also be a normative explanation: For some decisions, it seems particularly inappropriate to use a coin flip (e.g., life and death decisions, Keren & Teigen, 2010). Relationship decisions might be one of those. Although the coin flip was explicitly described as a decision aid and not as a decider, normative considerations might have led participants to generate even more arguments as an attempt to find an appropriate (i.e., rational and argument-based) solution, regardless of whether they were currently contemplating the decision themselves.

3.4: Approaching a good outcome and approaching process responsibility

In an *approach-approach* situation, people want to obtain a good outcome and are ready to take on responsibility for the process (e.g., because they know their preference and make a decision that only impacts them) and therefore want to make a decision themselves. Typically, they would not flip a coin then, but might still be confronted with a suggestion – when opening a fortune cookie after a meal with friends, when reading a horoscope in some magazine while waiting for a doctor's appointment, or when a friend gives unsolicited advice. People have difficulties ignoring advice and are influenced by it even when they know that the advice is unreliable (Fiedler, Hütter, Schott, & Kutzner, 2019). Similarly, coin flips might exert influence on decision-related processes even when people already have a preference and when people do not decide to flip a coin themselves.

When people are on the brink of making a decision but have not yet done so, this can have various reasons, for example, a (perceived) lack of information. This can lead to the postponement of decisions, with more or less severe consequences. If the decision concerns a consumer product, one might miss out on a special price. If the decision concerns a prosocial act, one might miss out on an opportunity to help in time. Given that people make up their mind quicker than they think (Klein & O'Brien, 2018), providing a shortcut in the form of a coin flip could be beneficial in such situations.

Information need in the domains of personnel, consumer, and prosocial decisions. People hold the assumption that the more information they possess, the better their resulting decision will be (Peters, Klein, Kaufman, Meilleur, & Dixon, 2013). They prefer to have more rather than less information in decision-making settings, even when that

information has no effect on the decision (Redelmeier, Shafir, & Aujla, 2001), or when the amount of information lowers decision performance (O'Reilly, 1980). Having too much information can result in negative consequences for both the decision and the decision-maker (see Fukukura, Ferguson, & Fujita, 2013, p. 658 for an overview).

Across five experiments (total $N = 997$), Douneva, Jaffé, and Greifeneder (2019) find that after participants make a preliminary decision between two options, a coin flip reduces their need for further information before settling for a final decision compared to control participants. Participants rarely adhere to the coin but stick to their preliminary decision as much as or even more than the control group. These results hold for various decisions that can be categorized as approach-approach situations, because participants did not have anything to lose and were apparently ready to make an own decision, given that they rarely deviated from their preliminary decision: They decided whether they would prolong a manager's contract (Studies 1, 1b, and 1c), judged which one of two backpacks costs more (Study 2), and donated money provided by us to an organization of their choice (Study 3).

The fact that participants needed less information after seeing a coin flip conceptually aligns with research showing that specific physical acts associated with the concept of closure (e.g., closing or covering something) can trigger choice closure (Gu, Botti, & Faro, 2013). Because a coin flip is often used to determine an outcome, it might activate the concept of having made a final decision. Similarly, it might signal a transition from deliberation to implementation (Beckmann & Gollwitzer, 1987; Heckhausen & Gollwitzer, 1987). Both of these explanations relate to the notion that by flipping a coin, one moves psychologically closer to the decision and therefore needs less information (Halamish & Liberman, 2017).

Forfeiture thoughts in the domain of consumer decisions. If a coin flip indeed moves individuals psychologically closer to a decision, then it might also cause them to mentally shift from the advantages to the disadvantages of deciding (Eyal, Liberman, Trope, & Walther, 2004). Instead of thinking about what they would gain, individuals might start thinking about what they would lose. The coin flip could therefore elicit forfeiture thoughts, especially when the suggestion is incongruent (vs. congruent) with people's initial preference, as the coin flip then emphasizes that the preferred option will be forfeited.

To test this, Jaffé, Douneva, and Greifeneder (2020b) conducted two studies (total $N = 310$) in the domain of consumer behavior, namely deciding between two snacks (again an approach-approach situation). The results show that a coin flip indeed elicits forfeiture thoughts (regarding both the snack it suggests and the snack it does not suggest choosing). Forfeiture thoughts are also more prevalent when the coin suggests the snack participants

prefer less. The goal of the next study in this line of research is to assess acquisition thoughts next to forfeiture thoughts, and to also examine confidence in decision making as a potential consequence of the change initiated by the coin flip.

Feelings in the domain of prosocial decisions. There is evidence that a coin flip can also elicit and strengthen feelings in approach-approach situations, namely when people can choose menu courses (Jaffé et al., 2019). While those studies found that participants' feelings are stronger after they receive a random suggestion, a menu choice is not emotional in nature and therefore unlikely to be influenced by the strength of those feelings, and there were no such effects indeed.

To examine whether participants display more affect-based valuation with a random suggestion, Jaffé and colleagues (2020) conducted two studies (total $N = 382$) with a task adapted from Hsee and Rottenstreich (2004). In the original task, participants decided how much money to donate for four and for one panda. Participants showed *valuation by affect* when information about the pandas was presented pictorially, meaning they donated similar amounts of money for four pandas and for one panda. This is presumably because participants were *scope insensitive*—they based their decision on their general evaluation of how much they like pandas, not on the number of animals they could save. In contrast, participants showed *valuation by calculation* when information about the pandas was presented abstractly, meaning they donated more for four pandas than for one panda because they were presumably *scope sensitive*.

Jaffé and colleagues (2020) used scenarios with four different animals and hypothesized that a random suggestion by a lottery wheel would make participants scope insensitive as it should make the decisions more vivid and concrete, mirroring the pictorial condition in Hsee and Rottenstreich (2004). In short, one study found support for this hypothesis, whereas the second did not. It therefore remains an open question as to whether the feelings elicited by a random suggestion also influence subsequent choices, and answering this question is the goal of the next study in this line of research.

4: The reluctance to use chance

Many people are familiar with the phenomenon of a coin flip as a catalyst from their own experience (Jaffé et al., 2020a). Yet, whenever people describe an own decision and are then asked to consider flipping a coin, they are rather reluctant to do so. This is in contrast to Levitt's (2020) study demonstrating a high interest in letting chance decide. A major difference between his study and the experiments presented in this dissertation is that his

sample selected into the coin condition. This raises the question of whether people who flip a coin are systematically different from those who do not. To explore this, Jaffé and colleagues (2020a; Study 1 and supplemental material) asked participants for their willingness to use coin flips and measured ten related personality constructs (indecisiveness, need for closure, buck passing, preference for intuition and deliberation, counterfactual thinking, superstition, tempting fate, tendency for fatalism, conscientiousness, honesty-humility), but the correlations were overall rather small. Personality differences therefore do not entirely explain the reluctance to use chance, at least not the ones examined so far.

Keren and Teigen (2010) investigated various factors of the decision situation that might influence the willingness to flip a coin (as a decider), but found that participants' reluctance was a relatively robust phenomenon. It was slightly diminished when the decision was of low importance, when participants were informed that there were no further reasons for making the decision, and when it was made clear that the decision could be biased if no coin is used. They discuss several reasons for the reluctance to flip a coin as a decider.

First, flipping a coin might imply giving up control, which people do not like (Skinner, 1996). In the case of catalysts, participants do not seem to perceive a lack of control: When asked about it, catalyst and control participants indicate similar levels of control and autonomy when making their decision (Douneva et al., 2019; Study 3). Second, there are contexts in which the use of randomizers is negatively connotated (e.g., gambling), which might transfer to other contexts. Yet, when asking participants to first think about a past event in which randomness/chance played a role, participants mostly describe positive events, and the valence of the event is not associated with the willingness to use chance for an own decision then (Jaffé et al., 2020a; Study 3). Last, it is expected that people should be able to justify their choices with adequate arguments and reasons (Shafir, Simonson, & Tversky, 1993), and that they should be accountable for their decisions (Tetlock, 1992), in particular when the consequences of the decision are important. Coins might not be seen as delivering appropriate reasons.

This last argument taps into an underexplored reason for people's reluctance to use coin flips both as deciders and as catalysts, namely the expectation of being evaluated negatively for flipping a coin. In fact, 57% of participants were reluctant to flip a coin for decisions that only impacted themselves, while 71% were reluctant to do so when others were impacted as well (Jaffé et al., 2020a, Study 2a). This higher reluctance might reflect that decisions are more important when more people are affected by them, but also that others could evaluate someone negatively for flipping a coin, making people refrain from using

chance. Is this fear warranted, meaning: Do people "punish" others for flipping a coin for a decision, even if it is mainly used to gain insight into one's feelings?

Douneva and colleagues (2020b) conducted three studies (total $N = 437$) which shed light on this question by employing an observer perspective on decisions with coin flips. In Study 1, participants first read that Frank makes an own decision regarding which theater play to watch (own decision baseline), and then imagine the same situation again but learn that Frank flips a coin for his decision. Participants ascribe higher responsibility to Frank when he flips a coin and does not adhere to it (catalyst condition) than when he adheres to it (decider condition). These results hold for both positive and negative decision outcomes (whether the play turns out to be enjoyable or boring).

In Study 2, participants first read that Frank flips a coin for his decision and adheres to it (decider baseline), and then imagine the same situation again but learn that Frank flips a coin, listens to his feelings, and then either adheres to the coin or not. Participants ascribe higher responsibility to Frank when he does not adhere to the coin than when he does, although he bases his decision on his emotions in both of those catalyst conditions. Again, the results hold for both positive and negative decision outcomes.

In Study 3 with a complete between-subjects design and only a negative decision outcome (choosing an online certification he does not like), participants rated responsibility similarly in the coin conditions and the own decision condition, while agency was rated highest when making an own decision, significantly lower when not adhering to the coin, and again significantly lower when adhering to the coin. Taken together: While participants perceive using a coin flip as a catalyst as more responsible than as a decider, they "subtract" some of the target's responsibility compared to making an own decision. As Keren and Teigen (2010, p. 100) note, "responsibility in the case of randomizers [is] a very tricky issue". In the case of catalysts, it is arguably an even trickier issue, and poses challenges for the acceptance of a coin flip as a decision aid.

5: Implications and future directions

My dissertation combines motivational, cognitive, and emotional aspects to explain a decision-making phenomenon that has long been subsumed under choice avoidance (Dwenger, Kubler, & Weizsäcker, 2013; Steffel, Williams, & Perrmann-Graham, 2016) or as a consequence of decision aversion (Beattie, Baron, Hershey, & Spranca, 1994). I here paint a more nuanced picture and show that while avoiding process responsibility for obtaining a bad outcome might be the main motivation to flip a coin as a decider, the motivation to avoid

process responsibility given the motivation to approach a good outcome might explain why coin flips sometimes act as strong catalysts, and I show that coin flips can also have effects in the absence of avoidance motivations. This dissertation thereby advances theorizing by not simply equating using chance with avoidance, but by disentangling process responsibility from the overall decision process as a crucial predictor and consequence of using chance. This allows the prediction of when people might involve chance instead of entirely opting out of choosing and instead of making a decision themselves, and furthermore allows the prediction of various downstream consequences of doing so (e.g., feelings and thoughts after using chance), which have not been addressed by previous research in their entirety.

While I focus on coin flips as prototypical examples of chance devices, there are many more, for example, die rolls, lottery wheels, and counting-out rhymes. Research on those devices as catalysts is scarce, in particular for important decisions, and the evidence so far paints a mixed picture of whether they operate like a coin flip (Jaffé et al., 2019, Study 2; Jaffé et al., 2020). It is also not yet entirely clear at which point in time the catalyst phenomenon exactly operates: Is the random suggestion the critical component, or can the catalyst phenomenon already arise before the outcome is known ("the moment the penny is up in the air")? One way to better gauge the temporal unfolding of the phenomenon would be to start the randomizing process and ask participants whether they wish for a certain outcome before the outcome is shown. This leads to another unanswered question, namely how intentionally people use coin flips as catalysts.

People might start out with the intention to use a coin as a decider and then sometimes experience it as a catalyst (then the random outcome would be the critical component), or they might be aware of the folk wisdom surrounding the coin flip and use it to actively explore their feelings (then the anticipation of a random outcome might be sufficient). The latter is something participants can be directly asked, while the former is challenging to rebuild under controlled conditions. My model suggests that the coin should strictly act as a decider in avoidance-avoidance situations and can act as a catalyst when people want to avoid process responsibility, but it is questionable to what extent people are aware of the specific decision situation they find themselves in. In addition, approach and avoidance tendencies are a moving target and can quickly transform (Ehrlich & Fasbender, 2017).

To derive practical implications, it is necessary to first address the reluctance to use coin flips as non-binding decision aids. Although people seem willing to flip a coin as a decision aid for a variety of hypothetical decisions, their willingness strongly decreases for own decisions, even when those decisions are content-wise similar (Jaffé et al., 2020a; Study

3). This difference between hypothetical and real decisions points to a Construal Level Theory perspective (Trope & Liberman, 2010) regarding the willingness to flip a coin. The abstract idea of consulting chance might be overridden by the concrete possibility of letting something random influence one's decisions. One way of testing this would be to examine whether people recommend flipping a coin to distant friends but not so much to close friends.

Another obstacle is that people hold the lay theory that a quick choice is a bad choice (Inbar, Botti, & Hanko, 2011), and think that more important decisions should take more time and effort (Krijnen et al., 2015). However, people's lay theories about decision processes can be altered (Inbar et al., 2011; Study 3). Taking a psychoeducational approach, people could be informed about speed-accuracy tradeoffs in decision making and that they use less information than they think to make up their mind (Klein & O'Brien, 2018). This might let them see coin flips as shortcuts in a different light.

Lastly, it is questionable whether decisions should always be made as quickly and efficiently as possible. Even if a coin flip does not influence any decision processes, it can be valuable to use it to consult one's feelings, because it might lead to perceiving the subsequent decisions as guided by the "true self". People are more satisfied with their decisions when they simply perceive them as guided by their true selves – it is not necessary that their decisions are actually different than making them without guidance by their true selves (Kim et al., 2020). Furthermore, taking time to think about a decision can have merits on its own and should not always be viewed as a deficiency, but as an important part of identity work. Newark (2014) notes that apart from leading to decisions, decision making can inspire "remarkable human insights, delights, and dolors" (p.162), an aspect which unfortunately is often overlooked.

6: Conclusion

When people want to make a decision but are unable to choose, they are sometimes told to flip a coin to find out what they really want. My proposed model explains the functions of a coin flip in different motivational states, and suggests that the appeal of the coin as a catalyst lies in its ability to simultaneously satisfy two needs: the motivation to obtain a particular outcome while reducing felt responsibility for the process of obtaining it.

~

"The world is governed by chance. Randomness stalks us every day of our lives."

*Paul Auster (*1947)*

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Toss and Turn or Toss and Stop? A Coin Flip Reduces the Need for Information in Decision-Making

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Abstract

When deciding between two options, settling can be difficult if one option is superior on one dimension but inferior on another. To arrive at a conclusion, people may gather further information, thereby running the risk of prolonging or blocking the decision-making process or even making suboptimal decisions. Here, we suggest that random decision aids may prove fruitful by reducing the need for further information. Five experiments (total $N = 997$) examined how information need is influenced after making a preliminary decision between two options and then receiving a suggestion from a random decision aid (a coin flip). Across studies, coin participants are less likely to request additional information (Study 1 and two follow-up studies, combined $p = .021$) and indicate a lower need for additional information (Study 2, $p = .023$, and Study 3, $p = .001$) compared to a control condition without a coin flip. Interestingly, participants do not necessarily adhere to the coin but stick to their preliminary decision as much as or even more than the control group, suggesting that the decision aid does not determine the decision outcome. This is true for hypothetical decisions between changing versus maintaining the status quo without an objectively correct solution (Studies 1, 1b, and 1c), for a decision between two options with an objectively correct solution (Study 2), and for a real monetary decision without an objectively correct solution (Study 3). Random decision aids may thus help to avoid decision blocks or the collection of too much information.

Keywords:

decision-making, information need, random device, coin flip

Toss and Turn or Toss and Stop? A Coin Flip Reduces the Need for Information in Decision-Making

Imagine that you receive two job offers after applying for several jobs. One promises an average salary and good work-life balance, while the other promises an extraordinary salary but comes with a high workload. In other words, one option is superior to the other on one dimension (work-life balance) but inferior on another (salary). This *attribute conflict* is inherent to many real-life decision situations (Carpenter, Yates, Preston, & Chen, 2016). The notion of *conflict* implies a negative connotation, and being undecided is indeed often experienced as aversive (van Harreveld, Rutjens, Rotteveel, Nordgren, & van der Pligt, 2009). People therefore try to resolve this state using various strategies (Carpenter et al., 2016), for example, by writing down arguments or asking friends, effectively resulting in more information about the decision options.

Decision aids, such as making lists or asking for advice, are often methods to gather information. They are expressions of the widely held assumption that the more information people possess, the better their resulting decision can be (see Peters, Klein, Kaufman, Meilleur, & Dixon, 2013), as put forward by classic economic theories such as rational choice theory (von Neumann & Morgenstern, 1947). This assumption is also reflected in the strategies people employ to make everyday decisions. In a study unrelated to this paper (materials and results available upon request), we asked 149 participants which decision aids they would use to decide between movies, restaurants, hotels, and so forth. Two frequently mentioned decision aids were asking friends or family (61% of participants) and thinking about or making a list of pros and cons (50% of participants), suggesting that collecting information is a valued decision-making strategy. People indeed prefer to have more rather than less information in decision-making settings, even when that information has no effect on the decision (Redelmeier, Shafir, & Aujla, 2001), or when the amount of information lowers decision performance (O'Reilly, 1980). One explanation for these behaviors might be that having more information fosters the feeling of

being in control (even if only illusory), which is considered to be a fundamental human motive (Kelley, 1971; Skinner, 1996).

Although accumulating information is desirable, it is time-consuming and thus not always feasible (Halamish & Liberman, 2017). Furthermore, one may end up having too much information, which may result in negative consequences for both the decision outcome and the decision-maker (see Fukukura, Ferguson, & Fujita, 2013, p. 658 for an overview). Finally, the need to gather further information can also result in not making a decision at all, a situation colloquially termed *analysis paralysis.* It describes the "inability to respond effectively to a situation due to an over-analytical approach or to an *excess of available information*" (The Oxford English Dictionary, 1989, emphasis added).

One way of ending analysis paralysis can be to let chance decide. A random decision device does not provide arguments or any actual information about the decision options. Instead, it offers a clear solution. In this paper, we investigate how information need is influenced when people are confronted with a suggestion coming from a random decision device before they settle for an option. In contrast to most previous research, we do not understand the random device as a decider (which effectively determines the decision), but as an aid supporting autonomous decisions. Before we outline our perspective, we will cover literature on random decision devices more generally.

An Alternative to Deciding by Oneself: Using Randomizers for Decisions

A vast body of literature suggests that people generally like to make decisions themselves: People find it inherently rewarding to have choice (Leotti & Delgado, 2011), people tend to have an aversion to uncertain outcomes (Simonsohn, 2009), choosing provides a sense of control (Leotti, Iyengar, & Ochsner, 2011), and choosing results in more enjoyment and higher task performance in the chosen activities (compared to when not being able to choose; Botti & Iyengar, 2004). However, this preference for choosing is seemingly eliminated or even reversed under certain circumstances: for instance, when choice options are very similar

(Botti & McGill, 2006), when having to choose between undesirable options (Botti & Iyengar, 2004), when one might regret the decision (Steffel & Williams, 2017), when one wants to avoid responsibility and blame (Steffel, Williams, & Perrmann-Graham, 2016), and/or when choosing for others (Leonhardt, Keller, & Pechmann, 2011). People then more often prefer to delegate the decision, for example to another person.

One special way of delegating decisions is to let chance decide. A well-known example of this strategy is to flip a coin, which is seen as a fair device to determine an outcome (Eliaz & Rubinstein, 2014; Keren & Teigen, 2010). Still, people seem ambivalent regarding the use of a coin flip. Although they see coin flips as fair, they are generally rather reluctant to use them (Keren & Teigen, 2010). At the same time, there are specific situations in which people prefer to flip a coin: when the coin flip increases procedural fairness by correcting a previous bias (Bolton, Brandts, & Ockenfels, 2005), when resources are scarce and cannot be divided (Beattie et al., 1994; Gordon-Hecker et al., 2017), or when people experience a moral conflict between self-serving and prosocial behavior (Lin & Reich, 2018). Coin flips, along with other random devices, have received particular attention in research on cheating and immoral behavior (see Gino, Norton, & Weber, 2016, for a review), and appear to be able to provide justification for engaging in these behaviors (e.g., Batson, Kobrynowicz, Dinnerstein, Kampf, & Wilson, 1997; Shalvi, Dana, Handgraaf, & De Dreu, 2011).

When people let chance decide by means of flipping a coin and simply do as suggested by the coin, the coin acts as *decider* (instead of the person). This is how coin flips have been treated in the literature described above. However, oftentimes people realize that they do not like the outcome of the coin flip, or are relieved that a specific outcome shows, and then make their decision independently of the coin. This second case – not simply doing what the coin says but rather realizing what one prefers after leaving the decision up to chance – might even be the more common case, at least in the context of personal decisions. An online field study with more than 20,000 observations (Levitt, 2016) supports this reasoning that coin flips rarely

act as deciders, but rather as decision aids when it comes to own decisions. In Levitt's study, people who had difficulties making a certain decision in the form of "Should I do X?" were invited to virtually flip a coin and instructed to adhere to its outcome within the following months. Although participants willingly used the coin, only 63% of them did what the coin suggested, and even less so when the decision at hand was important (e.g., quitting a job, ending a relationship). Importantly, however, the coin still had an impact: When told by the coin to make a change (vs. to maintain the status quo), participants were much more likely to make a change and were happier several months later. One way to look at these findings is that in decision situations of the form "Should I do X (or should I keep the status quo)?", many participants might have a preference to act (vs. not to act), but might not be confident enough to act upon this preference to make a change (see findings about status quo bias, e.g., Eidelman & Crandall, 2012; Ritov & Baron, 1992; Samuelson & Zeckhauser, 1998). If they, however, received a clear recommendation by the coin flip, this recommendation might have made their (assumed) preference to make a change clearer so that they more often acted accordingly.

The author concludes that "some part of the impact of the coin toss is to accelerate changes that would have happened anyway, but at a later date" (Levitt, 2016; p. 7). We resonate with this conclusion: When the coin does not act as a decider, it may still act as a decision aid that influences downstream processes, such as the search for information.

Information Search When Using Randomizers for Decisions

Previous work has identified various factors that influence information search in the decision-making context, for example, making a decision for oneself or for someone else, making a decision for the near or distant future (Halamish & Liberman, 2017), experience with or prior knowledge of a decision situation, situational involvement, the desire for an optimal decision, or personality variables such as the need for cognition (Schmidt & Spreng, 1996). We suggest that random decision devices affect information search, too. In particular, we assume

that random decision devices reduce information search. We base this assumption on the following arguments:

First, even subtle cues such as closing the menu after having decided on a meal can trigger choice closure. Choice closure is defined as the psychological process by which people perceive a decision to be final (Gu, Botti, & Faro, 2013). A coin flip, which is normally used to make a straightforward and quick decision, could therefore also signal that a decision is final, which would provide a reason to stop collecting information.

Second, the notion of choice closure also resonates with research on the implementation of decisions. The predecision phase (i.e., while thinking abstractly about a decision) is characterized by open-mindedness in processing decision-relevant information, while the decision phase is characterized by practical considerations regarding the implementation of the decision (Beckmann & Gollwitzer, 1987; Heckhausen & Gollwitzer, 1987). A coin flip might signal a transition from the predecision to the decision phase, thereby reducing open-mindedness. In other words, flipping a coin might signal that no further information is needed, and that one is ready to "cross the Rubicon." A coin flip might additionally enhance the mental simulation of engaging in a behavior, thereby lowering information search because again, it might feel like the decision has already been made. Solely fantasizing about a future behavior (vs. imagining the steps that need to be taken) indeed decreases the likelihood of displaying that behavior (Oettingen, 2012; Oettingen & Schwörer, 2013).

Third, a transition from the predecision to the decision phase can also be described as moving along the continuum from hypotheticality to reality. Put differently, flipping a coin might bring people closer to an actual decision. Evidence accrued within the framework of Construal Level Theory (Liberman & Trope, 2008; Trope & Liberman, 2010) has documented that people desire less information in "near" compared "far" conditions, for example, when deciding for themselves versus for a friend or when deciding for the near versus the distant future (Halamish & Liberman, 2017).

Lastly, when people have a preference, they know that additional information could sway them away from this preference and therefore sometimes even choose to ignore information (Woolley & Risen, 2018). This information avoidance to protect a decision is even greater when the preference is stronger and before a decision is made (vs. after it is made, Woolley & Risen, 2018). If people's preferences become clearer through a coin flip, this may reduce their search for further information.

All of these findings allow for the intriguing conclusion that a coin flip may reduce information search. We test this notion in what follows.

Overview of the Present Studies

Across five online studies (Study 1 with two follow-up studies, Study 2, and Study 3), we test the hypothesis that seeing the outcome of a coin flip reduces information search before making a final decision. We operationalize information search as both the *need* for information that people *express* as well as the *amount* of information they *consult* before making a final decision.

The overall procedure is the same in all studies. Step 1: We present participants with decision information. Step 2: We ask participants to make a preliminary decision. Step 3: We offer participants further information before making their final decision. Crucially, we introduce a coin flip for some participants before Step 3, which is explicitly described as non-determinant (i.e., people can choose independently of the coin's suggestion).

We report all measures, manipulations, and exclusions. We determined sample sizes prior to data collection through power analyses with G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), using small to medium-sized effects for the respective analyses and designs (since effects of this magnitude are typical for social psychological research; Richard, Bond, & Stokes-Zoota, 2003), a desired power of .80, and an alpha level of .05. Whenever two different analyses were necessary to test predictions (e.g., ANCOVA and chi-square test), we based data collection on the power analysis indicating a higher required sample size. We always recruited

slightly more participants than indicated by the power analysis to account for a potentially reduced sample size after applying predefined exclusion criteria (self-reported carefulness, self-reported reasons to exclude data, language proficiency). All data, analyses, and materials are stored in an online repository (https://bit.ly/2ljvoKP).

Study 1

In Study 1, participants decided whether or not to prolong the contract of a store manager based on information about his past performance, and they could request further information in the form of fictitious search engine results. We hypothesized that compared to a control condition, participants watching a coin flip would want further information less often and would check to read fewer pieces of information.

Method

Participants and design. For this study, we recruited 170 German participants via the online platform Clickworker (for a review on Clickworker data quality, see Lutz, 2016), offering a compensation of €0.75 ($0.93 at that time) for a median participation time of 6 minutes. Based on our previously defined exclusion criteria, we excluded the data of seven participants (participants who indicated low carefulness while filling out the study, i.e., a score below five on a nine-point scale, $n = 5$; participants who indicated that their data should not be used, $n = 2$). The final sample comprised 163 participants (85 male, 77 female, one undisclosed; $M_{age} = 37.94$, $SD_{age} = 11.33$). A sensitivity analysis with G*Power showed that our sample size was sufficient to detect effect sizes of Odds Ratio (OR) = .33 or larger with 80% power.

There were two conditions in which participants watched a coin flip: one condition with a coin outcome in line with participants' preliminary decision (*coin-congruent condition*), and one condition with a coin outcome opposite to participants' preliminary decision (*coin-incongruent condition*). We did not expect to find differences in information search between these two coin groups, but other variables might be differentially affected, which we report in

an exploratory fashion. Participants were randomly assigned to the coin-congruent (n_{congr} = 53), the coin-incongruent (n_{incon} = 55), or the control condition ($n_{control}$ = 55).

Materials and procedure. Participants learned that their task was to decide whether the contract of a store manager should be extended or not on the basis of information describing his earlier performance. The vignette has been successfully employed in several studies on selective exposure to information (e.g., Fischer et al., 2011; Fischer, Fischer, Weisweiler, & Frey, 2010; Mojzisch, Schulz-Hardt, Kerschreiter, & Frey, 2008) and was intended to present participants with an ambiguous decision problem. After reading the vignette, participants were asked to preliminary decide whether or not the contract should be extended (binary choice) while being explicitly informed that there would be more information available and that they could later change their decision. We furthermore asked for their preliminary decision certainty (from 0% to 100% certain).

Participants in the coin-congruent and in the coin-incongruent condition were then told that because some people think that the decision at hand is difficult, we offer them the possibility of virtually flipping a coin. This could help to make a decision, but they still may decide independently of the coin flip's outcome. Participants further learned about the two possible coin outcomes: heads meant that the contract should be extended, whereas tails meant that the contract should not be extended. Coin participants then saw a coin flip animation and an outcome that suggested either the same course of action as they had previously indicated (coin-congruent condition) or an outcome that suggested the other course of action (coin-incongruent condition). Participants in the control condition saw a rotating hourglass animation and were told to shortly wait while the next study part was loading.

All participants indicated whether they wanted further information before making their final decision (yes/no). If they indicated no, they proceeded to the final decision. If they indicated yes, they were asked on the next page to imagine having performed a Google search on the manager and were presented with snippets of 10 fictitious search results (e.g., restaurant

or product reviews he had written). We had pretested the material on an independent sample ($N = 15$) to ensure that participants could infer the valence of the information from the snippets but that the information pieces were not very relevant for the decision about the contract. We asked participants to select the results they would like to read in full (from 1 to 10). The chosen snippets were displayed on the following page.

Next, participants were asked to make their final decision (yes/no), to indicate their decision certainty (0% to 100% certain), and the subjective difficulty of making the final decision (Likert-scale, 1 = *very difficult* to 7 = *very easy,* later reverse-coded). Participants who had asked for additional information saw the corresponding pieces of information a second time and indicated how relevant each was for their decision (Likert-scale, 1 = *not relevant* to 7 = *very relevant*).

Finally, we asked participants how carefully they had filled out the survey, whether there was a reason to not use their data, and to indicate their gender and age. Upon completion, participants were provided with the possibility to comment on the study, were thanked for their participation, and provided with the necessary information for compensation.

Results

In the present sample, the decision situation was not as ambiguous as expected: The majority (81%) of participants opted for not prolonging the contract, participants were overall quite certain regarding their final decision ($M = 9.01$, $SD = 1.63$ on a 11-point scale, i.e. 80% certain on average), and did not find the decision particularly difficult ($M = 3.23$, $SD = 1.68$).

Need for further information. Our main interest pertains to participants' information need. Out of 163 participants, 34 (21%) indicated that they did not want further information. Besides experimental condition as the independent variable, we decided to include preliminary decision certainty in our model because of its substantial correlation with the primary dependent variable, need for further information ($r = -.37$, $p < .001$). We therefore conducted a logistic regression of participants' need for further information (1 = *information requested*, 0 = *no*

information requested) on experimental condition (1 = *coin*, 0 = *no coin*) and preliminary decision certainty.

The overall logistic regression model was significant with $\chi^2(2) = 29.39$, $p < .001$. Higher preliminary decision certainty resulted in a lower need for further information, $\beta = -.72$, $SE = .17$, Wald = 16.90, $p < .001$, Odds Ratio (OR) = .49, 95% $CI_{Exp(B)}$ = [.35, .69]. In addition, we found the hypothesized negative effect of seeing a coin flip on the need for further information, $\beta = -1.12$, $SE = .54$, Wald = 4.27, $p = .039$, OR = .33, 95% $CI_{Exp(B)}$ = [.11, .94]. Coin participants were three times less likely to request further information than control participants. Pattern and significance levels remain the same when preliminary decision certainty is not included as a covariate, $\chi^2(1) = 6.96$, $p = .008$.

To gain further insight, we conducted a second logistic regression with a more fine-grained perspective on the coin participants. Specifically, we distinguished between congruent and incongruent (in relation to the preliminary decision) coin suggestions, resulting in three conditions: control, coin-congruent, coin-incongruent. Planned contrasts revealed that participants in the coin-congruent condition were 2.7 times less likely to request further information compared to the control group, but this difference did not reach statistical significance (77.4% vs. 90.9%; $\beta = -.99$, SE = .60, Wald = 2.74, $p = .098$, OR = .37, 95% $CI_{Exp(B)}$ = [.12, 1.20]). Participants in the coin-incongruent condition were 3.4 times less likely to request further information compared to the control group (69.1% vs. 90.9%; $\beta = -1.23$, $SE = .58$, Wald = 4.43, $p = .035$, OR = .29, 95% $CI_{Exp(B)}$ = [.09, .92]). Again, pattern and significance levels remain the same when preliminary decision certainty is not included as a covariate, $\chi^2(2) = 8.08$, $p = .018$.

Amount of information requested. The need for further information and the amount of information requested were significantly correlated, $r = .48$, $p < .001$. To test whether coin participants also request fewer pieces of information compared to control participants, we

additionally conducted an ANCOVA with the number of information pieces requested as the dependent variable, experimental condition as the independent variable, and preliminary decision certainty as a covariate because of its substantial correlation with the number of information pieces (r = -.27, p < .001).

As noted above, 34 participants (21%) did not look at the additional information at all. Another 28 participants (17%) indicated that they wanted further information but then did not select any of the snippets to read in full. For these 62 participants, the dependent variable was set to 0; for the other 101 participants, the range was between 1 and 10. The covariate, preliminary decision certainty, significantly predicted the number of information pieces requested, $F(1, 160) = 11.07$, $p = .001$, $\eta_p^2 = .07$. In addition, mirroring the need for information need findings, coin participants requested fewer pieces of information (M_{coin} = 1.90, SE_{coin} = .21, 95% CI = [1.48, 2.31]) than control participants ($M_{control}$ = 2.57, $SE_{control}$ = .30, 95% CI = [1.98, 3.16]; both means adjusted for the covariate). The overall effect of experimental condition on the amount of information requested, however, did not reach statistical significance, $F(1, 160) = 3.39$, $p = .068$, $\eta_p^2 = .02$. See Table 1 for all descriptive statistics of Study 1.

Table 1

Descriptive statistics for the three experimental conditions

Measure	control	coin-congruent	coin-incongruent
Need for further information (%yes)	90.9	77.4	69.1
Number of information pieces requested[a]	2.67 (2.32)	1.91 (2.40)	1.78 (2.11)
Decision changed (%)	7.3	9.4	16.4
Decision certainty (1-11)	8.95 (1.64)	8.91 (1.75)	9.18 (1.52)
Change in certainty from preliminary to final decision[b]	1.15 (1.13)	.83 (1.22)	.87 (1.40)
Decision difficulty (1-7)	3.13 (1.50)	3.36 (1.74)	3.20 (1.80)
Mean relevance of all positive information (1-7)	3.15 (1.52)	3.80 (1.58)	3.32 (1.88)

Mean relevance of all negative information (1-7)	5.22 (1.30)	4.52 (1.50)	4.66 (1.69)

Note. Unless otherwise noted in the measures column, the table displays means (standard deviations).
[a] Participants who did not want further information or only read the snippets are included with a value of 0.
[b] Calculated as decision certainty minus preliminary decision certainty, i.e., positive values reflect increases in decision certainty.

Discussion

Study 1 provides initial evidence that making a preliminary decision between two options and then seeing a coin flip pointing to either option reduces the need for further information compared to making a decision without a random device. This pattern is also descriptively reflected in the amount of information chosen to read. Importantly, the results cannot be explained by assuming that coin participants simply delegated the decision to chance (and therefore had no further need for information), since there is no evidence that the coin determined the decision. Descriptively, information need is even lower when the coin suggests choosing a different option than the initially preferred one.

It should be noted that the effects of the experimental manipulation were relatively small. We therefore conducted two follow-up studies to enhance confidence in our findings and test alternative explanations. First, we aimed at replicating the findings while focusing on information need as the dependent variable, leaving out the information selection step. Second, in Study 1, the coin flip manipulation had taken about 20-25 seconds longer than the respective part of the control condition. To rule out the possibility that participants in the coin conditions were more tired than those in the control condition and therefore less likely to request further information, we temporally aligned the coin and control conditions. Third, we suspected that asking participants about their preliminary decision certainty might evoke the feeling of having to defend one's view and therefore left out this variable in one of the follow-up studies.

The detailed methods and main results of the follow-up studies are described in the supplemental material. In summary, combining the evidence of all three studies yielded a

significant overall pattern: Participants watching a coin flip had a lower need for further information compared to control participants. Temporally aligning coin and control conditions and/or not asking for preliminary decision certainty neither significantly changed this pattern nor did it significantly affect other study outcomes.

Study 2

Study 1 and the two follow-up studies demonstrate that after watching a coin flip, people are less likely to request additional information before making a decision. However, the decision scenario in Study 1 was not as ambiguous as we had expected: Most participants opted for prolonging the manager's contract. Moreover, participants were quite certain regarding their decision and did not find it particularly difficult. Given these constraints, it is remarkable that the coin flip still had an effect on participants' information need. The aim of Study 2 was to address these concerns by investigating the effects of a random device in a scenario that better simulates the indecisiveness people might have already experienced before flipping a coin. We investigated a decision in a consumer context as a domain in which it would be more realistic to flip a coin and which most people might have already encountered (in contrast to a personnel decision situation).

To this end, we presented participants with pictures of two non-branded backpacks, along with a short description about the backpacks' properties, and asked them to decide which one of the two backpacks costs more. In contrast to Study 1, this scenario represents a decision between two options (instead of a decision about keeping or changing the status quo) for which an objectively correct outcome exists.

Method

Participants and design. We recruited 260 US participants via the online platform Prolific Academic (for a review on data quality, see Peer, Brandimarte, Samat, & Acquisti, 2017), offering a compensation of £0.50 ($0.70 at that time) for a median participation time of

4 minutes. Based on our previously defined exclusion criteria, we excluded participants from our analysis who indicated low carefulness while filling out the study (i.e., a score below five on a nine-point scale, $n = 1$), who indicated their data should not be used ($n = 1$), and/or whose native language was not English ($n = 1$). The final sample comprised 257 participants (138 male, 115 female, four undisclosed; $M_{age} = 34.77$, $SD_{age} = 11.58$). A sensitivity analysis with G*Power showed that our sample size was sufficient to detect effect sizes of Cohen's $f = .18$ (.19 with three groups) or larger with 80% power.

Participants were randomly assigned to the control ($n_{control} = 86$), coin-congruent ($n_{congr} = 87$), or coin-incongruent condition ($n_{incon} = 84$).

Materials and procedure. Participants were presented with pictures and a short description of two laptop backpacks. Both were real products sold on a large international online store, the available pictures and information were similar, and no brand name was visible.

The procedure of Study 2 closely followed that of Study 1, with the following exceptions: We measured information need on a continuous scale, all participants were presented with additional information, we told participants whether their final decision was correct, and we assessed participants' reactions towards this feedback and towards the coin flip.

To obtain a continuous measure for information need, participants indicated how much further information they needed before making their final decision on a slider (ranging from 1 = *little additional information* to 50 = *much additional information*; numbers were not displayed to participants). All participants, regardless of their information need, were thereafter shown snippets from actual customer reviews for the backpacks and asked which reviews they would like to read in full (from none at all to ten, five for each backpack). Depending on participants' choice, the corresponding reviews were displayed on the following page.

After making their final decision and indicating their decision certainty, participants were informed whether they had decided correctly or not (based on the backpacks' selling price

on the retailer's website) and were asked about their satisfaction or disappointment with their decision (both on a Likert-scale ranging from 1 = *not at all/indifferent* to 7 = *very much*). Coin participants additionally answered three questions related to their thoughts and feelings regarding the outcome of the coin flip, namely whether the coin outcome had endorsed their preliminary decision, whether it had caused them to doubt their preliminary decision, and whether they would have liked to flip the coin a second time (all on a Likert-scale ranging from 1 = *not at all* to 7 = *very much*).

Results

In this study, 46.3% of participants opted for one option and 53.7% for the other, and they were less certain regarding their decision compared to participants in our previous studies (M = 7.17, SD = 1.92 on a 11-point scale, i.e. around 60% certain).

Confirmatory analyses: Information search. To test the hypothesis that coin participants have a lower need for further information compared to control participants, we conducted an ANCOVA with the need for further information as the dependent variable, experimental condition as the independent variable, and preliminary decision certainty as a covariate (given its significant correlation with the dependent variable, r = -.15, p = .010). Preliminary decision certainty significantly predicted a lower information need, $F(1, 254)$ = 5.23, p = .023, η_p^2 = .02. Importantly, there was a significant overall effect of experimental condition on information need, $F(1, 254)$ = 5.23, p = .023, η_p^2 = .02. Pattern and significance levels remain the same when preliminary decision certainty is not included as a covariate, $F(1, 255)$ = 5.53, p = .019, η_p^2 = .021.

To gain further insights, we conducted an additional ANCOVA with all three experimental groups. The overall effect of condition remained significant, $F(2, 253)$ = 3.15, p = .044, η_p^2 = .02, and planned contrast analyses (see Table 2) revealed that participants in the coin-congruent (compared to the control) condition had a significantly lower information need. Participants in the coin-incongruent (compared to the control) condition had a lower

information need, but this difference did not reach statistical significance. Again, the pattern and significance levels remain the same when preliminary decision certainty is not included as a covariate, $F(2, 254) = 3.17$, $p = .044$, $\eta_p^2 = .024$.

Table 2

Information need for each of the three experimental groups

Condition	Adjusted mean [95% CI]	*SE*	Mean difference to control group [95% CI]	*p*
Control	23.18 [20.27, 26.08]	1.47		
Coin-congruent	17.98 [15.09, 20.87]	1.46	5.20 [1.11, 9.29]	.013
Coin-incongruent	20.15 [17.21, 23.09]	1.49	3.03 [-1.11, 7.16]	.151

Note. Values could range from 1 = *little additional information to* 50 = *much additional information*.

Mirroring the analyses in Study 1, we also tested whether coin participants would request fewer pieces of information to read than control participants. Information need and the amount of information were significantly correlated ($r = .31$, $p < .01$). We conducted an ANCOVA with the amount of information requested as the dependent variable, experimental condition as the independent variable, and preliminary decision certainty as a covariate (correlation with the amount of information: $r = -.13$, $p < .05$). Higher preliminary decision certainty predicted a lower amount of information, $F(1, 254) = 4.47$, $p = .036$, $\eta_p^2 = .02$. More importantly, participants in the coin conditions requested fewer pieces of information (M_{coin} = 3.29, SE_{coin} = .20, 95% CI = [2.90, 3.68]) than participants in the control condition ($M_{control}$ = 3.75, $SE_{control}$ = .28, 95% CI = [3.20, 4.30]; both means adjusted for the covariate), but the overall effect of experimental condition did not reach statistical significance, $F(1, 254) = 1.84$, $p = .177$, $\eta_p^2 = .01$. See Table 3 for all descriptive statistics.

Table 3

Descriptive statistics for the three experimental conditions

Measure	control	coin-congruent	coin-incongruent

Need for further information (1-50)	23.28 (13.92)	18.06 (13.60)	19.96 (13.84)
Number of information pieces requested	3.77 (2.50)	3.31 (2.67)	3.25 (2.61)
Decision changed (%)	23.3	6.9	23.8
Decision certainty (1-11)	7.40 (1.94)	7.52 (1.93)	7.45 (2.07)
Change in certainty from preliminary to final decision[a]	.33 (1.43)	.43 (1.47)	.11 (1.37)
Satisfaction with being correct (1-7)	5.88 (1.33)	5.72 (1.53)	5.91 (1.60)
Disappointment with being incorrect (1-7)	3.30 (1.92)	3.44 (2.05)	2.85 (1.81)
Reactions to coin flip (1-7)			
Feeling validated		2.90 (2.36)	1.69 (1.45)
Doubting decision		1.47 (1.29)	1.85 (1.56)
Wish for repetition		1.63 (1.45)	1.51 (1.21)

Note. Unless otherwise noted in the measures column, the table displays means (standard deviations).
[a] Calculated as decision certainty minus preliminary decision certainty, i.e., positive values reflect increased certainty.

Exploratory analyses: Decision change, reactions to coin flip, and reactions to decision feedback. When looking at the descriptive data in Table 3, one finding appears noteworthy in addition to our main analyses: the percentage of participants that changed their decision throughout the study varied considerably as a function of condition. A post-hoc logistic regression (1 = *same decision*, 0 = *different decision*) revealed that participants in the coin-congruent condition were significantly less likely to change their decision compared to both the control group, $\beta = -1.41$, $SE = .49$, Wald = 8.13, $p = .004$, OR = .24, 95% $CI_{Exp(B)} = [.09, .64]$, and the coin-incongruent group, $\beta = -1.44$, $SE = .50$, Wald = 8.47, $p = .004$, OR = .24, 95% $CI_{Exp(B)} = [.09, .63]$.

We had also assessed reactions to the coin flip, namely feeling validated, doubting the decision, or wishing to repeat the coin flip. A post-hoc MANOVA using Pillai's trace revealed a significant effect of coin condition on reactions to the coin flip, $V = 0.16$, $F(3, 167) = 10.78$,

$p < .001$, $\eta_p^2 = .16$. Separate univariate ANOVAs showed that participants in the coin-incongruent condition felt significantly less validated by the coin regarding their preliminary decision, $p < .001$, $\eta_p^2 = .09$. There were no significant differences regarding the other two dependent variables, $p = .089$, $\eta_p^2 = .02$, for doubt and, $p = .557$, $\eta_p^2 = .00$, for wishing to repeat the coin flip.

We also gave participants feedback on whether or not they had decided correctly regarding which backpack costs more and asked how satisfied or disappointed they were. There was no significant effect when comparing coin and control conditions regarding satisfaction or disappointment, *ps* > .361.

Discussion

Study 2 tested the hypothesis that a random decision device reduces information search in a different decision context, with a different decision task, and with a different participant sample than Study 1. Conceptually replicating the results of Study 1, seeing a coin flip recommending one option significantly lowered information need before making a final decision compared to making the same decision without a coin flip. This pattern is also reflected in the amount of information participants wanted to read.

In addition to information search, the coin flip influenced the likelihood of sticking to one's initial preference: Participants who saw a coin flip in line with their preliminary decision switched to the other option less often at the end of the study. We interpret this exploratory finding as initial evidence that a random device recommending an option in line with one's preference can serve as a confirming cue.

We also assessed participants' reactions towards their final decision. Satisfaction or disappointment upon learning that the decision was correct or wrong, respectively, were unaffected by the coin flip. We infer that participants felt responsible for their decisions instead of transferring responsibility to the coin, a finding which is in line with previous research (Steffel et al., 2016) and demonstrates that a random device is different than delegating a

decision to others: Letting chance decide determines an outcome and therefore takes the burden of choosing, but only delegating the decision to someone else can additionally take the burden of responsibility associated with the decision outcome (Steffel et al., 2016).

Study 3

The studies so far demonstrated that information need is significantly lowered after receiving a random suggestion, be it a decision between changing versus maintaining a status quo without an objectively correct solution, or a decision between two options for which an objectively correct solution exists. With Study 3, we aimed at replicating our findings for a real and consequential decision between two options without an objectively correct solution while also increasing ecological validity and generalizability.

With these goals in mind, we turned to a donation decision and asked participants to decide which one of two medical charities should receive a monetary donation. Requests to donate and how much to donate represent moral conflicts that a substantial number of people prefer to resolve by a coin flip when given the chance to do so (Lin & Reich, 2018). Moreover, prior research suggests that donation decisions matter to people, even when the money involved is not their own. In particular, people are willing to cheat (i.e., to engage in an immoral behavior) so that a deserving charity is allocated more money, and so that a deserving instead of an undeserving charity receives money (Rixom & Mishra, 2014). Against this background, there is good reason to assume that participants perceive a donation decision as more important and relevant than decisions between backpacks or a decision within a fictitious employment scenario. By implementing a donation decision with actual money, Study 3 thus addresses the potential caveat of non-consequentiality inherent to Studies 1 and 2.

A second potential caveat of Studies 1 and 2 is the restriction to two specific options in each study. To address this, Study 3 contained six options, thereby reducing the likelihood that unknown idiosyncratic properties of choice options play a key role.

Finally, we designed Study 3 so that three conceptual concerns can be addressed. In short, it has been suggested that our findings may be attributable to pragmatic inference (i.e., coin participants might have perceived the use of a coin flip as a signal that the decision is unimportant and thereby feel that additional information is not warranted), relinquishment of control (i.e., coin participants might have perceived that the decision is rather determined by the coin than by themselves), and suspicion (i.e., coin participants might have thought that the coin is rigged or biased).

Method

Participants and design. We recruited 279 US participants via Prolific Academic[1], offering a compensation of £0.60 ($0.77 at that time) for a median participation time of 6 minutes. Based on our previously defined exclusion criteria, we excluded participants from our analysis who indicated low carefulness while filling out the study (i.e., a score below five on a nine-point scale, $n = 1$) and who indicated their data should not be used ($n = 4$). In addition, one participant had indicated that the survey crashed mid-way and another participant commented "this is all fake" as a reason for making his/her donation decision, so we excluded these two before analyzing the data. The final sample comprised 272 participants (123 male, 144 female, four undisclosed; $M_{age} = 32.48$, $SD_{age} = 11.99$). A sensitivity analysis with G*Power showed that our sample size was sufficient to detect effect sizes of Cohen's $d = .32$ ($f = .19$ with three groups) or larger with 80% power.

Participants were randomly assigned to the control ($n_{control} = 90$) and two coin conditions ($n_{heads} = 93$, $n_{tails} = 89$).

Materials and procedure. We informed participants that we are interested in how people make donation decisions, in particular with regard to medical charities. We then told them that they will receive a compensation of £0.60 for the study and that they can additionally

[1] We had aimed for 260 participants, as in Study 2, but ended up with a larger sample due to a technical glitch on the Prolific Academic website.

choose a charity that will receive £0.10. It was stressed that these additional £0.10 will be donated to the charity and will not be part of the participant compensation, so that they will always receive £0.60. Given the findings of Rixom and Mishra (2014) reviewed above, there is good reason to assume that participants care about this donation decision even if they do not donate their own money. Next, we provided participants with a list of six US-based medical charities which had been preselected by the first author from hmr.org: Aplastic Anemia & MDS International Foundation, Charcot-Marie-Tooth Association, Mesothelioma Applied Research Foundation, Pachyonychia Congenita Project, Sjogren's Syndrome Foundation, and Williams Syndrome Foundation. For each charity, participants were asked to indicate whether they know the charity, whether they know the disease associated with it, or whether they know neither. Only if participants ticked the last option for at least two charities (i.e., at least two charities and the respective diseases were unknown), they could continue the study (true for all but five participants in the initial sample). We had selected rather unknown diseases and charities and implemented the screening procedure described above to increase the likelihood that participants experience the need to gather further information.

Next, we informed participants that we randomly selected two of the unknown charities for the remainder of the study, and asked for a preliminary donation decision between those two charities based on the charity's name, its foundation year, and the city in which it is based. Again, we decided to provide minimal information so that enough room is left for a potential need to gather further information. Participants in the coin conditions were then introduced to the coin flip procedure. In contrast to the previous studies, participants first saw a trial coin flip and could subsequently test the coin as many times as they wanted. After completing the trial(s), the actual coin flip was run and randomly suggested one of the two charities.

On the next page, we asked all participants how much more information they need about the two charities before they can make their donation decision. To this end, participants saw two separate slider scales, one for each charity (ranging from 1 = *no further information* to 10

= *much more information*). All participants, regardless of their information needs, were thereafter provided with the links to the charities' websites in case they wanted to obtain more information. Before making their final decision which charity they would like to donate for, we asked participants to write down at least one and up to five reasons for their decision.

Finally, we asked all participants how autonomously they had made their decision (on a Likert-scale ranging from 1 = *not at all autonomously* to 7 = *very autonomously)*. In addition, we asked coin participants to think back to the moment when they first interacted with the coin and to answer the following two questions: "If this same coin would now be flipped 100 times, how many times do you think it would land on heads?" and "If this same coin would now be flipped 100 times, how many times do you think it would land on tails?" (order counterbalanced). If participants indicated anything else than "50" for either or both, we asked them on a separate page whether they thought that the coin was biased (yes/no). Lastly, we asked all coin participants to which extent they agree with the following statement: "Flipping a coin before making a decision is a signal that it is an unimportant decision" (on a Likert-scale ranging from 1 = *I strongly disagree* to 7 = *I strongly agree* and the midpoint 4 labeled with *I do not have an opinion on that*).

The presentation order (first/second) of the two charities was randomly determined throughout the study (i.e., for all presentations, scales, decisions).

Results

Information search. To test the hypothesis that participants in the two coin conditions have a lower need for further information, we conducted a one-sided t-test with the need for further information as the dependent variable. Because the need for further information did not differ between the two charities (M = 7.58, SD = 2.82 vs. M = 7.65, SD = 2.80), we summed up the two scores, resulting in a total information need score (overall M = 15.23, SD = 5.40). As hypothesized, coin participants had a significantly lower information need (M = 14.57, SD =

5.64) than control participants (M = 16.58, SD = 4.62), $t(212) = 3.14$, 95% CI = [.75, 3.28], p = .001, d = .39).

Participants' preliminary decision was evenly split between the two charities (55.5% vs. 44.5%). This allowed us to further divide the coin participants into coin-congruent and coin-incongruent participants with similar n (90 and 92) and to thus run an ANOVA with the three groups control, coin-congruent, and coin-incongruent. The ANOVA showed a significant effect of condition ($F(2, 269) = 4.67$, $p = .010$, $\eta_p^2 = .03$) and Games-Howell pairwise comparisons showed that information need was significantly lower for coin-congruent (M = 14.22, SD = 6.08) compared to control participants (M = 16.58, SD = 4.62; $p = .011$) and lower for coin-incongruent (M = 14.90, SD = 5.18) compared to control participants ($p = .058$), but that the two coin conditions did not differ ($p = .696$).

As in Studies 1 and 2, we examined the amount of information participants took into account after indicating their information need and before making a final decision. Different from Studies 1 and 2, we here operationalized information search as the total time spent on the two charities' websites. Information search was significantly correlated with information need ($r = .37$, $p = .010$). Mirroring previous results, participants in the coin conditions spent less time on the websites (in seconds: M = 80, SD = 67) than control participants (M = 96, SD = 94; $t(135) = 1.49$, 95% CI = [-5.44, 38.43], $p = .069$ (one-tailed), $d = .20$). Note that the high levels of variability are at least partly due to the fact that the web application we used to collect data is not engineered to reliably measure reaction times.

Decision and reasons for decision. Most participants did not deviate from their preliminary decision: 72.8% chose the same charity at the end of the study, and there was no influence of experimental condition on this proportion ($\chi^2(1) = 1.04$, $p = .309$). Furthermore, perceived autonomy regarding the decision did not differ between coin (M = 5.30, SD = 1.73) and control participants (M = 5.51, SD = 1.68; $t(270) = .945$, 95% CI = [-.23, .64], $p = .346$). Participants' mean number of reasons for their decisions was 1.85 (SD = 1.10). Mirroring the

results regarding information need and search, participants in the coin conditions wrote down fewer reasons (M = 1.77, SD = 1.07) than control participants (M = 2.01, SD = 1.15; $t(270)$ = 1.71, 95% CI = [-.37, .52], p = .088 (two-tailed), d = .22).

Additional analyses within the coin conditions: perceptions of the coin. After being introduced to the trial coin flip, none of the 182 participants in the coin conditions wanted to test the coin flip again. When asked at the end of the study how many times they think the coin would land on heads and tails if flipped again, 34 (19% of all participants in the coin condition) indicated something else than "50" for one or both questions. We asked those 34 participants on a separate page whether they thought that the coin was biased, which 13 participants affirmed. This represents 4.8% of the whole sample[2].

When asked whether using a coin flip for a decision signals that it is an unimportant decision, participants' mean response was 4.26 (SD = 1.71, on a Likert-scale ranging from 1 to 7 with the midpoint of 4 labeled "I do not have an opinion on that"), the median was 4, and the mode was 3. There was no association between this variable and information need (r = -.06, p = .459) or time spent on the websites (r = -.11, p = .883).

Discussion

Study 3 tested the hypothesis that a random decision device reduces information search for a real decision for which no objectively correct solution exists. Conceptually replicating the results of our previous studies, participants reported a significantly lower information need before making a final decision when they saw a coin flip recommending one option compared to participants who made this decision without a coin flip. This pattern is also (non-significantly) reflected in the time participants spent to gather additional information as well as the number of reasons participants indicate for their decision. We thus also find the

[2] Excluding these 13 participants does not change our pattern of results or significance levels; the same is true if we further exclude those 21 participants who indicated something other than 50 for the two randomness-frequency questions (statistically, all values are possible and therefore correct answers), but without explicitly expressing doubts about the coin.

hypothesized effect of a coin flip on information search when the decision at hand is consequential (with actual money being donated to charities) and when it appears to matter for participants, given that they voluntarily spent about 1.4 minutes on charity websites although they received a fixed amount of money for study participation.

In addition, we tested and refuted three alternative accounts, all associating the decrease in information need with specific conceptual aspects of using a random device. First, results suggest that coin participants did not view the decision as less important simply because a coin was involved, refuting pragmatic inference as a potential alternative explanation. Second, results show that coin and control participants felt similarly in control of their decision and made it autonomously, suggesting that coin participants' lowered information need does not result from a relinquishment of control. Finally, only very few coin participants were questioning that the coin is fair, and the pattern of results did not depend on their answers, thus ruling out suspicion about the coin as the reason to search less.

Although participants were asked to make their preliminary decision only on the basis of the charity's name, the foundation year, and the charity's location, the majority of participants did not change their decision throughout the study. This suggests that participants had made up their mind early on and that the coin flip, as in the other studies, did not influence the decision outcome but primarily speeded up the decision process. Perhaps this is because information provided on charity websites is generally in favor of donating to the charity (and not against), so that visiting the websites does rather not sway participants away from their initially expressed preference.

General Discussion

The present research investigated whether a random device, namely a coin flip, can influence information search for an upcoming decision. Across five studies (total $N = 997$), we provide evidence that the need for further information is reduced after watching a coin flip

suggesting one option over another: People are less likely to request further information (Studies 1, 1b, 1c) and indicate a lower need for more information before making a final decision (Studies 2 and 3). We show this for situations involving a decision about whether to keep or change the status quo without an objectively correct solution (Studies 1, 1b, 1c), and for situations involving a decision between two options with (Study 2) and without an objectively correct solution (Study 3). Moreover, results were obtained with participants recruited from two different populations (Germans in Studies 1, 1b, 1c; US-Americans in Studies 2 and 3) and for both hypothetical and real decisions.

Mirroring the results obtained for information need, coin participants compared to control participants always descriptively consulted less information, but this pattern was never significant. This partial dissociation between information need and information amount is consistent with recent research showing that people overestimate how much information they and others take into account to make up their mind (Klein & O'Brien, 2018). In line with this, we observed that some participants in Study 1 did not request to read any of the snippets in full, although they had indicated needing more information, suggesting that their need was satisfied by the short information snippets alone. We assume that this also played a role in Study 2, where information need significantly differed between groups but did not fully translate into the subsequently checked number of information pieces to read, likely because the information snippets might have already been sufficient for participants. In Study 3, we provided participants with the websites of unknown charities and analyzed how much time they spent on the respective websites as a proxy for actual information search. However, the benefit of ecological validity by providing naturalistic sources comes at the expense of experimental control. Factors such as speed of participants' Internet connection, reading speed, server response latencies, and differences in website content and usability add noise. It might prove beneficial in future research to control for these factors and to obtain more fine-grained measures of information search, as well as to control for individual differences on the person-

level that impact information search (e.g., need for structure or fear of invalidity; Mayseless & Kruglanski, 1987).

Throughout our studies, coin participants were not more often swayed away from their initial preference than control participants, but needed less information to make their final decision. Our results are therefore in line with research showing that once a first impression is made, it is often resistant to change, even if additional information might warrant to do so (e.g., Gawronski, Rydell, Vervliet, & De Houwer, 2010; Yu, Saleem, & Gonzalez, 2014). This is also consistent with the notion of the mere measurement effect (e.g., Fitzsimons & Williams, 2000; Levav & Fitzsimons, 2006), which holds that asking people for their intention to engage in a particular behavior makes it more likely that they subsequently engage in this behavior. If one equates our preliminary decision with asking for an intention, this intention then stood a higher chance of being carried through. It should be acknowledged that none of the information pieces we presented to participants was designed to fundamentally overpower all other information. It would be interesting to test in future research whether differences between experimental conditions arise when some piece of information clearly suggests that one should deviate from the preliminary decision.

Theoretical and Practical Contributions

Our results conceptually align with research showing that specific physical acts associated with the concept of closure (e.g., closing or covering something) can trigger choice closure (Gu et al., 2013). Because a coin flip is normally used to determine an outcome, it might activate the concept of having made a final decision. Similarly, it might signal a transition from deliberation to implementation (Beckmann & Gollwitzer, 1987; Heckhausen & Gollwitzer, 1987). Both of these explanations relate to the notion that by flipping a coin, one moves closer to the decision and thereby needs less information, which is also in line with a Construal Level Theory perspective (Halamish & Liberman, 2017).

Beyond this, we move towards understanding a phenomenon for which experimental studies are lacking, namely that some people are unable to decide but suddenly realize what they prefer after leaving the decision up to chance. Given that a coin flip reduces information need when people have an explicit preference, it might similarly reduce information need when this preference is not yet explicit but will be so in the future. As Galdi, Gawronski, Arcuri, and Friese (2012) point out, "people who are undecided about two available options may sometimes have a gut feeling that one of them may be better than the other" (p. 560). A coin flip might empower this gut feeling by promoting an implemental mindset and signaling choice closure.

Furthermore, we bridge the gap in the literature between making decisions by oneself and delegating decisions to others. So far, the use of random devices has been subsumed under choice avoidance (Dwenger, Kubler, & Weizsäcker, 2013; Steffel et al., 2016) or as a consequence of decision aversion (Beattie et al., 1994). We show that a device normally used to bypass decision-making has the potential to let people settle for a final decision without (endlessly) searching for more information.

From an applied perspective, our findings suggest ways in which the tendency to delay decisions by gathering further information could be reduced. We do not suggest that people should make decisions without taking available information into account or without looking for additional information, but as outlined in our introduction, there are situations in which abundant information can have detrimental effects. In his model of indecisiveness, Rassin (2006) names information search as a delaying behavior when people are undecided. Likewise, Schrift and Parker (2014) describe searching for information as a "no-choice option", along with procrastinating and deferring judgments. Given that people take less information into account than they think to come to conclusions (Klein & O'Brien, 2018), the coin flip may simply speed up what would happen anyway.

Although a normative perspective is not the focus of this paper, the question when to stop looking for information before making a decision is a truly intriguing one. Information is

important and, other things being equal, more information is better. Yet, oftentimes, other things are not equal: Gathering information has a price as it requires time and cognitive resources. Hence, there is likely no normative answer on when to stop the search for additional information, especially because this stopping decision is highly dependent on various decision dimensions such as importance, urgency, normativity, and the availability of pro and con arguments.

The present results suggest that using a random device has the potential to overcome sidestepping a decision by lowering the felt need for further information. This is particularly intriguing in the domain of prosocial behavior: If people have a hard time deciding whether and to which extent they should act in a prosocial way, providing them with a random suggestion might help them deciding, instead of delaying the decision (thereby potentially missing out on opportunities to help others) or avoiding the decision altogether. This appears all the more promising given that individuals are readily willing to rely on random devices when making prosocial decisions (Lin & Reich, 2018).

Conclusion

People usually gather information before making decisions. Information search, however, can lead to delaying decisions, as more information does not always help with a decision. We provide evidence that consulting a random device, namely a coin flip, can reduce the need for further information, thereby suggesting a way to overcome decision blocks.

Open Practices

Data, analyses, and materials for all studies are available at: https://bit.ly/2ljvoKP.

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Supplementary Material

Study 1b

Method

Participants and design. For this study, we recruited 120 German participants via the online platform Clickworker, offering compensation of €0,75 ($0.93 at that time) for a median participation time of 5 minutes. We received complete datasets from 117 participants[3] and then excluded eight participants from our analysis based on previously defined exclusion criteria (participants who indicated low carefulness while filling out the study, i.e., a score below five on a nine-point scale, n = 3; participants who indicated their data should not be used, n = 2; participants who indicated to have already participated in a very similar study, n = 3). The final sample comprised 109 participants (58 male, 49 female, two undisclosed; M_{age} = 33.71, SD_{age} = 13.00). A sensitivity analysis with G*Power showed that our sample size was sufficient to detect effect sizes of w = .27 (w = .30 when using 2 df) or larger with 80% power.

Participants were randomly assigned to the control ($n_{control}$ = 38), coin-congruent (n_{congr} = 35), or coin-incongruent condition (n_{incon} = 36). The need for further information served as a binary dependent variable.

Materials and procedure. Materials and procedure were identical to Study 1 with the following exceptions: First, because there was a significant time difference of about 20-25 seconds between the coin and control groups in Study 1 (due to introducing the coin flip and showing the outcomes afterwards), we shortened the duration of the coin flip manipulation to rule out the possibility that participants were simply tired and therefore less likely to request further information. To this end, we did not explain the outcomes beforehand but directly placed them on the sides of the coin ("Yes" and "No"), shortened the animation from 10 to 6 seconds,

[3] The difference of three participants between intended and actual sample size is likely due to technical properties of the panel website and lay outside of our control.

and let participants look at the coin flip outcome for only 4 seconds instead of giving them unlimited time.

Second, we suspected that asking participants about their preliminary decision certainty might evoke the feeling of having to defend one's view with possibly uncontrolled side-effects. We therefore only asked for their certainty after making the final decision.

Third, because we focused on the need for further information, participants did not have to select which of the additional pieces of information they wanted to read. Instead, we displayed all 10 pieces of information on one page for the participants who had indicated that they needed further information. We consequently did not assess the relevance of each information piece either.

Lastly, at the end of the study, we asked participants whether they were in a job position involving personnel responsibilities and whether they had already participated in a similar study before, with the latter being added to our list of exclusion criteria.

Results

Because we did not measure preliminary decision certainty in this study, we conducted a 2x2 chi-square test for our main analysis with condition (coin vs. control) and the need for further information (yes vs. no). Although the resulting pattern of results is as predicted with coin participants having a lower need for further information than control participants, the association between condition and information need was not significant, $\chi^2(1) = 0.25$, $p = .616$, $w = .05$.

Study 1c

Method

Participants and design. Based on the effect size obtained in Study 1, we recruited 215 German participants (217 completed the survey[4]) via the online platform Clickworker, offering compensation of €0,75 ($0.93 at that time) for a median participation time of 5 minutes. Based on our previously defined exclusion criteria, we excluded 18 participants from our analysis (participants who indicated low carefulness while filling out the study, i.e., a score below five on a nine-point scale, n = 3; participants who indicated their data should not be used, n = 7; participants who indicated to already have participated in a very similar study, n = 9). The final sample comprised 199 participants (99 male, 99 female, one undisclosed; M_{age} = 35.83, SD_{age} = 12.10). A sensitivity analysis with G*Power showed that our sample size was sufficient to detect effect sizes of w = .20 (w = .22 when using 2 df) or larger with 80% power.

Participants were randomly assigned to the control ($n_{control}$ = 68), coin-congruent (n_{congr} = 64), or coin-incongruent condition (n_{incon} = 67). The need for further information served as a binary dependent variable.

Materials and procedure. Materials and procedure were identical to Study 1b with the following exceptions: First, because there still was a slight time difference between the coin and control groups in Study 1b, we additionally extended the duration of the hourglass animation from 10 to 15 seconds, thereby employing an even stronger test of the possibility that the reduced need for information in the coin conditions might be a function of the time difference.

Second, because leaving out the preliminary decision certainty measure in the previous study did not alter the results, we again included this measure to be able to control for its effects.

Results

We conducted a 2x2 chi-square test for our main analysis with condition (coin vs. control) and the need for further information (yes vs. no). Although the resulting pattern of

[4]Due to an initial miscalculation of the effect size from Study 1, we had to recruit participants in two waves (n_1 = 120 and n_2 = 95). The difference of two participants between intended and actual sample size is likely due to technical properties of the panel website and lay outside of our control.

results is as predicted with coin participants having a lower need for further information than control participants, the association between condition and information need was not significant, $\chi^2(1) = 2.42$, $p = .120$, $w = .11$.

Combined Results of Studies 1, 1b, and 1c

To obtain a meta-analytic estimate for our studies, we use Fisher's method (1925) of combining p-values from multiple independent studies testing the same hypothesis. With the three p-values from our studies ($p = .039$ in Study 1, $p = .616$ in Study 1b, and $p = .120$ in Study 1c), Fisher's method gives a test statistic of $\chi^2 = 14.86$ with 6 degrees of freedom and a combined $p = .021$.

For an overview, the descriptive statistics of Studies 1, 1b, and 1c are displayed in Table 4. More detailed analyses for Studies 1b and 1c are available upon request.

Table 4

Descriptive statistics of studies 1, 1b, and 1c for the complete samples as well as for individual experimental conditions (after manipulation)

Measure	Study 1	Study 1b	Study 1c
Sample size (after exclusion)	163	109	199
Preliminary decision (%yes/no)	19/81	37.6/62.4	29.1/70.9
Preliminary decision certainty (1-11)	8.06 (1.49)	not measured	7.98 (1.77)
Need for further information (%yes, all conditions)	79.1	76.1	82.4
control	90.9	78.9	88.2
coin-congruent	77.4	80.0	78.1
coin-incongruent	69.1	69.4	80.6
Final decision (%yes/no)	11.7/88.3	22.9/77.1	22.1/77.9
Decision changed (%, all conditions)	11	14.7	10.1
control	7.3	15.8	13.2
coin-congruent	9.4	5.7	4.7
coin-incongruent	16.4	22.2	11.9
Decision certainty (1-11)	9.01 (1.63)	9.06 (1.46)	9.02 (1.72)

control		9.00 (1.51)	8.94 (1.65)
coin-congruent		9.09 (1.40)	9.09 (1.82)
coin-incongruent		9.11 (1.50)	9.03 (1.71)
Change in certainty from preliminary to final decision[a]	.95 (1.26)	not measured	1.04 (1.55)
control	1.15 (1.13)	not measured	1.00 (1.30)
coin-congruent	.83 (1.22)	not measured	1.03 (1.50)
coin-incongruent	.87 (1.40)	not measured	1.07 (1.84)
Decision difficulty (1-7)	3.23 (1.68)	3.05 (1.67)	3.40 (1.85)
control	3.13 (1.50)	3.18 (1.75)	3.50 (2.02)
coin-congruent	3.36 (1.74)	3.03 (1.67)	3.45 (1.66)
coin-incongruent	3.20 (1.80)	2.92 (1.63)	3.24 (1.85)

Note. Unless otherwise noted in the measures column, the table displays means and standard deviations in brackets.
[a]Calculated as decision certainty minus preliminary decision certainty, i.e., positive values reflect increased certainty.

Solve the dilemma by spinning a penny? On using random decision-making aids

Running title: On using random decision-making aids

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Abstract
When people find it difficult to make a decision, they may opt to let chance decide. Flipping a coin, rolling a die, or using a counting-out rhyme are well-known decision aids. When individuals directly follow the aid's suggestion, the decision aid acts as a *decider*. But when the decision aid elicits a felt response, such as liking or disliking the aid's suggestion, and individuals act upon this response, the decision aid serves as a *catalyst*. This manuscript investigates whether and how many individuals apply these two strategies. In four studies (total $N = 1136$), we focus on coin flips as one of the most common decision aids and place an emphasis on the catalyst strategy. We examine (1) the frequency of previous experiences and future willingness to use a coin flip to make decisions, (2) which affective reactions accompany the coin flip when using it as catalyst, and (3) the circumstances under which individuals are more versus less likely to accept the use of a random decision-making aid to come to a decision. These results illustrate the catalyst phenomenon but also highlight the boundary conditions of individuals' willingness to use randomness as an aid for decision making. We discuss directions for future research as well as potential applications.

Keywords: simple decision strategies, decision aids, coin flips

Solve the dilemma by spinning a penny? On using random decision-making aids

Our days are replete with decisions. For instance, should I attend my fitness class in the evening or should I go and have drinks with my work colleagues? Should I pack a lunch or have lunch in the canteen with Alex? Most of these decisions appear straightforward, but eventually, we might come across more difficult decisions: Should I quit my job? And if I have new job offers, which one should I accept? Or, on a more personal note, should I continue dating Alex, or should I end the relationship? These decisions are more consequential and individuals might want to carefully think about all of the potential options to make a good and informed choice. To do so, they might apply a variety of decision-making strategies: gather as much information as possible about their options, compile lists with pros and cons, or ask friends, relatives, and experts for advice.

In situations where these strategies do not result in a satisfying solution, people might turn to a different strategy: letting chance decide by, for instance, flipping a coin. If individuals directly follow the coin's suggestion, the decision aid serves as a *decider*. Interestingly, however, using a random device could come with a little twist in that the decision aid elicits a felt response, such as liking or disliking the aid's suggestion. If individuals act upon this felt response, the coin flip acts as a *catalyst* for the decision at hand. Here, we investigate whether individuals are aware of and use the decider and catalyst strategies. We furthermore research which affective reactions accompany the coin used as a catalyst and in which situations individuals are more or less likely to use a random decision-making aid. This manuscript thereby helps to understand the phenomenon of flipping a coin as one of the most common decision-making aids.

Coin flips that serve as deciders

Using a coin flip as a decider is generally considered as a means to make a fair decision (Keren & Teigen, 2010). Coin flips are widely applied in competitive situations such as sports events and are used to decide, for example, which team will start or who will choose the starting ends for each team, focusing on finding a fair solution for a decision involving two parties. However, there are also situations in which individuals use coin flips to come to a conclusion for themselves. Levitt (2020) conducted an online study in which undecided individuals described own decisions concerning, for example, whether or not to make a change, and then saw a virtual coin flip. Participants were contacted again two and six months later, and those who were told by the coin to make a change were indeed more likely to have made a change than participants who had been told to maintain the status quo (Levitt, 2020).

Prior research also shows that people see coin flips as a fair approach to making a decision (Keren & Teigen, 2010; Experiment 9), yet are nevertheless reluctant to use them because they seem "to conflict with traditional ideas about argument-based rationality and personal responsibility of the decision maker" (Keren & Teigen, 2010, p. 83). Other work (Elster, 1987) points out that individuals sometimes prefer the deliberate use of lotteries to allocate burdens, but that in general individuals have "an addiction to reason" and a strong preference for outcomes being determined by reason and not by chance (Elster, 1987, p. 177). This means that they would be willing to accept higher costs for the search for reasons justifying a decision instead of choosing a lottery. Yet, other research (Dwenger, Kübler, & Weizsäcker, 2019) paints a more malleable picture, suggesting that participants sometimes even prefer and actively choose randomization, which could be driven by indecisiveness or perceived indifference. Randomness might furthermore be preferred to determine

outcomes when individuals feel especially conflicted, for example, when faced with a prosocial request (e.g., a monetary donation, Lin & Reich, 2018), when facing a moral dilemma (e.g., choosing the trolley's path in the trolley dilemma, Gordon-Hecker & Olivola, 2019), or a situation in which individuals are asked to inflict inequity (e.g., allocating a reward to one of two equally deserving individuals, Gordon-Hecker, Rosensaft-Eshel, Pittarello, Shalvi, & Bereby-Meyer, 2017).

Common to all these findings is that the coin flip is supposed to determine the decision, meaning that it serves as *decider*. We now turn to a different use of random decision aids.

Coin flips that serve as catalysts

While the coin's decider function might be its most frequent role, individuals sometimes report that the coin elicited an affective reaction, for example, feeling satisfied or dissatisfied (Jaffé, Reutner, & Greifeneder, 2019), and that they acted upon this felt reaction. In these situations, the coin flip acts as a *catalyst*. We borrow this term from the natural sciences, as the coin flip serves as an additional ingredient that enhances (catalyzes) the decision-making process, presumably as it allows individuals to make a decision where they could not come to a conclusion before.

The advice of flipping a coin to better know what one wants has also been introduced in pop culture, such as in the TV series *The Big Bang Theory*. In one episode, one of the main characters cannot make up his mind about which of two video game systems he should buy. Standing in the shop, his girlfriend then recommends the following: "How about this. They say if you flip a coin, it shows your true feelings, because you'll either be excited or disappointed by the outcome. So, heads it's an Xbox One, tails it's a PS4" (IMDb, n.d.). It is not the outcome of the coin flip that is relevant, but the revelation of feelings that may then guide the decision.

Coin flips that serve as catalysts have only recently received attention in research: Studies showed that flipping a coin elicits affective reactions and triggers the feeling of knowing what one really wants (Jaffé et al., 2019), and that seeing a coin flip's suggestion reduces information need before making a final decision (Douneva, Jaffé, & Greifeneder, 2019). Both contributions show that the coin flip can act as a catalyst even in experimental settings. However, these studies use the coin flip as an experimental manipulation and do not investigate previous experiences with coin flips in general, affective reactions in the context of personal decisions, or the likelihood of applying this strategy.

The present research

While coin flips as deciders have been frequently addressed in behavioral research, much less is known about coin flips that serve as catalysts. We therefore set out to answer the following questions:

- **Question 1:** Are individuals familiar with the phenomenon of using a coin flip not only as a decider but also as a catalyst?
- **Question 2:** If yes, what affective reactions accompany the use of a coin flip as a catalyst?
- **Question 3:** In which situations are individuals more versus less likely to use a coin flip as a catalyst?

In Study 1, we assess participants' previous experience with coin flips as deciders and as catalysts and investigate participants' future willingness to use random decision-making aids (Question 1). In Studies 2a and 2b, we ask participants to describe an important decision they are currently facing. We then provide some of the participants with a virtual coin flip to aid their decision and investigate

their affective reactions in response to the coin flip (Question 2). In Study 3, we contrast hypothetical decision scenarios with a real decision and investigate individuals' willingness to flip a coin and use random decision-making aids within participants to provide first insight about situations in which individuals are likely to apply the catalyst strategy (Question 3).

Study 1

Study 1 investigated participants' previous experiences with coin flips, both as decider and catalyst, and their future willingness to use them for decisions.

Method

Participants and design

We recruited 467 participants (272 female, 191 male, 4 no information/missing; M_{age} = 51.07, SD_{age} = 14.77) via PsyWeb (psyweb.uni-muenster.de), an unpaid German online participant pool for people interested in psychological research. As an incentive for participation, participants could enter a lottery for an online shop voucher and receive brief feedback regarding the personality scales included in the survey. We collected data across two sessions to reduce carryover effects between measures and to keep participation time brief, and only analyzed data from participants who completed both sessions. Of those 467 participants, six indicated low carefulness during one or both parts of the study (< 5 on a scale from 1 to 9). Excluding them resulted in a sample of 461 participants.

Materials and procedure

Session 1

Participants were welcomed, provided informed consent and demographics (gender and age) before learning that they would answer questions about decision making and their personality. Participants first indicated whether they had ever flipped a coin to make a decision (yes vs. no), whether they had ever flipped a coin and then experienced a feeling, for example, of happiness, disappointment or relief, when looking at the outcome (yes vs. no), and whether they had ever flipped a coin to make a decision and then suddenly knew what they really wanted (yes vs. no). If participants had already flipped a coin to make a decision, we asked them to think back to the last situation where they had used a coin flip and how they had proceeded (decided in line with the coin suggestion vs. did the opposite, vs. did not make a decision). We then asked all participants whether they would be willing to flip a coin to make a decision now or in the future (yes vs. no). If participants indicated that they would, we asked them to specify the decision problem that they would try to solve: the point in time at which they would use the coin (1 = *early in the decision process* to 7 = *only when they had already tried everything else*), the type of decision for which they would use a coin (1 = *very easy decisions* to 7 = *very difficult decisions*), and the impact of the decision (1 = *only affects themselves* to 7 = *affects other persons, too*). Last, we asked more generally about participants' willingness to let chance decide in the past (1 = *not at all* to 7 = *very much*), their current and future willingness to let chance decide (1 = *not at all* to 7 = *very much*), and, as a proxy for a tendency for fatalism, to what extent the statement "whatever will be, will be" matches their personality (1 = *not at all* to 7 = *very much*).

Participants then completed the following scales: need for closure (Roets & Van Hiel, 2011), conscientiousness from the mini-IPIP (Donnellan, Oswald, Baird, & Lucas, 2006), honesty-humility from the Brief HEXACO Inventory (De Vries, 2013), and belief in superstition (Fluke, Webster, & Saucier, 2014). Participants could obtain automated feedback regarding their scores on

the personality questions. They indicated how carefully they had completed the survey, whether we could use their data for analyses, and whether they had any general comments.

Session 2

Two weeks after Session 1, participants were invited to Session 2, which mainly included more personality scales which were only used for exploratory analyses that are not reported in this manuscript, but can be accessed via our online repository, see below. We included scales on preference for intuition and deliberation (Betsch, 2004; Betsch & Kunz, 2008), the buck-passing subscale from the Melbourne decision making questionnaire (Mann, Burnett, Radford, & Ford, 1997), belief in tempting fate (Risen & Gilovich, 2018), counterfactual thinking for negative events (Rye, Cahoon, Ali, & Daftary, 2008), and indecisiveness (Germeijs & De Boeck, 2002). Again, participants were able to obtain feedback and we asked them for carefulness, self-exclusion, and comments.

Results

Overall, 210 (45.6%) participants had used a coin flip to make a decision, whereas 251 (54.4%) had not. Out of the 210 participants who had flipped a coin in the past, 173 (82.4%) had flipped a coin and experienced a feeling (e.g., happiness, disappointment, relief) when looking at the outcome and 137 (65.2%) suddenly knew what they really wanted. With respect to the last decision for which participants had flipped a coin, 115 (55.3%) decided in line with the coin suggestion, 50 (24.0%) chose the opposite, and 43 (20.7%) did not make a decision at all. Out of all participants who had flipped a coin in the past, 101 (48.1%) were willing to use a coin flip in the future, whereas only 16 (6.4%) were willing to use a coin flip when they had never flipped a coin to make a decision before.

If participants indicated a willingness to use a coin flip, we asked them to specify the decision problem that they would try to solve. Participants indicated that they would not use a coin flip very early in the decision process, but rather towards the end when they had already tried other strategies (M = 4.91, SD = 1.99). Participants would also rather use the coin for easy than for difficult problems (M = 3.14, SD = 1.81), and rather for problems that would affect only themselves and not others, too (M = 2.74, SD = 1.67). Overall, participants were relatively reluctant to let chance decide both in the past (M = 3.43, SD = 1.59) and now/in the future (M = 3.35, SD = 1.61).

As the personality scales were included for exploratory analyses only, results are not reported here. To uphold transparency, a summary of the results from the scales can be found in the online repository here: https://drive.switch.ch/index.php/s/ObPGiQJ4ZaCUwmm.

Discussion

Study 1 investigated whether participants had previous experiences with both using the coin flip as a decider and as a catalyst (Question 1). We found that about 46% of participants had used a coin flip before and the majority of them had also experienced an affective reaction (82%) and/or suddenly knew what they wanted (65%). This indicates that a substantial part of our participants had experiences with coin flips as deciders but also as catalysts.

However, in line with previous work (e.g., Keren & Teigen, 2010), our results also indicate a certain amount of skepticism regarding the use of a random decision-making aid. Participants were relatively reluctant to let chance decide both in the past and now/in the future. If they were willing to flip a coin in principle, they would apply this strategy rather late in the decision process, more for easy decisions, and for decisions that would only affect themselves.

It is important to keep in mind that the specific numbers might substantially vary between persons and situations: Individuals differ in their past experience and future willingness to flip a coin, and the situations individuals thought of vary as well. We therefore do not draw generalizations based on this study but demonstrate people's awareness of and experiences with the phenomena we study.

Studies 2a and 2b

While Study 1 investigated individuals' general willingness to flip coins without reference to a specific decision, Studies 2a and 2b investigated individuals' willingness to flip coins and their reactions towards the coin outcome for current decisions. In both studies, participants described an important decision-making problem they were facing at the time of the study. Because flipping a coin can result in two outcomes only (heads or tails), participants were asked to describe a decision problem with two options. Participants were randomly assigned to a condition in which we showed them a virtual coin flip versus a control condition without a coin flip.

Studies 2a and 2b were set up as longitudinal studies with two parts. In the following, we present the data from the first assessment only, because this is where we focused on learning about individuals' decisions, introducing the coin flip, and investigating individuals' affective reactions (data from the second sessions, which were unrelated to the present research question, are available upon request). We therefore concentrate mainly on the condition presented with a coin flip. We sampled from two populations: Swiss university students (Study 2a) and the general German population through an online panel (psyweb.uni-muenster.de; Study 2b). We pretested the structure of our study before conducting Study 2a, for which the method and results are stored here: https://drive.switch.ch/index.php/s/ObPGiQJ4ZaCUwmm.

Study 2a

Method

Participants and design

We recruited 205 participants (122 female, 81 male, 2 no information; M_{age} = 23.57, SD_{age} = 4.27) by advertising the study on the university campus and asked participants to fill out the questionnaires on tablet computers. Of those 205 participants, three indicated that they had either already made the decision or gave replies in a foreign language, and two participants did not finish the study. Eight participants indicated low carefulness (< 5 on a scale from 1 to 9) and 13 participants had already participated in a similar study (presumably the pretest). Excluding these participants resulted in a sample of 180. Participants received chocolate as compensation for their participation.

Study 2a included one between-subjects factor: Participants were either asked to use a coin flip as a catalyst (catalyst condition) or not (control condition). Given our particular interest in the coin condition, we sampled 60% of the participants into the catalyst condition and 40% of participants into the control condition. As dependent variables, we assessed whether the coin flip elicits affective reactions. In an exploratory fashion, we also assessed participants' evaluations of their decisions in regard to difficulty, importance, potential regret of a wrong decision, and probability of deciding within the next weeks. We furthermore assessed categorizations of the decision problem and investigated whether these categorizations were associated with willingness to flip a coin.

Materials and procedure

After participants were welcomed to the study and provided informed consent, we asked them to describe a difficult decision they were currently facing which involved two options and which they wanted/needed to make in the next few weeks. We furthermore specified that they should think of a decision involving two options. We first asked participants to describe the problem, then the two options (including pros and cons for each), and to then label the two options with a keyword. We then asked participants to indicate the date by which they would (a) want and (b) need to make a decision.

At this point, we introduced catalyst-participants to the coin flip as a decision-making aid that should be used as a catalyst, not as a decider. The verbatim instructions were: "Even if it appears unusual: We would like to encourage you to use a coin flip for your decision. Of course, you will make your decision yourself, however, consider the possibility of following the coin's suggestion, even if you're dealing with a difficult decision."[1] After reading the explanation, catalyst-participants could indicate if they did not want to make their decision with the help of a coin flip (tick box), and we informed them that this would not influence the remainder of the study. Catalyst-participants then saw the coin flip and were asked which of the following four reactions they experienced when looking at the coin's outcome: satisfaction, relief, disappointment, or indifference (forced choice item). Furthermore, we assessed catalyst-participants' wish to flip the coin again (yes vs. no). On the next page, participants indicated the strength of the feeling they had experienced (1 = *very weak* to 5 = *very strong*), and, if applicable, their reasons for wishing to flip the coin again (open text box).

Afterwards, all participants indicated how long they had been thinking about the decision problem (open textbox) and rated the decision difficulty (1 = *not difficult at all* to 7 = *very difficult*), importance (1 = *not important at all* to 7 = *very important*), potential regret of a wrong decision (1 = *not at all* to 7 = *very much*), and the probability of deciding by their set date (1 = *very unlikely* to 7 = *very likely*). Participants furthermore indicated whether their decision was more emotional versus rational, whether it only affected themselves or others as well, and whether it was a "should I / should I not" decision versus a decision between different options (all three simplified forced choices[2]).

At the end of the study, participants provided demographic information, indicated how carefully they had completed the study (1 = *not carefully at all* to 9 = *very carefully*), how difficult it was to come up with a decision problem, reasons for data exclusion, and whether they had participated in similar previous studies. Participants were asked for any further comments before being thanked and receiving chocolate as compensation.

Results

All participants came up with a decision problem that they were currently facing and which involved two options. Participants rated the decision problem as rather difficult (M = 5.16, SD = 1.44), important (M = 5.86, SD = 1.26), that they would rather regret a wrong decision

[1] The original instructions in German were: „Auch wenn es ungewöhnlich erscheint: Wir möchten Sie ermutigen, für Ihre Entscheidung einen Münzwurf zu nutzen. Natürlich treffen Sie die Entscheidung selbst; ziehen Sie die Möglichkeit jedoch in Betracht, der Empfehlung der Münze zu folgen, auch wenn es sich um eine schwierige Entscheidung handeln sollte."

[2] We acknowledge that the binary choices we offered in regard to important decisions are highly simplified, as, for example, most decisions require some reasoning but can also be associated with affect. We were mainly interested in individuals' rather general categorizations, but future studies might investigate decision types on a more fine-grained level.

(M = 5.01, SD = 1.62), and that it was rather likely they would make a decision within the next weeks (M = 5.50, SD = 1.70). Half of the participants (50.6%) categorized their decision as a more emotional decision, whereas 49.4% indicated it was a more rational decision. Furthermore, 53.9% indicated that the decision would only impact themselves, whereas 46.1% indicated that others would be impacted as well. Lastly, 69.4% of participants indicated having described a "should I / should I not" decision, whereas 30.6% indicated having described a decision between two options. Figure 1 summarizes these findings.

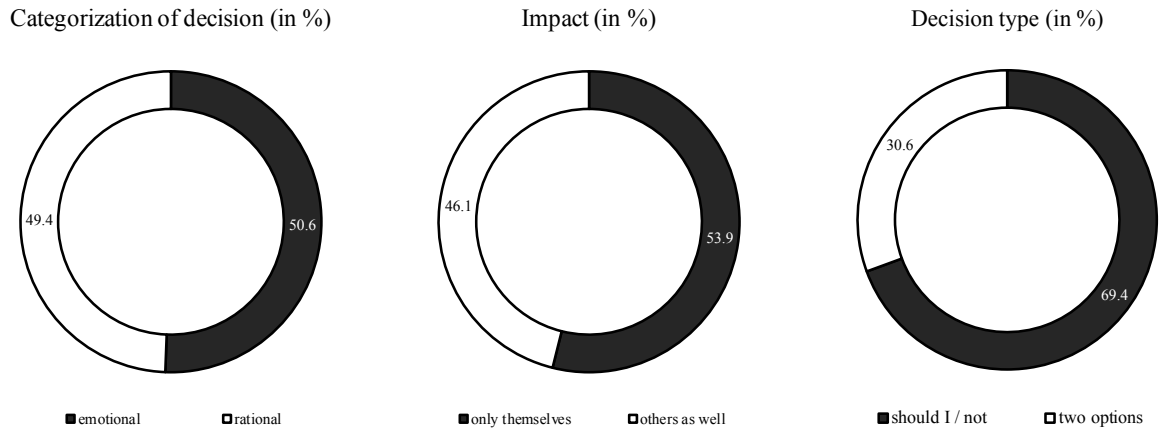

Figure 1. Self-categorization of participants' decisions.

For the analyses on the reactions towards the coin flip, we focused on the respective condition only. Catalyst-participants (N = 106) showed a relatively high level of skepticism regarding the coin flip: More than half of them (56.6%) did not want to flip a coin to make a decision, although we had explicitly told them that they would make the decision on their own and would not need to adhere to the coin flip's outcome. Because the coin was flipped nevertheless, we can analyze affective reactions of all catalyst-participants: 77.4% indicated having an immediate feeling when looking at the outcome of the coin flip, namely either satisfaction (38.7%), relief (16.0%), or disappointment (22.6%). Only 22.6% felt indifferent towards the outcome of the coin flip. Moreover, their feeling was moderately strong (M = 3.35, SD = 0.87). Last, 15.5% wished to flip the coin again.

When analyzing the data as a function of willingness to flip the coin, we find that participants willing to flip a coin (N = 46) compared to those unwilling (N = 60) indicated feeling satisfaction in 43.5% versus 35.0%, relief in 10.9% versus 20.0%, disappointment in 19.6% versus 25.0%, and indifference in 26.1% versus 20.0% of the cases. Although descriptively different, this distribution did not significantly differ as a function of willingness ($Chi^2(3) = 2.60$, $p = .457$). Similarly, feeling intensity did not differ significantly as a function of willingness (willing: M = 3.22, SD = 0.84 versus unwilling: M = 3.45, SD = 0.89; $t(104) = -1.37$, $p = .175$).

To understand whether there were situations in which catalyst-participants would be more or less likely to flip a coin, we looked at percentages of participants in the quadrants resulting from willing and unwilling participants by the three dichotomous decision categories (categorization of decision; impact; decision type). If participants decided for themselves, 44.8% did not want to flip a coin. If others were involved, this number increased to 70.8%. Whether the decision concerned a should I / should I not decision or a decision between two options did not result in differences of similar magnitude (53.4% vs. 63.6%), nor did the emotionality/rationality dimension (57.4% vs. 55.8%).

Discussion

Study 2a sheds light on affective reactions accompanying a coin flip (Question 2) and situational factors related to the willingness to flip a coin (Question 3). In the catalyst condition, 77.4% of participants reported experiencing a feeling of satisfaction, disappointment, or relief when looking at the outcome, and this feeling was generally rather strong. Affective reactions did not consistently differ in regard to type or strength between participants who were willing versus unwilling to use the coin flip. Consistent with Study 1 and prior literature (e.g., Keren & Teigen, 2010), a substantial proportion of participants in the catalyst-condition (56.6%) did not want to make their decision with the help of a coin flip. The willingness to flip a coin decreased even more when others were impacted by the decision.

Study 2b

Study 2b again focuses on affective reactions and situational factors associated with the use of a coin flip, but with a larger sample from the general public to capture more diverse attitudes and experiences, thereby examining the generalizability of our earlier findings.

Method

Participants and design

We recruited 370 participants (213 female, 155 male, 2 no information/missing; $M_{age} = 49.33$, $SD_{age} = 15.84$) via PsyWeb (psyweb.uni-muenster.de). Of those 370 participants, two indicated low carefulness (< 5 on a scale from 1 to 9) and one of them also explicitly asked for exclusion. We excluded these two participants from the data analysis, resulting in a sample of 368. As incentive for participation, participants could enter a lottery for books on decision making.

Study 2b included the same between-subjects conditions as Study 2a (a catalyst and control condition to which participants were randomly assigned). As dependent variables, we assessed affective reactions towards the coin flip. In an exploratory fashion, we also assessed participants' evaluations of their decision (difficulty, importance, potential regret of a wrong decision, and probability of deciding within the next weeks).

Materials and procedure

The study setup was identical to Study 2a with the following exceptions: 1) After describing the decision problem, participants were additionally asked how long they had been thinking about the decision problem (1 = *not long*, 7 = *very long*), 2) catalyst-participants were not asked about the strength of the feeling towards the coin flip and did not have to provide reasons if they wished to flip the coin again, and 3) participants were not asked to categorize their decisions.

Results

All participants came up with a decision problem that they were currently facing and which involved two options. Participants indicated that they had thought about the decision problem for a while ($M = 4.20$, $SD = 1.96$), and rated the decision problem as rather difficult ($M = 5.55$, $SD = 1.48$) and important ($M = 5.92$, $SD = 1.32$). They indicated that they would rather regret a wrong decision ($M = 5.27$, $SD = 1.60$) and that it was rather likely that they would make a decision within the next weeks ($M = 5.26$, $SD = 1.65$).

For the analyses on the reactions towards the coin flip, we focused on the respective condition only. Catalyst-participants ($N = 177$) were again relatively skeptical about the coin flip: More than two thirds of the sample (70.6%) did not want to flip a coin to make a decision, although we had explicitly told them that they would make the decision on their own and would not need to adhere

to the coin flip outcome. Because the coin was flipped nevertheless, we could analyze affective reactions of all catalyst-participants: 68.4% had an immediate feeling when looking at the outcome of the coin flip, namely either satisfaction (17.5%), relief (30.5%), or disappointment (20.3%). Only 31.6% felt indifferent towards the outcome of the coin. Lastly, 16.9% wished to flip the coin again.

When analyzing the data as a function of willingness to flip the coin, we find that participants willing to flip a coin ($N = 52$), compared to those unwilling ($N = 125$), indicated feeling satisfaction in 19.2% versus 16.8%, relief in 36.5% versus 28.0%, disappointment in 23.1% versus 19.2%, and indifference in 21.2% versus 36.0% of the cases. These distributions did not significantly differ ($Chi^2(3) = 3.83$, $p = .280$).

Discussion

Study 2b investigated the coin flip phenomenon with a more diverse sample and found the same patterns as in Study 2a: Participants again reported affective reactions towards the outcome of the coin flip, namely satisfaction, relief, or disappointment, while less than a third indicated being indifferent. The majority of catalyst-participants did not want to make their decision with the help of a coin flip. Regarding the reported affective reactions, we did not find differences between willing and unwilling participants. As a tendency, however, we see that more of the unwilling participants indicated being indifferent compared to the participants willing to flip a coin.

Study 3

Studies 1, 2a, and 2b show that individuals are reluctant about the idea of using a coin flip to make a decision, although we framed the coin as a catalyst and emphasized that individuals could make their own decision (see Studies 2a und 2b). One could now speculate that this reluctance was caused by the fact that we asked for personal and real decisions, which can often be of some importance. Going back to the work by Keren and Teigen (2010), the researchers show that willingness to use a coin flip is higher for low importance decisions (choosing between going to the theater or a concert) than for high importance decisions (deciding who will be first author on a scientific paper). The skepticism towards using coin flips for important decisions might be driven by individuals' concept of accountability. Individuals are held accountable for the decisions they express and seek approval and respect of those to whom they are accountable (Tetlock, 1985). If they believe that flipping a coin is not an acceptable strategy, as (especially important) choices should be determined by reason (see Elster, 1987), they should be unwilling to use random decision-making aids.

However, there might be situations in which it is more acceptable to use chance to support making a decision. What if the decision was not real and important, but a hypothetical scenario? A thought experiment about a choice between two equally good restaurants in a faraway city? Would hypotheticality increase participants' willingness to use it to make a decision?

We tested this idea with Study 3, which also assessed the associations individuals have with chance. We aimed at understanding the valence of these associations and whether negative (compared to positive) associations might explain participants' reluctance to introduce a chance element (a coin flip) into their decisions. At the same time, we analyzed participants' willingness regarding hypothetical but also regarding a real decision, which allows us to compare willingness across hypothetical versus real decisions.

Method

Participants and design

We recruited 128 participants (69 female, 58 male, 1 no information/missing; $M_{age} = 36.85$, $SD_{age} = 12.72$) via Prolific. One participant did not provide a specific random event at the beginning of

the study and another participant did not provide an understandable personal decision, and this exclusion resulted in a sample of 126. Participants received £1.05 (US $1.35) as compensation for an estimated study time of 9 minutes.

Study 3 included one within-subjects factor: Participants were first asked about the likelihood of flipping a coin for six hypothetical decisions with two outcomes (hypothetical decisions) and then about the likelihood of using random decision-making aids for an upcoming real decision (real decision). For the real decision, we asked for random decision aids in general and not only for coin flips, because participants' decisions could have entailed more than two options. Both self-reported likelihoods for hypothetical and real decisions served as dependent variables.

Materials and procedure

After giving informed consent, participants were asked to think back and describe a past random event. They were then asked how much randomness/chance played a role in this situation (1 = *not at all*, 7 = *very much*), how positive or negative the event was (1 = *very negative*, 7 = *very positive*), how consequential the event was for themselves and their life (1 = *there were no consequences*, 7 = *very big consequences*), and when the event took place (drop down). After this introductory part, participants learned that the aim of the study was to investigate whether individuals use decision aids in different situations and that we were particularly interested in random decision aids, such as counting-out rhymes, die rolls, or coin flips. Participants were then presented with six short scenarios (a choice between two hotels, restaurants, films, dresses, theater tickets, and city trips; materials can be found here: https://drive.switch.ch/index.php/s/ObPGiQJ4ZaCUwmm). Participants indicated how likely it was that they would flip a coin to help them decide between the two options on an 11-point Likert scale (1 = *0%,* 11 = *100%*). Next, participants were asked to briefly describe a real upcoming decision that they needed to or would like to make soon. We then asked how important the decision was for them (1 = *very unimportant*, 7 = *very important*) and how willing they were to use a random decision aid to help them make this decision (1 = *0%,* 11 = *100%*). Lastly, participants were asked how carefully they had completed the study (1 = *just clicked through*, 9 = *seriously answered the questions*), whether there were any reasons not to analyze their data, demographics (gender and age), and whether they had any comments.

Results

All participants described a random event (M = 6.06, SD = 1.20), that was of rather positive valence (M = 5.18, SD = 2.26) and moderately consequential (M = 3.27, SD = 1.98).

Looking at the hypothetical scenarios, participants' self-reported likelihood of flipping a coin to help make the decision was moderately high with M = 4.19, SD = 2.40 (31.93% when translated back to probabilities). Across scenarios, the likelihood varied: M = 3.37, SD = 2.60 for hotels; M = 3.80, SD = 3.04 for dresses; M = 3.96, SD = 2.81 for restaurants; M = 4.10, SD = 3.05 for city trips; M = 4.91, SD = 3.16 for tickets; and M = 5.02, SD = 3.31 for films.

Looking at the real decisions, participants indicated that these were quite important (M = 5.69, SD = 1.42) and that participants were not particularly willing to use a random decision-making aid to help with this decision (M = 2.65, SD = 2.27, 16.51% when translated back to probabilities).

Next, we wished to compare willingness to use chance for the hypothetical scenarios and the real decisions. This comparison would be questionable if hypothetical and real decisions strongly differed in content. To find out, we asked an independent coder to classify the real decisions into the categories used for the hypothetical decisions in regard to the content area, namely holidays, food, entertainment, and consumer goods, or other, if no category was applicable. When looking at coding, 30.95% of decisions were categorized into consumer goods, 15.87% into holidays, 15.87% into entertainment, and 5.56% into food. Only 31.75% could not be categorized. All in all, these results reflect a strong content overlap between the hypothetical and the real decisions,

allowing us to proceed with a comparison of the willingness to use chance. To this end, we averaged participants' likelihood ratings across the six scenarios and compared the resulting mean to their willingness rating for their real decision with a paired-samples t-test. Results revealed that willingness was significantly lower for real than for hypothetical decisions with a mean difference of 1.54, $t(125) = 7.07$, $p < .001$, $d = 0.63$. If we only include participants that described a real decision that was categorized as content-wise similar to the hypothetical decisions (total 68.25%), results are similar: mean difference of 1.28, $t(85) = 4.88$, $p < .001$, $d = 0.53$.

Looking at the correlation between self-rated importance of the personal decision and willingness to use a random decision-making aid to make the personal decision resulted in a non-significant finding, $r(124) = -.07$, $p = .463$. As reported above, the valence of the past experience involving randomness was rather positive and neither correlated with participants' likelihood to flip a coin for hypothetical decisions, $r(124) = .06$, $p = .514$, nor with their willingness to use random decision-making aids for real decisions, $r(124) = -.10$, $p = .291$.

Discussion

Study 3 shows that participants' aversion towards random decision-making aids was less pronounced when it came to hypothetical compared to real decisions. When presented with various hypothetical decisions, participants reported a relatively higher likelihood of using a coin flip to help them make a decision (on average, 31.93%). Within real decisions, however, we do not find that higher importance was associated with higher or lower willingness to flip a coin, but as personal decisions were generally rated as quite important, we believe that this result should be interpreted with caution.

Summarizing Study 3, one could speculate about further possibilities to understand and reduce individuals' reluctance regarding random decision-making aids. One important aspect could be an even stronger explanation of the catalyzing phenomenon, to show individuals that flipping a coin can be a helpful strategy that still allows the expectations associated with accountability to be fulfilled (Tetlock, 1985). Within Study 3 we used a concise description of the catalyst, which frames the coin flip as *helping* to make the decision. Here, we show that even in the context of a milder catalyst frame, willingness can critically differ between personal and hypothetical decisions. Using a more versus less detailed description might prove to be another moderator of participants' willingness to flip a coin and might strengthen versus weaken the differential enthusiasm for flipping a coin for hypothetical versus personal decisions.

General Discussion

When people face a difficult decision, they might use a variety of strategies to come to a conclusion. In this manuscript, we investigate coin flips as a possible strategy. Coin flips can be used in different ways: They can serve as a decider and determine the decision for the individual, or they can act as a catalyst, meaning that they elicit a felt response to which individuals react. We addressed three research questions by examining both phenomena:

Question 1: Are individuals familiar with the phenomenon of using a coin flip not only as a decider but also as a catalyst?

We investigated participants' past experiences with coin flips in Study 1 and found that 46% of participants had used a coin flip to decide before. Of those, 82% had experienced a feeling and 65% indicated that when they had looked at the outcome, they suddenly knew what they wanted.

This shows that participants are familiar with coin flips as decision-making aids, and if they had used them in the past, many had experienced them as catalysts.

Question 2: If yes, what affective reactions accompany the use of a coin flip as a catalyst?

When experimentally confronting undecided participants with a coin flip as a catalyst, the majority experienced an affective reaction when looking at the outcome. These reactions were diverse: 25% were satisfied, 25% were relieved, 21% were disappointed, and only 28% were indifferent (weighted average across Studies 2a and 2b). Willingness versus unwillingness to flip a coin did not significantly change the pattern in the studies. Some participants furthermore wished to flip the coin again (16%, weighted average across studies), indicating a translation of these affective reactions to behavioral intentions. It seems that participants experience negative or positive feelings that allow them to qualify the coin's suggestion by signaling a form of liking or disliking that might then be used as a heuristic to make a decision.

Question 3: In which situations are individuals more versus less likely to use a coin flip as a catalyst?

In general, we find a rather strong reluctance to use a coin flip to aid decision making, especially when we asked about real and personal decisions in which other people are involved as well. First, individuals seem more likely to use random decision-making aids for hypothetical decisions (32%) compared to real decisions (17%; see Study 3). Second, when being asked directly in Study 1, participants reported being more likely to use the coin flip towards the end of the decision process when they had already tried other strategies, more for easy than for difficult problems, and rather for problems that would affect only themselves and not others, too. Third, if participants decided for themselves, 44.8% did not want to flip a coin. If, however, others were involved as well, this number increased to 70.8% (Study 2a).

Implications for future research

Study 1 shows that many participants who had used a coin flip in the past had also experienced an affective reaction, meaning that they had used the coin flip as a catalyst. One open question is whether they deliberately applied the catalyst strategy. In Studies 2a and 2b, we framed the coin flip as a catalyst to investigate felt reactions and to then make a more informed choice, meaning that the workings of the catalyst strategy were clarified before using it. Another option could be that the coin flip is generally used as a decider and then, in some cases, elicits a spontaneous affective reaction that turns it into a catalyst. It would then work similarly to the example of individuals writing down a list of pros and cons, only to then conclude that the results are just not coming out right (Zajonc, 1980), signaling to individuals that they are not as ambivalent as they thought. Are catalysts deliberately used as such, or do they "coincidentally" become catalysts? Our data so far do not answer this question, and potential motivations associated with either approach (e.g., accountability and responsibility concerns) could be disentangled in future research.

On a more general level, our data show that many individuals are not willing to use a random decision-making aid despite knowing about the phenomenon of flipping coins or also having experienced it as a catalyst. This skepticism may reflect individuals' preference for "argument-based rationality" (Keren & Teigen, 2010, p. 83) and for solutions determined by reason (Elster, 1987), as they expect to be held accountable for judgments and decisions (Tetlock, 1985). This preference for reason-based decisions may come at a cost: Trying to gather additional reason-based information, postponing, or not making a decision at all can be unpleasant and associated with

negative consequences for the decision maker and other individuals affected by the decision process (see Elster, 1987, for an example regarding custody decisions). If the catalyst is used to learn about emotional reactions towards options, and if this affect-based information is beneficial to the decision (see, e.g., Bechara, Damasio, Tranel, & Damasio, 1997; Chang & Pham, 2013; Gigerenzer, 2007; Kahneman, 2011; Loewenstein & Lerner, 2003; Schwarz & Clore, 1988), it could be perfectly rational to use a random decision-making aid as it maximizes utility (Li & Hsee, 2019).

Eventually, individuals could believe that the catalyst may allow them to discover their "true self" (Schlegel, Hicks, Davis, Hirsch, & Smith, 2013). As a result, one could argue that using a catalyst could lead to an overweighing of affective compared to other information (see for example the literature on emotional reasoning, e.g., Arntz, Rauner, & Van den Hout, 1995), meaning that this information would be given more weight than it should and, in turn, not maximize utility.

We carefully speculate that a psychoeducational approach may prove fruitful. First, one could explain the monetary and psychological costs associated with procrastination and decision paralysis. One could also highlight how a coin flip can not only serve as a decider, but as a catalyst, too, meaning that individuals are not bound to chance alone, but can still feel responsible for their decision. Second, individuals could learn how they can benefit from taking an affect-driven approach to decision making without overweighing feelings. As research shows, including feelings may maximize utility and is therefore rational in an utilitarian sense (Li & Hsee, 2019). This knowledge, in turn, could reduce the belief that only reason-based decisions are good decisions. In the end, individuals need to know that they and not the coin are making the decision and the way they can benefit from a strategy that builds on chance and the associated affect.

Conclusion

Flipping a coin can be a fruitful strategy to support decision making. Individuals can either use the coin to make a decision (decider) or to investigate their felt reactions and then use these feelings as further decision input (catalyst). Both can be a worthwhile strategy, especially when running out of ideas or needing a new perspective by including feelings as additional information. One could argue that if coming to a conclusion is important and necessary, and that taking affect into account maximizes utility and does not deteriorate decision quality, there is no loss but only potential gain "to solve the dilemma by simply spinning a penny."

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When choosing implies losing:

Flipping a coin increases forfeiture thoughts

Running head: Forfeiture thoughts

Abstract

When individuals choose between two options, one strategy they can apply is flipping a coin. Individuals might follow the coin's suggestion, without further thought. Another possibility is to take advantage of the change in perspective that the random suggestion affords by pointing to one option over the other. We here suggest that the coin flip increases forfeiture thoughts as losing one option when choosing the other should be more salient. We further expect forfeiture thoughts to be particularly strong when the coin flip's outcome is incongruent with pre-existing preferences. Two studies (total $N = 310$) have already been conducted. We find that flipping a coin increases forfeiture thoughts compared to a control group. Furthermore, we find preliminary support that forfeiture thoughts are stronger when the coin's suggestion is incongruent (vs. congruent) with participants' initial preference. Congruency (vs. incongruency) also results in stronger feelings of validation and more positive mood. We follow up on these findings by suggesting a preregistered study that investigates both forfeiture and acquisition thoughts as well as confidence in decision making as a downstream consequence of the change initiated by the coin flip.

Keywords: social cognition; forfeiture thoughts; confidence; coin flip; random decision aids

When choosing implies losing: Flipping a coin increases forfeiture thoughts

When individuals need to make a difficult decision, they may look for support. They could search for reviews, ask experts, or consult with friends. In some situations, however, individuals might not have the willingness, time, or capacity to spend much effort on deciding. Instead, they could choose to let chance decide by flipping a coin. The coin suggests choosing one option over the other, and by following this suggestion, individuals can escape the eventually unpleasant decision-making situation (see Beattie, Baron, Hershey, & Spranca, 1994; Gordon-Hecker, Rosensaft-Eshel, Pittarello, Shalvi, & Bereby-Meyer, 2017). Yet, people like making decisions themselves (Leotti & Delgado, 2011; Leotti, Iyengar, & Ochsner, 2010), and so individuals may not follow the coin's suggestions, but instead be influenced by a change in perspective that the coin flip affords. In particular, with the coin suggesting one option over the other, individuals may be moved from an acquisition perspective (choosing something) to a perspective that includes forfeiture thoughts, as they realize what they will forfeit if they follow or decide not to follow the coin's suggestion. The coin flip may thus increase forfeiture thoughts, thereby helping individuals to elaborate more on the decision. Here, we use a decision task with snacks to investigate how flipping a coin affects forfeiture thoughts.

Coin flips in decision making

Flipping a coin as a decision strategy has been studied in a variety of settings, be it with fairness-related decisions (Keren & Teigen, 2010), personal decisions (Levitt, 2020), in interpersonal conflicts such as prosocial requests (Lin & Reich, 2018), or with moral dilemmas (Gordon-Hecker & Olivola, 2019). Choosing randomized outcomes can signal indecisiveness or perceived indifference (Dwenger, Kübler, & Weizsäcker, 2019), yet lotteries can also be effectively used to allocate tasks, resources, or burdens (Elster, 1987), especially when fairness is important (Keren & Teigen, 2010). Previous research with a sample from the general population has shown

that 46% of participants had used a coin flip to make a decision before, indicating that almost every second individual in the sample had first-hand experiences with this approach (Jaffé, Douneva, & Greifeneder, 2020). Moreover, over 20,000 coins were flipped to make various personal decisions in the study by Levitt (2020), showing that a very large number of participants accepted this device as a decision-making strategy in an online experiment.

These investigations have in common that participants flip the coin with the intention to follow its outcome. In contrast, more recent research has investigated consequences of flipping a coin as a "catalyst," meaning that the coin flip does not determine the outcome, but instead influences factors related to the decision-making process (Jaffé, Reutner, & Greifeneder, 2019). The idea is that individuals consider the suggestion of the random decision device, but also their felt reactions towards and thoughts about this suggestion. Consistent with this notion, a coin flip as a catalyst can result in a stronger affective reaction, allowing individuals to know what they want (Jaffé et al., 2019), and in a lower need for further information before making a final decision (Douneva, Jaffé, & Greifeneder, 2019). A recent survey furthermore showed that 82% of participants who had flipped a coin before indicated that they had also used a coin flip and experienced feelings, and 65% indicated that they used a coin flip and then suddenly knew what they really wanted (Jaffé et al., 2020). These numbers again illustrate that many individuals know and apply this strategy in their everyday life.

The impact of coin flips on decision-related thoughts

In this manuscript, we hypothesize that flipping a coin may not only strengthen feelings or reduce information need, but may shift individuals' perspective from an acquisition towards a forfeiture scenario, thereby increasing forfeiture thoughts related to the choice options. Previous research without coin flips suggest that in choice situations, individuals ask themselves which option they prefer (acquisition scenario; see Dhar & Wertenbroch, 2000) and at the same time

neglect opportunity costs (Frederick, Novemsky, Wang, Dhar, & Nowlis, 2009; Greenberg & Spiller, 2016). Intriguingly, adding a coin flip may fundamentally alter the scenario, as the coin suggests of one option over the other and thereby renders salient that choosing this options means forfeiting the other, which resembles a forfeiture scenario (Dhar & Wertenbroch, 2000). As a result, individuals who flip a coin might experience stronger forfeiture thoughts compared to individuals that do not flip a coin. When individuals first consider the coin flip's outcome, these forfeiture thoughts likely focus on the not-suggested option. But once individuals are in a forfeiture mode, forfeiture thoughts may further pertain to the option suggested by the coin, too. This is consistent with Kahneman and Tversky's work (1984) on losses looming larger than gains, as a loss framework makes it more difficult for individuals to give up either one of the choice options (Park, Jun, & Macinnis, 2000). Put differently: Once potential losses (forfeiting one option) have entered the picture, individuals may mentally simulate forfeiting not only the *not-suggested* option, but also the option the coin *has pointed to*, thus increasing the overall level of forfeiture thoughts compared to not flipping a coin.

The previous considerations neglected that individuals may have a pre-existing preference for one option over the other. But preferences often exist, and may range from unnoticeable to strong. If the preference is barely noticeable or unclear, the coin flip may help by strengthening feelings (Jaffé et al., 2019). But even if the preference is strong, flipping a coin may be perceived as helpful, because it may grant "permission" even if other cognitions suggest not to follow through on the preference (e.g., health considerations, but see also Batson, Kobrynowicz, Dinnerstein, Kampf, & Wilson, 1997). Hence, irrespective of the preferences' strength, individuals may opt for a coin flip. The outcome of this coin flip may be congruent or incongruent with individuals' initial preference. From our perspective, the incongruent case appears particularly interesting: If a preference for option A is confronted with an incongruent coin suggestion for option B, forfeiture

thoughts may be particularly strong. We hence assume that forfeiture thoughts will be especially strong when the coin flip's suggestion is incongruent (vs. congruent) with individuals' initial preferences.

Receiving an incongruent suggestion could furthermore feel unsettling for individuals, as it poses the immediate question whether individuals want to reject the suggestion, which could then increase deliberation about the choice options more generally (Sokolova & Krishna, 2016). While a congruent suggestion could result in feelings of validation (see Douneva et al., 2019; Study 2) and confidence in making a good decision, an incongruent suggestion might symbolise loss and potential rejection, triggering the need to check whether the loss associated with forfeiting one option or the other is perceived as smaller than the other, again resulting in an increasing overall level of forfeiture thoughts.

Using a coin flip could not only result in stronger forfeiture thoughts, but also influence acquisition thoughts. On the one hand, it seems likely that the triggered forfeiture and loss perspective could go hand in hand with a decrease in acquisition thoughts. But on the other hand, Dhar and Wertenbroch (2000) point out that a forfeiture setup increases elaboration in general, which could also be associated with an increase in acquisition thoughts. Thus, although flipping a coin could make the choice appear less like an acquisition situation, it is not clear whether this will also result in a decrease in acquisition thoughts.

All in all, flipping a coin may strengthen forfeiture thoughts in regards to both choice options, especially when the suggestion is incongruent versus congruent with an initial preference. This change could be associated with an increase or decrease in acquisition thoughts and allow for a new perspective on the decision problem. By providing this change in perspective, the coin may help individuals to make a decision.

Let's put these general considerations to practice: Imagine having received a voucher for new shoes and having found two pairs, A and B, that you like. However, your voucher will only cover one of the pairs. This scenario can be described as an "acquisition choice" (Dhar & Wertenbroch, 2000): You will acquire one or the other pair, eventually making the choice by considering your preference or by comparing important details, and in the end you will increase the number of shoes you own by one pair. Now imagine that you decide to flip a coin to make the decision, and that the coin suggests taking pair A. This might lead you to focus on pair A ("Do I like the colours, applications, and the sole of pair A?") and could result in feelings of prefactual ownership for pair A (Carmon, Wertenbroch, & Zeelenberg, 2003). Furthermore, the coin's suggestion of pair A may trigger thoughts about forfeiting pair B, as only one pair is covered by the voucher and choosing pair A means losing pair B. Suddenly, you might notice the beautiful details on the back of pair B. These details may have escaped your attention during the acquisition choice (Dhar & Wertenbroch, 2000, show that a forfeiture decision is associated more strongly with loss aversion for hedonic attributes). Do you really want to forfeit pair B and give up on these nice details? Yet, choosing pair B would result in giving up pair A with its nice colour, applications, and sole – is that truly the better option? Ultimately, forfeiture thoughts about both options are much more salient than before flipping the coin.

Now imagine that you had an initial preference for pair B. The coin, however suggests pair A and is therefore incongruent with your preference. You need to ask yourself whether you want to reject the suggestion, which means that you need to elaborate even more: Is pair B really the pair that you like better? Should you not look at pair A again? Forfeiture thoughts can be even stronger here. While having received a congruent suggestion could have validated your preference, this incongruent suggestion might be unsettling and could have planted a seed of doubt whether pair B is really better and worth forfeiting pair A.

Before flipping the coin you might have wondered which pair of shoes you would prefer to acquire: pair A or B. After flipping the coin, forfeiture thoughts came into play. Thinking about whether to follow the coin's suggestion and choosing pair A or rejecting it and choosing pair B could in both cases highlight that you will lose the other pair. On the one hand, you could be less likely to ask yourself which pair you would actually prefer to have, and more likely to think about which pair you would be willing to leave behind. On the other hand, you might want to carefully think through all scenarios and ask yourself additional questions, about which pair of shoes would match better with your other clothes. Flipping a coin could therefore result in decreased or, if elaboration is generally stronger, in increased acquisition thoughts.

Research question and hypotheses

Again the background of the above theorizing, we offer the following set of hypotheses: First, based on our reasoning that using random decision-making aids changes individuals' perspective, we hypothesize that flipping a coin (compared to not flipping a coin; control group) increases forfeiture thoughts for both choice options (Hypothesis 1).

Second, we hypothesize that in situations where individuals indicate an initial preference and the coin suggestion is then incongruent (vs. congruent) with their preference, individuals report stronger forfeiture thoughts (Hypothesis 2).

Third, we hypothesize that flipping a coin (compared to not flipping a coin; control group) could also impact acquisition thoughts for the choice options (Hypothesis 3). The direction of this effect, however, awaits testing: Acquisition thoughts could decrease as forfeiture thoughts are strengthened, whereas higher elaboration associated with the forfeiture decision could be associated with a simultaneous increase in acquisition thoughts, too (see Dhar & Wertenbroch, 2000).

Fourth, we hypothesize that in situations where individuals receive a suggestion of the coin flips that is congruent (vs. incongruent) with their initial preference, individuals feel validated and therefore more confident that they will make a good decision (Hypothesis 4).

Overview of studies

In this registered report, we present two lab studies (total N = 310), which we aim to complement with a third preregistered study to replicate and extend the previous results. In Studies 1 and 2, participants were asked to choose between a small package of Smarties and a Snickers bar[1], from now on referred to as Snack A and Snack B, respectively. Before choosing (but after indicating their preference), participants were shown a coin flip and its outcome suggesting one of the snacks, and then indicated the extent to which they were thinking about forfeiting either option. We assessed forfeiture thoughts before participants made their decision to ensure that these thoughts were not overpowered or obscured by post-decisional cognitions (e.g., dissonance reduction, Festinger, 1962; Shultz & Lepper, 1996; or regret aversion, Zeelenberg, Beattie, Van Der Pligt, & De Vries, 1996). The data can be accessed via the following repository: https://drive.switch.ch/index.php/s/kh3jCA4Giq4W5HS.

Hypothesis 1 receives support from Study 2, while the evidence regarding Hypothesis 2 was mixed across Studies 1 and 2. Against this background, Study 3 is suggested to offer a further test of Hypothesis 2, and further extend the study design to address Hypotheses 3 and 4. Study 3 includes the assessment of both forfeiture and acquisition thoughts as well as confidence in making a good decision. We next report Studies 1 and 2, and then describe a proposed Study 3 that is the key element of this registered report.

Study 1

[1] An informal pretest suggested that participants from the sampled population select the snacks about equally often (i.e., 50:50).

Methods

Participants and design. One hundred fifty-one individuals participated in this study, which was conducted in university buildings using tablet computers. From this sample, we excluded three participants because of their self-indicated participation in previous studies using a similar setup, one indicating explicit reasons why they wanted their data to be excluded, and two self-identifying as not having completed the study carefully (a value of ≤ 4 on a scale from 1 to 9). This resulted in a sample size of 145 participants (84 female, 58 male, 3 no information; M_{age} = 22.26, SD_{age} = 4.08). A sensitivity analysis conducted with G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) suggests that this sample is sufficiently large to detect effect sizes of $f \geq .12$ with standard criteria (α = .05, power = .80, correlation among repeated measures 0.5). Participants received the chosen snack as compensation.

Participants were randomly assigned to one of two between-subjects conditions: For half of the participants, the coin suggested choosing Snack A, for the other half Snack B. As we assessed participants' initial preference within the study (which, based on our informal pretest, we assumed would be evenly distributed across the two snacks), we could derive (in)congruency as independent variable that indicated whether participants had received a suggestion that was congruent versus incongruent with their initial preference.

Materials and procedure. Participants were welcomed to a study on decision making. After providing informed consent, participants learned that the study focused on snacks and that we were interested in their preference between two snacks: a package of Smarties and a Snickers bar. Participants indicated their preference by clicking on one of the two options and were then introduced to the coin flip. We explained that a coin flip can sometimes help making decisions and that we would like them to try flipping a coin in this study. Participants could try the coin flip several times to ensure that they would believe that its outcome was random. The two snack options

were then displayed again, the coin was virtually flipped, and it recommended one option by appearing above Snack A or B. On the next page, participants were then asked about their forfeiture thoughts with respect to the two options: "To what extent did you think about forfeiting the option suggested by the coin [placeholder for either Snack A or B, depending on the condition]?" and "To what extent did you think about forfeiting the option not suggested by the coin [placeholder for either Snack A or B, depending on the condition]?" Answers were recorded on a Likert scale (ranging from 1 = *not at all* to 7 = *very much*). Participants were asked about their demographics and thanked for their participation. Before leaving the room, participants picked one of the two snacks as compensation for their participation (this final choice was not recorded as it was not the focus of this study).

Results

Overall preferences. Seventy-five participants (52%) preferred Snack A, while seventy participants (48%) preferred Snack B. Cross-tabulated with the coin's (random) suggestion, this resulted in a cell distribution of $n = 34$ ($n = 29$) preferring Snack A (B) and receiving a congruent suggestion, and $n = 41$ ($n = 41$) preferring Snack A (B) and receiving an incongruent suggestion.

Analyses. Consistent with Hypothesis 2, we found that participants reported stronger forfeiture thoughts when the coin suggestion was incongruent (vs. congruent) with participants' initial preference, $M_{incongruent} = 3.77$, $SD = 1.18$, $M_{congruent} = 2.66$, $SD = 1.30$, $F(1, 143) = 29.16$, $p < .001$, $\eta^2_p = .17$. To illustrate: If a participant preferred Snack A, but the coin suggested Snack B (i.e., preference and suggestion were incongruent) and not Snack A (i.e., preference and suggestion are congruent), participants reported higher levels of forfeiture thoughts for both the suggested and not-suggested snack (suggested option: $M_{incongruent} = 3.77$, $SD = 2.13$ vs. $M_{congruent} = 2.63$, $SD = 1.93$, $F(1, 143) = 10.92$, $p = .001$, $\eta^2 = .07$; not-suggested option: $M_{incongruent} = 3.78$, $SD = 2.15$ vs. $M_{congruent} = 2.68$, $SD = 2.12$, $F(1, 143) = 9.42$, $p = .003$, $\eta^2 = .06$).

We initially also hypothesized that the coin's suggestion could result in individuals focusing on the suggested option and therefore thinking more about forfeiting the not-suggested versus the suggested option. Contrary to this idea, however, we did not find that participants had more forfeiture thoughts regarding the not-suggested versus the suggested option, $M_{not\text{-}suggested} = 3.30$, $SD = 2.20$, $M_{suggested} = 3.28$, $SD = 2.12$, $t(144) = -0.10$, $p = .922$, $d = 0.01$, paired samples *t*-test.

Discussion

Study 1 investigated whether congruency versus incongruency between initial preference and suggestion impacts forfeiture thoughts. Consistent with Hypothesis 2, the coin flip elicited more forfeiture thoughts for both snack options when its suggestion was incongruent versus congruent with individuals' preferences. While we had started into this project with the additional assumption that participants will report more forfeiture thoughts for the not-suggested versus the suggested option, we found no support for this. While this assumption may be true directly after the coin flip, the temporal resolution of our research methodology is not high enough to tease this initial reaction apart from further forfeiture thoughts that subsequently pertain to both options. As discussed initially, once individuals have entered a forfeiture mode, they may not only mentally simulate forfeiting the not-suggested option, but also the suggested option, thus increasing forfeiture thoughts more generally.

Study 1 provides first insights into when a coin flip increases forfeiture thoughts, but it does not allow testing whether the coin flip generally increases forfeiture thoughts compared to a control group (Hypothesis 1). Moreover, Study 1 does not examine further consequences of flipping a coin. As we introduce the coin flip as a decision-making aid where individuals still stay in charge of their decisions, we would not assume that the coin flip impacts individuals' choices. Unbeknownst of the final choices in Study 1, however, we cannot test this assumption, which is why we assess choices in Study 2. Furthermore, we investigate whether congruency between initial preference

and suggestion may result in feeling validated, while incongruency could lead participants to doubt their initial preferences. Study 2 tests all of these assumptions by incorporating a control group, recording final choices, and by assessing validation, unsettlement, and mood.

Study 2

Methods

Participants and design. An a priori power analysis conducted with G*Power (Faul et al., 2007) assuming a medium effect size of f = .25, α = .05, three groups, and a desired power of .80 resulted in a required sample size of 159 participants. To compensate for potential problems resulting in participant dropout, we added 10% to this number while keeping group sizes balanced, therefore aiming for a sample size of 177 participants. We obtained data from 176 participants, but excluded four participants because of their participation in similar previous studies, two because they indicated explicit reasons why they wanted their data to be excluded, and six because they indicated not carefully completing the study (a value of ≤ 4 on a scale from 1 to 9). The resulting sample comprised 165 participants (109 female, 55 male, 1 no information; M_{age} = 22.80, SD_{age} = 5.29). Participants received the chosen snack as compensation.

Participants were randomly assigned to one of three between-subjects conditions: control without any suggestion (n = 57), coin suggests choosing Snack A (n = 54), or coin suggests choosing Snack B (n = 54).

Materials and procedure. Study 2 was similar to Study 1, except for the following: After having indicated their preference by clicking on the respective snack, participants were introduced to the coin (the control group did not receive any further information at this point). Participants could test the coin several times to ensure that they would believe in its random nature. The two snack options were then displayed again, the coin was virtually flipped, and it recommended one

option by appearing above Snack A or B. In the meantime, control-participants were shown four different hour glasses, each turning for 20 seconds, to equalize the study length in all conditions.

Coin-participants were then asked about their forfeiture thoughts with respect to the two options using the same items as in Study 1, while control-participants answered "To what extent did you think about forfeiting Snack A [placeholder]?" and "To what extent did you think about forfeiting Snack B [placeholder]?" Answers were recorded on a Likert scale (ranging from 1 = *not at all* to 7 = *very much*).

Coin-participants then indicated whether the outcome of the coin had made them feel validated and whether it had made them feel unsettled (both ranging from 1 = *do not agree at all* to 7 = *agree very much*). Finally, all participants were asked to describe their mood on a Likert scale (ranging from 1 = *somewhat negative* to 7 = *somewhat positive*) before finally choosing a snack.

Results

Overall preferences. Ninety-one participants (55%) preferred Snack A, while seventy-four participants (45%) preferred Snack B. This resulted in a cell distribution of n = 25 (n = 20) preferring Snack A (B) and receiving a congruent suggestion, and n = 34 (n = 29) preferring Snack A (B) and receiving an incongruent suggestion.

Final choices. Looking at choice proportions, 91 (55%) participants chose Snack A and 74 (45%) chose Snack B. In the coin (control) condition, 58 (54%) participants chose Snack A and 50 (46%) Snack B, while 33 (58%) participants chose Snack A and 24 (42%) Snack B in the control condition. Choice proportions did not differ between the coin and control groups ($\chi^2(1) = 0.27$, p = .625). When comparing initial preferences with final choices, only six participants chose against their initial preference (five in the coin and one in the control condition, no significant difference between conditions, $\chi^2(1) = 0.88$, p = .432).

Forfeiture thoughts. A t-test comparing coin- with control-participants showed that coin-participants indicated more forfeiture thoughts. The two groups, however, did not differ in terms of mood, see Table 1.

[Table 1]

Looking at differences within the coin group with a repeated measures ANOVA, we descriptively found a tendency that more forfeiture thoughts (averaged across both snacks) were reported when preference and suggestion were incongruent versus congruent, see Table 2. Furthermore, mood and feelings of validation were higher in the congruent compared to the incongruent condition (see Table 2).

[Table 2]

Discussion

Study 2 investigated how flipping a coin impacts forfeiture thoughts compared to not flipping a coin. Although all participants reported forfeiture thoughts to some extent, flipping a coin resulted in stronger forfeiture thoughts, providing support for Hypothesis 1 (see Table 1). These results demonstrate a differential effect of flipping a coin on forfeiture thoughts, which was not present for mood.

As in Study 1, the coin flip descriptively elicits more forfeiture thoughts when it is incongruent versus congruent with participants' preferences. Unlike in Study 1, however, this pattern failed to reach significance here. We therefore test Hypothesis 2 again in Study 3. Study 2 further showed that congruency (vs. incongruency) increased feelings of validation and positive

mood. Increased feelings of validation after congruent (vs. incongruent) suggestions have also been found in previous research on coin flips as catalysts in consumer contexts (Douneva et al., 2019; Study 2), and illustrate one reason why people might experience coin flips as helpful.

Suggested Study 3 (preregistered)

Study 2 supports the hypothesis that using a coin strengthens forfeiture thoughts compared to a no-coin control group (Hypothesis 1). Studies 1 and 2 provide mixed support for Hypothesis 2 that incongruency (vs. congruency) between preference and suggestion increase forfeiture thoughts. We suggest to conduct a preregistered Study 3 that puts Hypothesis 2 to another test and extends the previous studies by investigating further consequences of flipping a coin (see Hypotheses 3 and 4 below).

As we assume that using a coin flip changes individuals' perspective on the decision situation, the coin could increase forfeiture thoughts and *decrease* acquisition thoughts. However, Dhar and Wertenbroch (2000) argue that a forfeiture setup increases elaboration regarding the choice options more generally. This elaboration may not only increase forfeiture thoughts, but also acquisition thoughts. We therefore test for bidirectional differences in acquisition thoughts between control and coin-participants (Hypothesis 3). Based on the results of Study 2, we furthermore hypothesize that receiving a suggestion that is congruent (compared to incongruent) with initial preferences does not only increase mood and feelings of validation (see Study 2), but that these feelings could also increase individuals' confidence in making a good decision (Hypothesis 4).

Methods

Participants and design. An a priori power analysis conducted with G*Power (Faul et al., 2007) assuming a medium effect size of $f = .25$[2], $\alpha = .05$, two groups (as we will only compare two conditions each), and a desired power of .90 resulted in a required sample size of 65

[2] The effect size estimate is based on the results from Studies 1 and 2.

participants per cell[3]. To compensate for potential problems resulting in participant dropout, we add 15%[4] to this number, therefore aiming for a sample size of 75 participants per cell and 450 participants overall. The study will again be conducted in the lab. We will exclude all participants that indicate that they a) participated in a similar study, b) want their data to be excluded, and c) did not carefully completed the study (a value of ≤ 4 on a scale from 1 to 9). Participants will receive the chosen snack as compensation.

Participants will be randomly assigned to one of the following three between-subjects conditions: control without any suggestion, coin suggests choosing Snack A, or coin suggests choosing Snack B (condition). Participants will be furthermore randomly assigned to one of the following two between-subjects conditions: they will be either asked about forfeiture or acquisition thoughts regarding the suggested and not-suggested option (type of thoughts). We chose to assess either forfeiture or acquisition thought to minimise carry-over effects of asking one after the other. Forfeiture or acquisition thoughts serve as dependent variable in the respective type of thoughts conditions.

Materials and procedure. Study 3 will be similar to Study 2 with the following exceptions:

We will again ask for participants' preference for Snack A or B, but they will also have the option to indicate being undecided (scale with options 1 = *Snack A*, 2 = *indecisive*, 3 = *Snack B*).

After indicating their initial preference (and flipping the coin in the coin-condition), half of the participants will be asked about their forfeiture thoughts, while the other half will be asked about acquisition thoughts regarding the two options.

[3] We calculated the required sample size for the repeated measures ANOVA, as (according to G*Power) the required n was slightly higher (65) than for the t-test (64).
[4] We increased the number from 10% (Study 2) to 15% in Study 3, as indecisive participants cannot be included in the statistical analyses that use congruency between preference and suggestion as independent variable (see suggested analysis plan below). To compensate for this fact, we collect more data from the start.

After completing these dependent measures, participants will be asked about feelings of validation and mood (see Study 2). Furthermore, we will assess how confident participants are that they will make a good decision (1 = *not confident at all* to 7 = *completely confident*), before then finally choosing a snack.

Suggested Analysis Plan

Effect of condition on forfeiture thoughts (Hypothesis 1). To test whether flipping a coin compared to not flipping a coin increases forfeiture thoughts regarding Snacks A and B, we will conduct two one-tailed t-tests with condition as independent variable and forfeiture thoughts across both snacks as dependent variable.

Effect of congruency on forfeiture thoughts (Hypothesis 2). We will first categorize participants depending on whether their preference was congruent or incongruent with the suggestion received by the coin flip. Participants who indicated being indecisive will not be included in this analysis. Given our informal pretest (see Footnote 1) and the fact that very few participants chose a snack incongruent to their preference in Study 2, we expect the number of indecisive participants to be very low. With a repeated measures ANOVA, we will then investigate the impact of congruency (independent variable) on forfeiture thoughts (dependent variable). Forfeiture thoughts regarding the suggested versus not-suggested option will serve as repeated measure. If a significant interaction occurs (indicating that congruency vs. incongruency has differential effects on the suggested vs. not-suggested snack), we will use simple main effects to analyse the pattern.

Effects of condition on forfeiture versus acquisition thoughts (Hypothesis 3). To investigate a) whether flipping a coin compared to not flipping a coin decreases or increases acquisition thoughts and b) how forfeiture thoughts are strengthened in relation to acquisition thoughts, we will conduct a repeated measures ANOVA with condition and type of thought as

between-subject and suggested versus not-suggested option as within-subject independent variable. The strength of the respective thoughts will serve as dependent variable. We will investigate main and interaction effects of the between-subjects variables, and will analyse the pattern of the significant interaction by looking at simple main effects. Even if the interaction between condition and type of thought is not significant, we will investigate the simple main effect of condition on acquisition thoughts, which allows to test Hypothesis 3.

Effect of congruency on confidence in decision-making (Hypothesis 4). To test whether congruency versus incongruency increases mood, feelings of validation, and confidence in decision making, we will use one-tailed t-tests with congruency as independent variable and mood, feelings of validation, and confidence as respective dependent variable. Participants who indicate being indecisive cannot be included in this analysis. If we find associations, we will test whether the impact of congruency on confidence is mediated by mood and / or feelings of validation. In an exploratory fashion, we will furthermore investigate effects of receiving a congruent versus incongruent suggestion versus no suggestion (control group) on confidence with a one-way ANOVA.

Effects of indecisiveness on forfeiture and acquisition thoughts. For all participants being indecisive between snacks, we will separately investigate the impact of condition (independent variable) on forfeiture and acquisition thoughts as well confidence in decision making (dependent variable) using two-tailed t-tests. If the sample size is smaller than 20 participants per condition, we will only report the descriptive results and refrain from conducting inferential tests.

Adherence to the coin's suggestion and choice proportions. To investigate participants' adherence to the coin flip's suggestion, we will use a χ^2-test to test for associations between suggestion (Snack A vs. Snack B) and participants' choices (Snack A vs. Snack B). To investigate

whether choice proportions differ between the coin and the control group, we will use a χ^2-test to test for associations between condition (coin vs. control) and choice (Snack A vs. Snack B).

Discussion

[To be added after stage 1 approval]

General Discussion

[To be added after stage 1 approval]

Proposed Timeline

IRB approval has been received for all studies presented in this manuscript. Data for Study 3 can be collected during the upcoming fall 2020 or spring term 2021. We anticipate that data collection will be completed within four to five months during semester times (as soon as government and university policies allow lab-based data collection during the COVID-19 situation). Following the completion of data collection, we plan on finishing and documenting the data analyses and discussions within two months.

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Table 1

Comparison of coin- versus control-participants regarding forfeiture thoughts and mood.

	Coin (n = 108) M (SD)	Control (n = 57) M (SD)	Test for difference	Effect size
Forfeiting Snack A	3.06 (2.06)	2.04 (1.73)	$t(132.46) = 3.36$, $p = .001$	$d = 0.52$
Forfeiting Snack B	3.31 (2.11)	2.37 (2.09)	$t(163) = 2.75$, $p = .007$	$d = 0.45$
Mood	4.69 (1.37)	4.61 (1.65)	$t(163) = 0.30$, $p = .767$	$d = 0.05$

Table 2

Comparison of forfeiture thoughts, mood, and feelings of validation and unsettlement depending on preference and congruency within the coin-condition

	Incongruent (n = 63) M (SD)	Congruent (n = 45) M (SD)	Test for difference	Effect size
Forfeiting Snack A	3.16 (2.10)	2.91 (2.02)	$F(1, 106) = 1.48$, $p = .226$†	$\eta^2_p = .01$
Forfeiting Snack B	3.49 (2.14)	3.07 (2.06)		
Forfeiting sugg. option	3.27 (2.09)	3.11 (2.12)	$F(1, 106) = 1.48$, $p = .226$‡	$\eta^2_p = .01$
Forfeiting not-sugg. option	3.38 (2.17)	2.87 (1.95)		
Mood	4.38 (1.24)	5.11 (1.43)	$t(106) = -2.83$, $p = .006$	$d = 0.55$
Validation	2.22 (1.73)	4.71 (2.00)	$t(106) = -6.92$, $p < .001$	$d = 1.35$
Unsettling	2.29 (1.87)	1.96 (1.48)	$t(104.88) = 1.02$, $p = .308$	$d = 0.19$

† When looking at inferential statistics for each snack separately, the pattern was consistent for both Snack A, $F(1, 106) = 0.38$, $p = .541$, $\eta^2 = .00$, and for Snack B, $F(1, 106) = 1.07$, $p = .303$, $\eta^2 = .01$.

‡ When looking at inferential statistics for each option separately, the pattern was consistent for both the suggested option, $F(1, 106) = 0.15$, $p = .700$, $\eta^2 = .00$, and for the not-suggested option, $F(1, 106) = 1.61$, $p = .208$, $\eta^2 = .01$.

This feels like the right choice: How decision aids may facilitate affect-based valuation

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Abstract

When individuals cannot make up their mind when facing a decision, they sometimes use a random decision-making aid such as a coin flip, a die, or a counting out rhyme to come to a conclusion. These aids are random devices and do not provide informed advice; but they lead to a clear result that decision makers can adopt and follow. Interestingly, prior research suggests that decision aids may have an additional effect, in that they elicit affective reactions. In particular, the person flipping a coin may like or dislike the outcome, and thus decide according to this feeling. We refer to this process as *catalyzing decisions* and to the aid as a *catalyst*. Study 1a shows that a catalyst (a lottery wheel) leads to more affect-driven decisions regarding donation behavior. A follow-up study that included several changes did not replicate these results. Based on the insights from these two studies, we suggest conducting a well-powered preregistered final Study to gain insights into whether a catalyst results in more affect driven decision making in the realm of donations.

Keywords: social cognition, affect, feelings, preferences, decision-making

This feels like the right choice: How decision aids may facilitate affect-based valuation

Individuals are faced with many decisions every day. Some are clear-cut, but for others, individuals are torn between options and remain undecided. To support decision-making, individuals sometimes use aids or procedures that produce random outcomes, such as a coin toss or games like rock-paper-scissors. For instance, Francis Pettygrove and Asa Lovejoy once tossed a one-cent coin to decide on the name of a fledgling site, now called Portland, Oregon. In this case, the coin's outcome determined the decision (Orloff, 2019). Yet, interestingly, individuals do not always end up following the aid's suggestion. For instance, in one of our studies, a participant described a situation in which she wanted to decide whether or not she should attend a party. She decided to flip a coin, and the coin suggested going to the party. The participant then described having an affective reaction–she strongly disliked the outcome–and suddenly knew that she did not want to attend the party. This phenomenon is interesting, as apparently our participant had been undecided before; otherwise she would not have needed the help of a random decision-making aid. However, after using the aid, she was apparently no longer undecided. We refer to this process as *catalyzing decisions* and to the aid as a *catalyst*. We borrow the term catalyst from natural science, as it is an additional component in the decision-making setting that initiates or accelerates the decision process. This manuscript aims to investigate the phenomenon of catalyzing decisions in more detail, to better understand what happens when individuals use a random decision-making aid to finally make a difficult decision.

So far, there is only little research investigating the effects of random decision-making aids. Some research has investigated the willingness to use coin flips (e.g., Keren & Teigen, 2010), some the impact of the coin flip's outcome on subsequent choice behavior and well-being (Levitt,

2016). However, research on the catalyzing phenomenon, in which a coin flip or other decision-making aid does not determine the decision but elicits an affective reaction that then impacts subsequent behavior is scarce (but see Douneva, Jaffé, & Greifeneder, 2019; Jaffé, Reutner, & Greifeneder, 2019). Our manuscript investigates this missing link to better understand the impact of decision-making aids on individuals' judgments and decisions.

Theoretical considerations on the catalyzing phenomenon

On the level of psychological processes, we argue that the coin flip renders the decision quasi-factual, that is, as if decided. Out of all possible outcomes, a choice has been made, which is not binding, but nevertheless can feel very real and has come closer. As a result of this reduction in hypotheticality and therefore psychological distance (Liberman & Trope, 2008; Trope & Liberman, 2010), decision options may be imagined more vividly and with more detail, and elicit stronger affective reactions. For instance, prior research has shown that closeness leads to stronger affective reactions when reading an embarrassing self-disclosure (Williams & Bargh, 2008). Addressing the same notion from the opposite perspective (distance leads to less vividness), Bandura (1999) pointed out that individuals distance themselves from atrocities or other actions with very severe consequences by reducing vividness by, for example, using euphemisms or dehumanizing measures.

Consistent with the notion that a random decision aid may reduce psychological distance, which increases vividness and affective reactions, prior research on consumer choices has documented that flipping a coin or rolling a die lead to more vividness and more feelings of satisfaction/dissatisfaction (depending on the outcome; Jaffé et al., 2019). Stronger affect, in turn, is likely to be more salient and thus stands a higher chance of influencing judgment and

decision-making (Albarracín & Kumkale, 2003; Loewenstein & Lerner, 2003; Raghubir & Menon, 2005). A plethora of findings suggest that feelings are used in decision-making, and may even constitute a critical ingredient (Bechara, Damasio, Tranel, & Damasio, 1997; Clore, 1994; Clore, Gasper, & Garvin, 2001; Kahneman, 2011; Schwarz, 2012), particularly if salient (Albarracín & Kumkale, 2003; Pham, 1998; Exp. 1). The feeling-as-information account, for example, holds that feelings, just like facts and figures, can be used as information to make decisions (e.g., Pham, 2008; Schwarz, 1990). For instance, individuals might ask themselves *how-do-I-feel-about-it?* (similar to the situation where one assesses one's own satisfaction with the outcome of the coin toss) and then rely on this feeling to arrive at a decision ("I feel so good about the decision object, I seem to like it", Pham, 2008).

In support of this chain-of-arguments, for instance, Hsee and Rottenstreich (2004) showed that providing more vivid information, such as pictures compared to text, leads to judgments that are more affect-driven. Additionally, Greene and colleagues (2001) argue that judgments in moral dilemmas differ depending on the potential to engage individuals' emotions. When dilemmas ae described as more "up close and personal" (p. 2106), they become more emotionally engaging, which then results in faster acceptance of deontological compared to consequentialist solutions, meaning that emotional reactions drive more deontological responses (Greene, 2007). Both empirical contributions thus illustrate that vividness may result in a stronger reliance on feelings in judgments and decisions. This influence is ex ante neither good nor bad, and governed by highly flexible and adaptive processes (e.g., Huntsinger, Isbell, & Clore, 2014). In the context of the present research, these results suggest that random decision

devices may not only strengthen feelings, but potentially increase the vividness and affect of downstream decision making.

To summarize, decision aids that produce random outcomes may render the decision quasi-factual, that is, as if decided, which reduces psychological distance. As a result, feelings are strengthened and their impact on judgments is increased. We refer to this process as catalyzing, as the decision aid psychologically initiated or accelerated the decision process. Against this background, we hypothesize that participants using a catalyst (catalyst-participants) compared to participants without a catalyst (control-participants) show judgment and decision-making behavior that is indicative of reliance on feelings.

The present studies

To test the hypothesis that decision aids such as flipping a coin may increase the impact of feelings in decision processes, we selected a paradigm introduced by Hsee and Rottenstreich (2004) that allows whether a decision outcome is reached via rational calculation or affect-based valuation to be differentiated (see also Hsee, Rottenstreich, & Xiao, 2005). In particular, when asked how much a specific object is worth, individuals can look at the facts and figures describing the object (a more *rational* approach). But they can also assess their feelings towards the object (*How-do-I-feel-about-it?*). To differentiate these two pathways, Hsee and Rottenstreich (2004) asked participants how much they would donate for an endangered animal (e.g., a panda). Taking the rational approach, individuals may look at the quantitative aspect or *scope* and consider how many pandas they are being asked to donate money for. In this case they determine *value by calculation*, and four pandas should receive a larger donation than one panda. Alternatively, taking the affect-based approach, individuals may consult their feelings towards the target – how

much do they like pandas? Here they determine *value by affect* and may therefore help irrespective of the number of endangered animals.

Hsee and Rottenstreich (2004) provided participants with either vivid (pictures) or abstract (dots) information about the number of endangered pandas. They observed valuation-by-affect for pictures of pandas (vivid), but valuation-by-calculation when pandas were represented as dots in a table (abstract). Put differently, picture-participants donated a similar amount of money irrespective of the number of endangered animals, whereas dot-participants donated more for four compared to one panda.

Our studies mimic Hsee and Rottenstreich's (2004) abstract dot-condition to show valuation-by-calculation in the control group. Because catalysts strengthen feelings as shown in work by Jaffé and colleagues (2019), we reasoned that catalyst-participants are likely to show valuation-by-affect. As a result, catalyst-participants should display a lower sensitivity towards numbers (i.e., a smaller difference between donation amounts for one or four animals) compared to control-participants, just as Hsee and Rottenstreich's (2004) picture group did.

Throughout all studies, all measures, manipulations, and exclusions in the studies are disclosed.

Study 1a

Building on Hsee and Rottenstreich's (2004) abstract dot-condition, we provided participants with information on four endangered animals for which they could indicate their willingness to donate money. To build a catalyst-condition, we then introduced a random device, in this case, a lottery wheel. We opted for a lottery wheel (instead of a coin), as the lottery wheel

allows continuous suggestions to be made and not just binary ones. Catalyst-participants were asked to spin the lottery wheel before donating, and to consider the outcome.

We implemented two control conditions. In one control condition, participants were also shown the lottery wheel, but were just asked to remember the suggested number (control-wheel). In the other control condition, participants were not shown a lottery wheel at all (standard-control). This design allowed us to test whether introducing a random device that is associated with the decision (catalyst) would lead to more affect-driven decisions about donations for endangered animals compared to having no device (standard-control) or a random device that has no bearing on the decision (control-wheel).

Study 1a followed a preliminary study that we conducted mainly among psychology students or individuals interested in psychological research. Analyses of the responses from a preliminary study revealed that about one third of the participants spontaneously associated the lottery wheel with anchoring effects, reflecting that Tversky and Kahneman's (1974) seminal findings on the anchoring heuristic using a lottery wheel are comprehensively taught and well-remembered by psychology students. As existing assumptions (even if wrong) about the study background and associated second-order conditions may severely alter results, we report this preliminary study in Appendix B, but refrain from interpreting the findings. Instead, we focus on Study 1a, which was conducted with a more general sample outside of the university context.

Method

Participants and design. The study was advertised as a study on *Endangered Animals* on the German online platform Workhub and took about five minutes to complete. Not knowing the effect sizes in this combination of paradigms, we aimed for 40 participants per cell, with the

awareness that this was only an approximation. Two hundred and twenty-six individuals participated (139 male, 84 females, 1 other, 2 no answer; M_{age} = 32.76 years, SD_{age} = 12.17). A sensitivity analysis conducted with G*Power (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007) indicated that this setup (N = 226, α = .05, power = .80, correlation among repeated measures 0.5) would allow minimum effect sizes of f = 0.19 to be detected. Participants received 0.60 € (approximately US$ 0.60) as compensation.

We used a 3 (condition: catalyst vs. control-wheel vs. standard-control) x 2 (scope: one vs. four endangered animals) x 4 (animals: pandas vs. dolphins vs. elephants vs. polar foxes) mixed design, with the factor animals as repeated measures. The dependent variable was the amount of money donated for the animals. As the outcome is a continuous dependent variable and not a binary one, we used a lottery wheel with 51 options as the catalyst (the number referred to possible donations between 0 and 50€).

Materials and procedure. Participants received a link to the online study, gave informed consent, and learned from the instructions that we were interested in donation behavior regarding different animals. Before participants started, catalyst- and control-wheel participants learned about a critical ingredient of the study: a lottery wheel. Participants learned that they would be asked to turn the wheel before making a decision. Catalyst-participants were told that the resulting number might elicit a helpful gut feeling. Control-wheel participants were told that they would need to remember the resulting number as we would be asking them about it later on. Standard-control participants did not see a lottery wheel and simply learned that some pages might take some time to load and were asked to be patient (the loading time was fixed to the time that the other groups needed to turn the lottery wheel). All participants were informed that

we were interested in their donation behavior and would be asking them how much they would donate for one (four) exemplar(s) of different endangered species.

Subsequently, we asked participants to imagine that a team from the local zoological institute discovered some exemplars of an endangered species in a remote region. Half of the participants were then offered the possibility to donate for one animal, the other half of participants for four animals. Remodeling Hsee and Rottenstreich's (2004) valuation-by-calculation condition, the number of animals was indicated by either one or four dots in a table. Catalyst and control-wheel-participants then turned the wheel and learned about the outcomes. Catalyst-participants were told that they may use this number as a recommendation and to check their gut feeling. Control-wheel-participants were asked to memorize the number. Standard control-participants simply saw a blank screen for 3 seconds (the time it took the other groups to turn the wheel). All participants then saw the table with the animal type and number of endangered animals again and were asked to indicate how much they would donate on a scale from 0€ to 50€ (in 5€ intervals). Control-wheel-participants were asked to enter the number that they had memorized before in an open text box.

The first scenario contained pandas, the second dolphins, the third elephants, and the fourth polar foxes. At the end of the study, control-wheel-participants learned how many numbers had been memorized correctly, and we collected basic demographic information (sex, age, German language proficiency, and education). We also asked about actual donation behavior for charities in general and for animals in specific in the last 12 months. Participants were thanked and were offered monetary compensation.

Results

Participants donated between 0 and 50€ for the different animals, with a grand mean of 14.46€ (*SD* = 11.65). To test the hypothesis, we calculated a 3 (condition: catalyst vs. control-wheel vs. standard-control) x 2 (scope: one vs. four animals) x 4 (animals) mixed ANOVA with condition and scope as between factors and animals as within factor. Donation behavior was the dependent variable. We observed a significant main effect for animals, $F(3, 660) = 2.70$, $p = .045$, $\eta^2 = .01$, indicating that donation behavior differed for different animals. In particular, mean donations for pandas were 14.71€ (*SD* = 12.80), for dolphins 14.94€ (*SD* = 12.91), for elephants 14.67€ (SD = 12.66), and for polar foxes 13.52€ (*SD* = 12.42; see appendix A for further details). We also observed a significant main effect for scope, $F(1, 220) = 7.42$, $p = .007$, $\eta^2 = .03$, showing that overall participants donated more for four animals than for one animal.

Crucially, the predicted interaction between condition and scope was observed, $F(2, 220) = 3.33$, $p = .038$, $\eta^2 = .03$, suggesting that the conditions differed in their behavior in regards to scope (see Figure 1). Replicating Hsee and Rottenstreich's (2004) valuation-by-calculation results, both control-wheel and standard-control-participants donated more money for four compared to one animal, $F(1, 220) = 10.21$, $p = .002$, $\eta^2 = .04$ and $F(1, 220) = 3.45$, $p = .065$, $\eta^2 = .02$, respectively. In contrast, catalyst-participants were less sensitive to scope, and donated a similar amount of money irrespective of the number of endangered exemplars, $F < 1$. The catalyst-group thus conceptually mimics Hsee and Rottenstreich's (2004) valuation-by-affect group. All other main or interaction effects were not significant, all *F*s < 2.60.

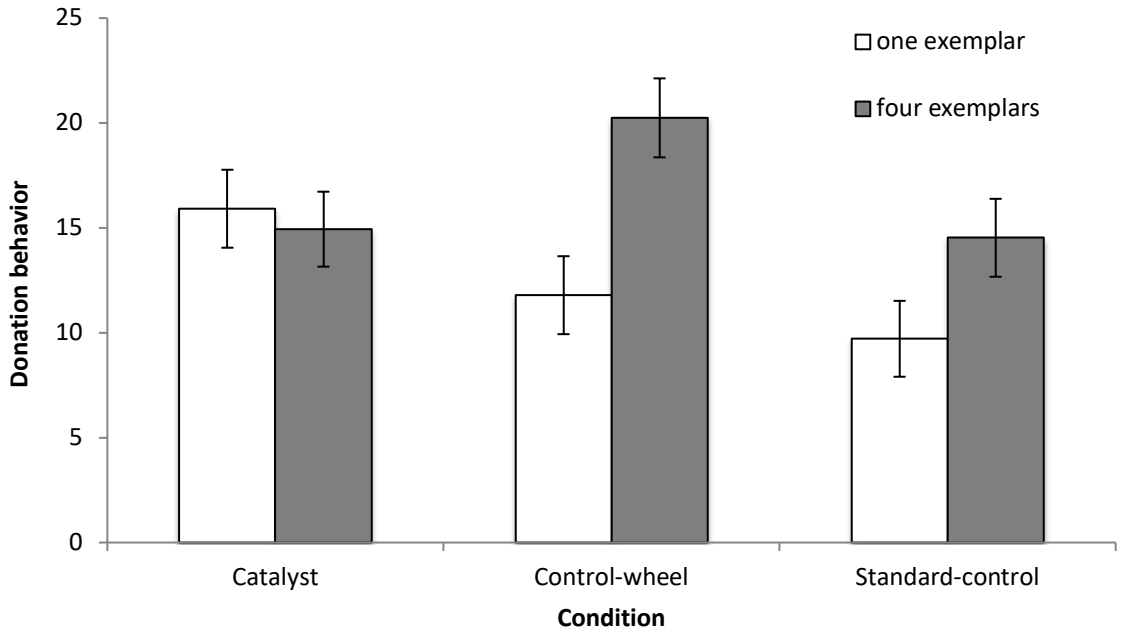

Figure 1. Donation behavior (in €) as a function of condition and scope (error bars reflect standard errors).

Further analyses. Because the lottery wheel provides a plausible numeric suggestion, the existence of anchoring effects appears conceivable (consistent with Tversky & Kahneman, 1974). To test this possibility, we relied on a two-pronged approach. First, to minimize anchoring effects ex ante, we fixed the outcome of the lottery to a constant equal for catalyst and control-wheel-participants (33 for pandas, 15 for dolphins, 23 for elephants, 29 for polar foxes). This fixed number, however, does not allow us to calculate correlations between outcome and donation. We therefore inspected the above-reported ANOVA from an anchoring perspective as a second step. Standard-control-participants were not provided with any *anchor* and therefore should differ in their donation behavior from both other groups, if anchoring occurred. We observed a non-significant main effect for condition, $F(2, 220) = 2.60$, $p = .077$, $\eta^2 = .02$. Post-hoc comparisons with Tukey HSD revealed a non-significant difference between the catalyst and standard-control,

p = .161, and the control-wheel and standard-control, p = .091. Hence, by tendency, standard-control-participants donated less money than catalyst- and standard-control-participants. Irrespective of this, however, our main result is that catalyst-participants were not affected by scope, which appears incompatible with an anchoring effect.

Readers may be further interested in the effects of donation behavior habits. To investigate, we included participants' general and animal-specific donation habits as covariates in the above described analysis. We followed the procedure suggested by Muller, Yzerbyt, and Judd (2008) and checked for redundancy between the covariate and the independent variables by calculating the same mixed ANOVA with condition and scope as between factors and animals as within factor, but donation habits in general and specifically for animals as dependent variables (Yzerbyt, Muller, & Judd, 2004). The analysis did not yield significant results (all Fs < 1.21), indicating no redundancy between the covariate and the independent variables. Therefore, we calculated the mixed ANOVA with condition and scope as between factors and animals as a within factor, but included reported donation habits in general and specifically for animals as two covariates. All main and interaction effects remained significant and effect sizes were of a similar magnitude.

Discussion

Study 1a was designed to demonstrate that individuals relying on catalysts use feelings to determine value. To this end, we relied on Hsee and Rottenstreich's (2004) abstract (dot) condition, in which participants determine value by calculation. We reasoned that catalyst-participants would be likely to show valuation-by-affect even in the abstract (dot) condition. As a result, catalyst-participants should display a lower sensitivity towards numbers (i.e., a smaller

difference between donation amounts for one or four animals) compared to control groups. The results support this, as catalyst-participants donated a similar amount of money irrespective of the number of endangered animals, whereas participants in both control groups were sensitive to scope, that is, donated more money for four compared to one animal. We conclude from these results that catalysts may not only strengthen feelings (Jaffé et al., 2019), but that these feelings may influence decision-making.

Study 1b

Intrigued by the previous findings, we decided to conduct a replication of Study 1a on a different sampling platform and implemented three changes to the study design. First, as the two control groups in Study 1a showed the same pattern of results, we decided to only use the control-wheel condition in the replication study and not the standard-control group. Second, although the catalyst-instructions stating that the resulting number might elicit a helpful gut feeling is consistent with our process assumption, it likely increased the feeling's salience by itself. A more stringent test of the hypothesis omits this allusion to feelings, so that the decision aid can act as a catalyst by strengthening feelings. We therefore changed the instructions in the catalyst group and explained that the resulting number may serve as an aid for the decision. Third, we aimed to make the lottery wheel more realistic and let it result in a random number between 5 and 25 (+/- 10 from the grand mean of donation behavior in Study 1a). Each participant therefore saw a different number, in order for us to be better able to investigate potential anchoring effects by calculating correlations between the random suggestion and participants' donations.

Methods

Participants and design. The study was advertised as a study on *Donations for Animals* on the German online platform clickworker and took about four minutes to complete. We aimed to collect data from 160 participants. One hundred and fifty-six individuals participated (83 male, 71 females, 1 other, 1 no answer; M_{age} = 35.13 years, SD_{age} = 12.29). A sensitivity analysis calculated with G*Power (Faul et al., 2007) showed that this sample size allowed for the detection of effect sizes of f = 0.21 (small to medium) with standard criteria (alpha = 0.05, power = 0.80, correlation among repeated measures 0.5). Participants received 0.60 € (approximately US$ 0.60) as compensation.

We used a 2 (condition: catalyst vs. control-wheel) x 2 (scope: one vs. four endangered animals) x 4 (animals: pandas vs. dolphins vs. elephants vs. polar foxes) mixed design, with the factor animals as repeated measures. The dependent variable was the amount of money donated for the animals. As the outcome is a continuous dependent variable and not a binary one, we used a lottery wheel with 51 options (the number referred to possible donations between 0 and 50€) as the catalyst.

Materials and procedure. The materials and procedure were identical to Study 1a, except for the three changes detailed above: There was no standard-control group; no reference to consulting gut feelings was made in the catalyst-condition, and the outcome of the lottery wheel was not pre-fixed but could freely range from 5 to 25.

Results

Participants donated between 0 and 50€ for the different animals, with a grand mean of 14.78€ (SD = 11.97). To test the hypothesis, we calculated a 2 (condition: catalyst vs. control-wheel) x 2 (scope: one vs. four animals) x 4 (animals) mixed ANOVA with condition and scope as

between factors and animals as a within factor. Donation behavior was the dependent variable. We observed a significant main effect for animals, $F(2.57, 389.95) = 4.95$, $p = .002$, $\eta^2 = .03$, indicating that donation behavior differed for different animals. In particular, mean donations for pandas were 14.01€ (*SD* = 12.49), for dolphins 14.97€ (*SD* = 13.35), for elephants 16.25€ (SD = 13.28), and for polar foxes 13.91€ (*SD* = 13.14). We also observed a significant main effect for scope, $F(1, 152) = 18.65$, $p < .001$, $\eta^2 = .11$, showing that, overall, participants donated more for four animals than for one animal.

However, we did not find a main effect for condition, $F(1, 152) = 0.06$, $p = .804$, $\eta^2 = .00$, or any support for the predicted interaction between condition and scope, $F(1, 152) = 0.02$, $p = .900$, $\eta^2 = .00$. On several levels, the results from Study 1b therefore do not replicate the results from Study 1a. All other interaction effects were also not significant, all *F*s < 2.08.

Further analyses. We again inspected potential anchoring effects. We calculated correlations between the donation for every animal and the random number that the lottery wheel showed. All correlations were not significant ($r(154) = .10$, $p = .211$ for pandas; $r(154) = .09$, $p = .248$ for dolphins; $r(154) = .10$, $p = .204$ for elephants; $r(154) = .10$, $p = .236$ for polar foxes). This pattern did not change when only looking at the catalyst condition. We therefore do not find support for anchoring in our study.

Discussion

Study 1b does not support our hypothesis that using a catalyst results in more affect-driven decision making. Instead, all participants showed donation behavior that mirrors the valuation by calculation behavior in the original study (Hsee & Rottenstreich, 2004), as

participants donated more for four than for one animal. Study 1b however replicates that anchoring does not provide a consistent explanation for the observed data pattern.

The results from Study 1b are puzzling, as the results from Study 1a point in a very different direction. This leaves us in a situation where one study speaks for the suggested hypothesis and the other against it. We therefore conclude that a third and well-powered study is required to test the presence and stability of effects of a catalyst on decision behavior.

Study 2

Based on the contradicting results from Studies 1a and 1b, we here suggest conducting a third well-powered study to test our hypothesis in a preregistered setup. When reevaluating the changes introduced between Studies 1a and 1b, some appear detrimental in retrospect. First, to avoid threats to internal validity in the catalyst-introduction to Study 1b, we cut down the original text and deleted all parts alluding to gut feelings. The result was a rather abstract instructions that individuals may not have found helpful. We therefore suggest wording the catalyst-instructions for Study 2 in a more concrete way, while still refraining from any mention of gut feelings. Second, allowing the lottery wheel to randomly suggest a number was important to test for anchoring effects, and Study 1b fulfills this purpose. The downside of this procedure is that participants receive different suggestions that might be more or less realistic, resulting in additional (error) variance within our manipulations. Because decision aids in real life usually suggest realistic options (consider a coin toss where heads is assigned to one plausible option and tails to the other) and to avoid error variance, we suggest returning to the procedure of Study 1a, where the lottery outcome was fixed to a constant equal for catalyst and control-wheel-participants (33 for pandas, 15 for dolphins, 23 for elephants, 29 for polar fixes).

Methods

Study 2 will be advertised as a study on *Endangered Animals* on the German online platform clickworker. Based on the effect sizes from Study 1a ($\eta^2 = .03$, meaning $d = .35$), we will aim to collect data to be able to detect small effect sizes ($f = 0.10$) with a power of .90. Using G*Power (Faul et al., 2007), a sample size of 892 participants is required. We will increase this number by 10% while keeping cell sizes balanced, to account for potential drop outs, participants that ask for the exclusion of their data, or participants that need to be excluded based on the criteria described below. This will result in an aspired sample size of 984 participants. Participants will receive compensation of 0.60 € (approximately US$ 0.60) for an anticipated participation time of 4 minutes.

The design will be identical to Study 1b, using a 2 (condition: catalyst vs. control-wheel) x 2 (scope: one vs. four endangered animals) x 4 (animals: pandas vs. dolphins vs. elephants vs. polar foxes) mixed design, with the factor animals as repeated measures. The dependent variable will be the amount of money donated for the animals.

Materials and procedure. The materials and procedure are identical to Study 1a, except for three changes. First, as in Study 1b, we will focus on the catalyst-group and the wheel-control group and will not include a standard-control group. Second, we will adjust the instructions in the catalyst group. We will inform participants that they should look at the outcome of the lottery wheel as a helpful suggestion to better investigate how much they would themselves like to donate. They will be told that they are not bound to the suggestion and can make their own choice. More concretely, the instructions will be:

"Before starting the study, we would like to introduce you to an important component of the study: a lottery wheel. Some people find it is easier to come to a decision when consulting a random device. To this end they can flip a coin or turn a lottery wheel and then observe their reactions to the outcome. Of course, the lottery wheel's suggestion is not binding.

You will be working on several decision scenarios. Each time, we will ask you to spin the lottery wheel. Please take a moment to consider and think about the lottery wheel's suggestion, before you indicate your own decision: that is, how much you would be willing to donate."

The original German instructions can be found in Appendix C. These instructions will allow us to avoid mentioning the concept of gut feelings as in Study 1a, but at the same time be more concrete than Study 1b. In the control condition, we will simply introduce the lottery wheel as an important component of the study and ask participants to memorize the suggested number, before they indicate how much they would be willing to donate.

Last but not least, we will fix the lottery wheel to the same numbers as in Study 1a to avoid implausible suggestions. As minor changes, we will exclude the question on education and mother tongue (if not German). To control for people with knowledge about the anchoring or numerical priming phenomenon (see preliminary study in Appendix B), we will ask participants about their conceptions of the investigated research question. We will further assess whether participants had been or are currently enrolled in a university course in either psychology or economics. Both questions will be placed at the end of the questionnaire.

Suggested Analyses

From the resulting sample we will exclude all participants that did not complete the study, mention a reason to exclude their data as a reply to the respective question in the questionnaire,

who name anchoring or numeric priming as the research question either verbatim or in an obvious paraphrase, or who indicate being enrolled or having completed studies in psychology or economics. The following analyses will be conducted with the remaining sample.

To test the hypotheses, we will calculate a 2 (condition: catalyst vs. control-wheel) x 2 (scope: one vs. four animals) x 4 (animals) mixed ANOVA with condition and scope as between factors and animals as a within factor. Donation behavior will serve as the dependent variable. If results yield a significant interaction, we will investigate the pattern with the help of simple main effects analyses.

We will also investigate if the pattern of results changes when excluding participants that, in the control condition, did not remember all numbers of the lottery wheel correctly. We will also investigate how results may change when including past donation behavior as a covariate in the ANOVA.

Results

[To be updated after data collection]

Discussion

[To be updated after data collection]

General Discussion

[To be updated after data collection]

Acknowledgements

We thank [to be updated] and Jonas [to be updated] for their help with creating the study materials.

Appendices

Appendix A: Descriptive statistics from Study 1a.

Means and standard deviations of donation behavior (in €), separately for condition, scope and animals.

		Catalyst		Control-wheel		Standard-control	
Animals	Scope	*M*	*SD*	*M*	*SD*	*M*	*SD*
Panda	1	17.16	15.12	12.16	12.45	9.615	9.28
	4	14.88	10.41	20.56	14.58	14.32	12.26
Dolphin	1	16.35	13.26	13.24	13.65	9.74	10.82
	4	14.88	10.77	19.72	13.25	16.08	14.20
Elephant	1	15.27	11.72	11.62	11.37	11.54	12.52
	4	15.00	11.04	20.56	13.46	14.32	14.35
Polar fox	1	14.87	12.61	10.14	11.58	7.95	7.84
	4	15.00	11.15	20.14	13.23	13.38	14.38

Appendix B: Preliminary Study

Study 1a builds on previous work that differentiates affect-driven decisions from a calculation-driven approach. Participants were introduced to four endangered animals for which they could indicate their willingness to donate money after spinning a lottery wheel.

Method

Participants and design. The study was advertised as a study on *Endangered Animals* on the German platform "Forschung Erleben", which informs the interested public about new psychological research. Furthermore, Forschung Erleben recruits students to join their mailing list in order to learn about but also participate in psychological research. Members of this mailing list thus generally participate because they are interested in psychological research.

We aimed for 40 participants per cell. One hundred and seventy-three individuals participated (47 male, 126 females, 2 other; M_{age} = 27.75 years, SD_{age} = 8.06). A sensitivity analysis conducted with G*Power (Faul et al., 2009, 2007) indicated that this setup (N = 226, α = .05, power = .80, correlation among repeated measures 0.5) would allow minimum effect sizes of f = 0.11 to be detected. Participants were able to participate in a lottery for vouchers for online retailers as compensation.

We used a 2 (condition: catalyst vs. control-wheel) x 2 (scope: one vs. four endangered animals) x 4 (animals: pandas vs. dolphins vs. elephants vs. polar foxes) mixed design, with the factor animals as repeated measures. The dependent variable was the amount of money donated for the animals. As the outcome is a continuous dependent variable and not a binary one, we used a lottery wheel with 51 options as the catalyst (the number referred to possible donations between 0 and 50€).

Materials and procedure. The materials and procedure were identical to Study 1a, except for a reduced design that only included the catalyst and the control-wheel condition. The standard-control condition was omitted in the preliminary study.

Results

Participants donated between 0 and 50€ for the different animals, with a grand mean of 19.78€ (*SD* = 14.88). To test the hypothesis, we calculated a 2 (condition: catalyst vs. control-wheel vs. standard-control) x 2 (scope: one vs. four animals) x 4 (animals) mixed ANOVA with condition and scope as between factors and animals as a within factor. Donation behavior was the dependent variable. We observed a significant main effect for animals, $F(2.68, 453.46) = 3.70$, $p = .015$, $\eta^2 = .02$, indicating that donation behavior differed for different animals. In particular, mean donations for pandas were 19.42€ (*SD* = 15.97), for dolphins 19.83€ (*SD* = 16.04), for elephants 21.07€ (SD = 16.39), and for polar foxes 18.82€ (*SD* = 15.33). We also observed a significant main effect for scope, $F(1, 169) = 19.06$, $p < .001$, $\eta^2 = .10$, showing that, overall, participants donated more for four animals than for one animal, *M* = 23.18, *SD* = 16.60, and *M* = 14.60, *SD* = 12.74; respectively.

An interaction between condition and scope was observed, $F(1, 169) = 9.59$, $p = .002$, $\eta^2 = .05$, suggesting that the conditions differed in their behavior in regards to scope. However, opposing our predictions, the control-wheel-participants were less sensitive to scope compared to the catalyst participants. While catalyst participants donated more money for four compared to one animal, *M* = 29.05, *SD* = 16.75; *M* = 12.98, *SD* = 10.76; $F(1, 169) = 26.53$, $p < .001$, $\eta^2 = .14$, this difference was not significant for control-participants, *M* = 21.32, *SD* = 15.32; *M* = 18.59,

SD = 12.87; $F(1, 169) = 0.85$, $p = .358$, $\eta^2 = .01$, respectively. All other main or interaction effects were not significant, all *F*s < 1.

Further analyses and discussion. We analyzed participants' spontaneous comments about what they considered the study's purpose to be. As described above, our sample consists of individuals interested in psychological research. From our demographic variables we can see that 161 out of 173 participants had finished their A-levels or even completed a university degree. 40.5% of our sample spontaneously mentioned some version of anchoring or numeric priming (impact of the lottery wheel on their donation behavior) as the study's purpose. Given that this was an open format response box, it is unclear how many more participants had similar thoughts but did not spontaneously mention these. These suspicions (even if wrong) might lead to second-order cognitions such as reactance (e.g., not wanting to follow the instructions and being especially critical in the catalyst-condition) or supportive behavior (e.g., trying to follow the instructions really well), both of which would interfere with a critical test of our hypothesis and might result in a more calculation driven approach, especially in the catalyst-condition. We are therefore uncertain about the interpretation of these results and identify the need to investigate our research question with participants less knowledgeable about psychological research.

Appendix C: Original Instructions for Preregistered Study 2

«Bevor Sie beginnen, möchten wir Ihnen einen wichtigen Teil der Studie vorstellen: Ein Glücksrad. Manchen Menschen fällt es leichter eine Entscheidung zu finden, wenn Sie den Zufall zu Rate ziehen. Dazu können sie zum Beispiel eine Münze werfen oder ein Glücksrad drehen, und dann ihre Reaktion darauf beobachten. Natürlich ist der Vorschlag des Glücksrads nicht bindend.

Sie werden verschiedene Entscheidungsszenarien sehen. Vor jeder Entscheidung werden wir Sie bitten, das Glücksrad zu drehen. Bitte nehmen Sie sich einen Moment Zeit, um über den Vorschlag des Glücksrads nachzudenken, bevor Sie dann Ihre eigene Entscheidung angeben, das heisst: wieviel Sie spenden möchten.»

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